

# Atkinson Review: Final report

---

Measurement of Government Output and  
Productivity for the National Accounts

© Crown copyright 2005

Published with the permission of the Controller of Her Majesty's Stationery Office (HMSO).

This publication, excluding logos, may be reproduced free of charge, in any format or medium for research or private study subject to it being reproduced accurately and not used in a misleading context. The material must be acknowledged as crown copyright and the title of the publication specified. This publication can also be accessed at the National Statistics website: [www.statistics.gov.uk](http://www.statistics.gov.uk)

For any other use of this material please apply for a free Click-Use Licence on the HMSO website:

[www.hmso.gov.uk/click-use-home.htm](http://www.hmso.gov.uk/click-use-home.htm)

or write to HMSO at The Licensing Division, St Clements House, 2-16 Colegate, Norwich, NR3 1BQ

Fax: 01603 723000 or e-mail: [hmsolicensing@cabinetoffice.x.gsi.gov.uk](mailto:hmsolicensing@cabinetoffice.x.gsi.gov.uk)

First published 2005 by

PALGRAVE MACMILLAN

Houndmills, Basingstoke, Hampshire RG21 6XS and

175 Fifth Avenue, New York, NY 10010

Companies and representatives throughout the world.

PALGRAVE MACMILLAN is the global academic imprint of the Palgrave Macmillan division of St Martin's Press, LLC and of Palgrave Macmillan Ltd. Macmillan® is a registered trademark in the United States, United Kingdom and other countries. Palgrave is a registered trademark in the European Union and other countries.

ISBN 1-4039-9646-6

This book is printed on paper suitable for recycling and made from fully managed and sustained forest sources.

Printed and bound in Great Britain by

Ashford Colour Press Ltd, Gosport.

# Contents

---

|   | <b>Page<br/>numbers</b> |
|---|-------------------------|
| Preface   | vii                     |
| <b>1. Introduction</b>  | <b>1</b>                |
| Terms of Reference  | 1                       |
| Actions and Action Plans  | 2                       |
| Contents of Report  | 3                       |
| The Functions and Limits of National Accounts   | 4                       |
| Conclusions   | 10                      |
| <b>2. Measuring Government Output in the UK</b>   | <b>11</b>               |
| Conventional Approach to Measuring Government Output  | 12                      |
| Developments over Time in ONS (and CSO) Practice  | 14                      |
| Technological and Institutional Change in the Public Sector   | 18                      |
| Measures of Government Output, Inputs and Productivity: The Key Elements  | 19                      |
| Inputs  | 20                      |
| Data Sources  | 21                      |
| Resource Costs of Statistics  | 22                      |
| Conclusions   | 25                      |
| <b>3. The International Context</b>   | <b>27</b>               |
| International Guidelines: UN SNA and OECD Productivity Manual   | 27                      |
| OECD Productivity Manual  | 29                      |
| European System of Accounts (ESA 95) and the Eurostat Handbook of Price and<br>Volume Measures in National Accounts | 30                      |
| Progress of Other Countries in Measuring Government Output  | 33                      |
| Summary   | 34                      |
| <b>4. Methodology for the Future: The Principles</b>  | <b>35</b>               |
| Parallel with the Private Sector  | 36                      |
| The Concept of Added Value in Public Services: Individual Services  | 39                      |
| The Concept of Added Value in Public Services: Collective Services  | 42                      |
| Complementarity between Public and Private Output   | 43                      |
| Coverage of Output Indicators   | 47                      |
| Geographical Coverage   | 48                      |
| Inputs  | 48                      |
| Deflators   | 50                      |

|           |  |            |
|-----------|--|------------|
|           | Productivity and Triangulation                                   | 51         |
|           | Margins of Error   | 54         |
|           | Summary of Principles  | 55         |
| <b>5.</b> | <b>Inputs and Deflators</b>                                      | <b>57</b>  |
|           | Introduction   | 57         |
|           | Input Measures   | 57         |
|           | New Developments   | 58         |
|           | Issue 1: Complex Data Flows                                      | 59         |
|           | Issue 2: Data Classification                                     | 60         |
|           | Data by Country and Function                                     | 63         |
|           | Issue 3: Poor Data Timeliness and Periodicity                    | 64         |
|           | Issue 4: Possible Solutions Offered by COINS                     | 66         |
|           | Issue 5: Measurement of Capital Inputs to Production             | 67         |
|           | Issue 6: Measurement of Labour Inputs to Production              | 70         |
|           | Deflators  | 71         |
|           | Annex  | 73         |
| <b>6.</b> | <b>Outputs</b>   | <b>84</b>  |
|           | Introduction   | 84         |
|           | Introduction of New Indicators for Existing Functions            | 85         |
|           | Treatment of Collective Elements                                 | 86         |
|           | Weighting  | 88         |
|           | Joint Products and Joint Producers                               | 90         |
|           | Quality Adjustment   | 91         |
|           | Timing and Attribution   | 93         |
| <b>7.</b> | <b>Implementation</b>  | <b>96</b>  |
|           | Introduction   | 96         |
|           | Moving from Concepts to Robust Statistical Series                | 96         |
|           | Publishing Analysis of Public Service Output and Productivity    | 98         |
|           | Satellite Accounts   | 99         |
|           | International Cooperation  | 100        |
|           | Extension to New Functions                                       | 100        |
|           | Country and Regional Accounts                                    | 101        |
|           | Resource Costs of Statistics                                     | 102        |
| <b>8.</b> | <b>Health</b>  | <b>103</b> |
|           | Introduction   | 103        |
|           | Current and Previous Methods of Output Measurement, and Critique | 106        |
|           | Future Methods of Output Measurement                             | 110        |
|           | Inputs and Deflators   | 121        |
|           | Triangulation and Productivity Measurement                       | 122        |
| <b>9.</b> | <b>Education</b>   | <b>125</b> |
|           | Introduction   | 125        |

|                   |   |            |
|-------------------|---|------------|
|                   | Current Methods of Output Measurement, and Critique     | 128        |
|                   | Future Methods of Output Measurement                    | 129        |
|                   | Inputs and Deflators                                    | 137        |
|                   | Productivity and Triangulation                          | 139        |
| <b>10.</b>        | <b>Public Order and Safety</b>                          | <b>141</b> |
|                   | Introduction  | 141        |
|                   | Current Methods of Output Measurement, and Critique     | 142        |
|                   | Future Methods of Output Measurement                    | 146        |
|                   | Incremental Improvements to the Current ONS Methodology | 147        |
|                   | Inputs and Deflators                                    | 155        |
|                   | Productivity and Triangulation                          | 157        |
| <b>11.</b>        | <b>Social Protection</b>                                | <b>159</b> |
|                   | Introduction  | 159        |
|                   | Personal Social Services                                | 159        |
|                   | Administration of Social Security                       | 163        |
|                   | Current Methods of Output Measurement, and Critique     | 165        |
|                   | Future Methods of Output Measurement                    | 169        |
|                   | Inputs and Deflators                                    | 178        |
|                   | Productivity and Triangulation                          | 180        |
| <b>12.</b>        | <b>Executive Summary</b>                                | <b>182</b> |
|                   | Summary   | 184        |
|                   | Introduction  | 185        |
|                   | Measuring Government Output in the UK                   | 185        |
|                   | The International Context                               | 186        |
|                   | Methodology for the Future: The Principles              | 186        |
|                   | Inputs  | 188        |
|                   | Outputs   | 189        |
|                   | Implementation  | 191        |
|                   | Health  | 192        |
|                   | Education   | 194        |
|                   | Public Order and Safety                                 | 195        |
|                   | Social Protection                                       | 196        |
| <b>Appendices</b> |   |            |
| A                 | Consultation  | 198        |
|                   | UK Consultation   | 198        |
|                   | International Consultation                              | 199        |
| B                 | International Guidance                                  | 201        |
|                   | Timing of Recording in National Accounts                | 202        |
|                   | General Government Sector and Non-Market Producers      | 203        |
|                   | Classification of Government by Function                | 205        |
|                   | GGFC Expenditure and Actual Final Consumption           | 208        |
|                   | General Government as a Producer                        | 209        |

---

|   |            |
|---|------------|
| Valuation of Government Output            | 210        |
| Measuring the Volume of Government Output | 211        |
| Capital Measures and Definitions          | 215        |
| OECD Guidance on Productivity             | 217        |
| Satellite Accounts                        | 218        |
| <b>Glossary</b>                           | <b>221</b> |
| <b>List of Abbreviations</b>              | <b>223</b> |
| <b>References</b>                         | <b>226</b> |
| <b>Index</b>                              | <b>230</b> |

# Preface

---

The National Statistician, Len Cook, asked me in December 2003 to conduct an independent review of the measurement of government output in the National Accounts, with a Final Report to be produced by the end of January 2005. An Interim Report was published in July 2004. This volume constitutes the Final Report.

Both the task and the timetable were challenging. The fact that it has been possible to produce these reports is due to two important inputs. The first is the remarkable quality of the team assembled for the Review. This team has been headed by Joe Grice, Deputy Head of the Government Economic Service, with Aileen Simkins from the Department of Health as co-director. It has consisted of ONS staff and of staff seconded from the Bank of England. The team are:

Liz de Freitas, James Hemingway, Ben King, Phillip Lee, Michael Lyon, Nicola Mai (until July 2004), Sukwinder Mehmi, Alwyn Pritchard, Janet Snelling, Amanda Tuke, Lorraine Watson, and Georgina Fletcher-Cooke as a consultant.

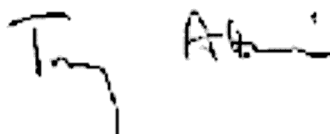
The review team has consulted extensively with other branches of ONS, in particular with the National Accounts Group. While I take full responsibility for the contents of the reports, and their limitations, I should stress that their production has been a team effort, and I am most grateful to the members of the review team and ONS staff for their many contributions over the past year. At Nuffield College, I have been greatly helped by Lin Sorrell, Warden's Secretary.

The second important ingredient has been the advice and help that we have received from a wide variety of quarters, both in the United Kingdom and overseas. The review has benefited greatly from the help of an Interdepartmental Co-ordination Group, chaired by Len Cook. The list of members is in Appendix A. We are grateful to members of the Co-ordination Group for their views and for facilitating work within their departments. In the review, we have sought to consult widely. We organised an open consultation meeting at the Bank of England in May 2004, to which interested parties were invited. I have had meetings with the Cabinet Secretary, the Monetary Policy Committee of the Bank of England, the Statistics Commission, the Chair of the Audit Commission, the Comptroller & Auditor-General, and the Head of the Prime Minister's Delivery Unit. We had a valuable meeting with representatives of the Royal Statistical Society. Members of the review team have made presentations at a large number of conferences and seminars, from which we have received useful comments.

The review team consulted the Devolved Administrations, visiting Belfast, Cardiff and Edinburgh. In September 2004, we organised a seminar to discuss how to take work forward with the Devolved Administrations, and were greatly heartened by the positive response.

The review team paid particular attention to international consultation, in view of the importance of international guidelines and because we wished to learn from the experience of other countries. The team visited Eurostat on two occasions. We visited the Organisation for Economic Co-operation and Development (OECD), and participated in the October meeting of the National Accounts Working Party. The team visited the Statistics Offices of Finland, Italy, the Netherlands, Norway and Sweden – all of whom are in the vanguard on this particular agenda. Appendix A gives details of international contacts. We are most grateful for the time and welcome given to us. The team had very helpful discussions with Steven Keuning, Director General of Statistics at the European Central Bank, with Rob Edwards, Australian Deputy Statistician, during his visit to the ONS in March 2004, and with Jack Triplett, formerly of the US Bureau of Economic Analysis. None of these bodies or individuals should, of course, be held in any way responsible for the views expressed in this report.

The publication of the Interim Report in July 2004 was intended to generate discussion. We are most grateful to the many people who sent us comments. In particular, we would like to thank Sir Jack Hibbert and Rob Edwards. We have not always been able to resolve the issues raised but we have attempted to address them.



**Tony Atkinson**  
January 2005



# 1 Introduction

---

## Terms of Reference

1.1 The terms of reference of the review set out by the National Statistician were:

‘To advance methodologies for the measurement of government output, productivity and associated price indices in the context of the National Accounts, recognising:

- a) the full scope of government outputs;
- b) differences in the nature and quality of these outputs over time;
- c) the relationship between government outputs and social outcomes;
- d) the need for comparability with measures of private sector services’ output and costs;
- e) the existing work of the Office for National Statistics (ONS); and
- f) the appropriate measurement of inputs, including quality and the distinction between resource and capital, so that, together with the measurement of output, light can be thrown on developments in government productivity.’

These terms of reference have set the framework for the review.

1.2 Our brief is to examine the measurement of government output within the context of the National Accounts. The end result should be reflected in the National Accounts or associated statistics. While we are mindful of the performance indicators used in Public Service Agreement (PSA) targets and other management agreements, and refer to these at a number of junctures (see below in this chapter), these are not our concern in this review. We are seeking aggregate indicators that can form part of the National Accounts, not complete tool kits for the management and audit of government activities.

1.3 Our review is concerned with government output. We are conscious that government services are an important, but not the only, way in which our society achieves its objectives in such fields as health, education, and social services. A major contribution is made by unpaid services that are not recorded in the National Accounts. These services, provided by individuals to their families and by voluntary organisations, are an essential feature of our lives. It is not within our terms of reference to consider an extension of the National Accounts to the unpaid economy, but we have drawn attention to its role at a number of places.

- 1.4** In this review, we are concerned with the measurement of the volume of government output relative to the volume of government inputs, and with the implied measure of government productivity. These measures are important because the functioning of public services is a matter of widespread public interest. They are important because they throw light on the quality of the nation's public finances. The measures are significant at a macroeconomic level because government output represents a sizeable part of Gross Domestic Product (GDP). In broad terms, a 1 per cent per year faster growth rate of government output raises the overall GDP growth rate by some 0.2 per cent.
- 1.5** The aim of the review is to establish the future strategic direction for work in this area. Our Interim Report, and the work of the ONS staff associated with the review, has already led to significant changes in methods and practice. We welcome these changes and hope that this Final Report will contribute to the further development of national accounts in the United Kingdom. Considerable interest has been expressed by statistical agencies, and statisticians, outside the United Kingdom, and we hope that the Report will help carry forward the agenda set in the United Nations 1993 *System of National Accounts* (SNA) and the 1995 *European System of Accounts* (ESA).

### **Actions and Action Plans**

- 1.6** Our starting point has been the existing work of ONS, and our conclusions build on the substantial progress that has been made by ONS since it began in 1998 to measure government output directly. The field that we are reviewing is a dynamic one, and the report needs to be read bearing in mind that advances are continually being made in ONS practice. Members of the review team have, for instance, been involved in the development of improved measures of health output introduced by ONS in the *Blue Book 2004*.
- 1.7** Progress towards improved measures of government inputs and outputs depends very much on cooperation between government departments, the Treasury, and ONS. To facilitate this, action plans were agreed with key service delivery departments (Department of Health, Department for Education and Skills, Department of Work and Pensions, Home Office, Office of the Deputy Prime Minister) and with those departments responsible for expenditure data (the Treasury and ONS). The Scottish Executive, Welsh Assembly Government and Northern Ireland Civil Service also each have action plans at various stages of development. We should like to stress the essential role played by this cooperation and urge that departments continue to accord priority to the provision of data on a reliable and timely basis. We hope that our reports will underscore the importance of this activity. Ownership of the process by all those involved is essential if reliable and timely figures are to be produced, and if new methods are to be developed.

- 1.8** This report is about methodology. We have reached a number of conclusions, and these are collected in Chapter 12. The conclusions, if adopted by ONS, may lead to changes in measured government output and the implied indicators of government productivity. Indeed, the changes already introduced with respect to the measurement of health services output have affected the estimated growth rate of general government final consumption. But this report does not contain any new figures with regard to government output or productivity. The publication of national accounts statistics is the responsibility of ONS, and any new figures will be published by ONS.

## Contents of Report

- 1.9** The first part of the report (Chapters 1-7) deals with the subject in general. Chapter 2 describes the subject matter of the review, outlining the main steps in the development of the ONS approach to measuring government output. This approach has been much influenced by international guidelines, and these are considered in Chapter 3. Chapter 4 provides a methodological framework, setting out the principles we believe should form the basis for measuring government output, inputs and productivity. The implications for national accounts measurement in the UK context are the subject of Chapter 5, which deals with inputs, and Chapter 6, which deals with outputs. The process of implementation is the subject of Chapter 7. The second part of the report considers separately four major spending functions: Health, Education, Public Order and Safety, and Social Protection. These are four of the ten broad functions identified in the ‘Classification of the functions of government’, or COFOG. The ten functions are

- 1) General Public Services
- 2) Defence
- 3) Public Order and Safety
- 4) Economic Affairs
- 5) Environmental Protection
- 6) Housing and Community Amenities
- 7) Health
- 8) Recreation, Culture and Religion
- 9) Education
- 10) Social Protection.

The more detailed two digit classification is given in Table B2 in Appendix B.

- 1.10** In the remaining part of this chapter, we provide an introduction to the role of national accounts. National accounts play an important role in economic analysis and in public debate about economic issues, but their functions and limits are not always appreciated.

## The Functions and Limits of National Accounts

- 1.11** The national accounts consist of a coherent, consistent set of macroeconomic accounts and tables designed for a variety of analytical and policy purposes.’ (SNA, 1993, paragraph 1.68). The national accounts of the United Kingdom are published annually as *United Kingdom National Accounts*, known as the *Blue Book*. Quarterly estimates of the main components of the National Accounts are also published. The accounts record in an integrated way economic activity, including aggregate measures of income, output and expenditure.
- 1.12** Several purposes are served by measures of national income. The introduction of official national accounts in the United Kingdom during the Second World War may indeed be seen as emanating from two related, but different, streams of economic thought. The first, and the most pressing at that time in terms of policy needs, was the development of economic management at the macroeconomic level. It was no accident that Keynes was a strong advocate of national accounts and set in train their development by Meade and Stone. This first use sees national accounts as ‘summary indicators of economic activities taking place within the economy as a whole’ (SNA, 1993, paragraph 1.70). The second is the expression of the level of national welfare in terms of national income, stemming from the earlier, welfare economic tradition symbolised by Pigou, developed by Hicks, Samuelson and others, and implemented by Bowley and Clark. This second use sees ‘measures of aggregate production or consumption as indicators of welfare’ (SNA, 1993, paragraph 1.70). In what follows, we consider in turn these two influential strands, considering how changes in the method of estimating government output would affect the uses of national accounts.

### Macroeconomic management

- 1.13** National accounts provide data on the major economic flows necessary for aggregate economic management. As it was put by Christopher Allsopp in his *Review of Statistics for Economic Policymaking*, ‘the demands of monetary and fiscal policy establish a clear need for high-frequency, macroeconomic data’ (paragraph 2.9). These data are used to estimate causal relationships at the macroeconomic level, and they furnish the input into macroeconomic models used to make forecasts and aid the formation of economic policy.
- 1.14** In simplified terms, the central issue of macroeconomic management may be seen in terms of balancing aggregate supply with aggregate demand. Considerable attention is paid by the Monetary Policy Committee of the Bank of England (MPC) and by the Treasury to the ‘output gap’ between potential supply and demand in the economy. Our particular concern here is with how the measurement of government output affects this gap.

- 1.15** In presenting the February 2004 *Inflation Report*, the Governor of the Bank of England, Mervyn King, said ‘in assessing inflationary pressures, the official GDP data may not be the best guide to the balance between demand and supply in the economy as a whole. GDP includes an estimate of the output of the public sector. That is extremely difficult to measure in sectors such as health and education’. We fully share the view that there is no single number that will serve all purposes, and that different aggregates are relevant to answering different questions. As it was put by Sir John Hicks, ‘there may be more than one *Money Value of the Social Income*, each corresponding to a different purpose of calculation’ (1940, p 106).
- 1.16** From the standpoint of macroeconomic policy, it may therefore be that the appropriate aggregate measures are those for the private economy, excluding government from both the supply and demand side of the equation. The main concern is then to make an appropriate subtraction from potential supply of that part of resources absorbed by the public sector. To continue the quotation from Mr King, ‘what matters is not the value of the services provided by the public sector but the opportunity cost of the resources that would otherwise be employed in the private sector’. This ‘resource cost’ measure can be estimated by adding the public sector’s procurement to a hypothetical quantity of goods and services that would have been produced by the public sector workforce if it had been employed in the private sector (as calculated by the Bank of England in the May 2004 *Inflation Report*).
- 1.17** If government outputs are separable in this way from private supply and demand, then this allows considerable simplification. Any recommendations that we make concerning the direct measurement of government output should not affect the macroeconomic policy stance. At the same time, if our investigation suggests that changes need to be made to the construction of the nominal spending figures or of the associated input price indicators, or both, then this will have implications for macroeconomic management. If we were to discover that the measure of spending on inputs is overstated, or the price index is too low, then the government would be making less demand on resources than at present indicated by the National Accounts. The converse would be true if we were to discover that the measure of spending is too low, or the price index is too high. The estimate of spare capacity by the MPC would then be affected. One evident conclusion is that users of the National Accounts need to be aware of the different elements that, in principle (not necessarily in detail), enter the different macroeconomic variables.
- 1.18** To a first approximation, a degree of separability between public output and the private economy may be a reasonable assumption in terms of short-run macro-management. Even, however, in the short term, the output of the government sector may complement private sector production.

**1.19** Taking a longer term view, there are very likely to be feedback effects from public to private output. If, for example, smaller class sizes are leading to better-educated school children, then there will eventually be a better-educated labour force, representing an increase in effective labour supply. Improved medical care may have a more immediate impact through reduced sickness absence. Moreover, it would be a mistake to see the public sector just as a consumer of resources, rather than as a key producer in the economy. Some of the output, such as health care or education, may substitute for market sector production of the same services. In other cases, public sector output complements private sector production. Overall, it seems clear that the outcomes from government services are an important element determining the well-functioning and growth prospects of the UK economy.

### Assessing overall economic performance and welfare

**1.20** The second major use of national accounts is as an indicator of the contribution of economic activity to increasing welfare. ‘Certain key aggregates of the System, such as GDP and GDP per head of population, ... are widely used by analysts, politicians, the press, the business community and the public at large as summary, global indicators of economic activity and welfare’ (SNA 1993, paragraph 1.68).

**1.21** In this respect, both public and private economic activities play their role. The contribution of private goods and services is perhaps more evident. Market prices ‘represent the relative value to the individual of different goods and services, on the usual assumption that the price paid for each commodity is proportional to its marginal significance. Thus an increase in the domestic product at market prices, other things being equal, can be regarded as indicating *prima facie* an increase in the ‘economic welfare’ of the community.’ (Maurice, 1968, pp 14). SNA 1993 makes the same point under the heading ‘Changes in welfare’ (1993, paragraph 1.76), the title of which reminds us of the large welfare economic literature of the 1940s and 1950s (for example, Samuelson, 1950) on the conditions under which we can identify an increase in real income.

**1.22** A substantial part of public output takes the form of services provided to individuals: for example, a GP consultation. There may be no market price, but the service adds to individual welfare in the same way as a consultation with a vet, which is paid for as a market service, adds to the pet owner’s satisfaction. Other public sector output takes the form of a collective good, where benefits are consumed jointly, and non-excludably, by the whole population. In the case of a pure public good, there is again a marginal value to each consumer; and, as was explained by Samuelson in his pure theory of public expenditure (1954), we have to add these marginal valuations to arrive at the total value of the activity. (With public goods, we add demand curves vertically for a given quantity; whereas with private goods we add the demands at a given price.) It should be noted that we are concerned in both cases with the *marginal* benefit, not with the total benefit. In the case of private goods, we are taking the price as an indicator of the willingness of the consumer to pay for the marginal unit; we are not taking into account the consumer surplus associated with intra-marginal units. In the same way, with public goods, we are adding the marginal valuations, not the total consumer surplus.

- 1.23** In considering the welfare interpretation, there are two possible misunderstandings. The first is that national income provides a total measure of welfare. This is not the case, as is clearly stated in SNA 1993, ‘the consumption of goods and services, both individually and collectively, is one of the most important factors influencing the welfare of a community, but it is only one of several factors. There are also others, such as epidemics, natural disasters or wars, that can have major negative effects on welfare, while others, such as scientific discoveries, inventions or simply good weather, may have significant positive impacts. These factors obviously do not enter into the measurement of GDP, which refers only to the flow of goods and services produced within a given period.’ (SNA 1993, paragraph 1.69). The calculation is therefore different from extended measures of ‘net economic welfare’ devised by James Tobin and others. National income is an indicator of the *contribution* to welfare of a specified set of economic activities.
- 1.24** Secondly, welfare is only one of the considerations entering into policy judgements. Governments have multiple goals. They are concerned with distribution as well as with totals. They are concerned with rights and procedural justice, as well as with outcomes. Equity and fairness have value for governments, but are not captured in the National Accounts. For these reasons alone, there is no reason to expect government policy to be directed solely at maximising national output; nor, conversely, should the output measure be determined solely by the policy objectives.

#### Relation with government performance targets

- 1.25** In its work on the measurement of government output, ONS has made quite clear that there is a difference between National Accounts estimates of output, on the one hand, and performance measures for the management of public services on the other hand. Neuburger and Caplan (1998) recognised that performance measures and output indicators will use much of the same data, but spelled out the differences in the requirements. In the case of performance indicators, they argued, the need was for precise, transparent and simple measures, not subject to manipulation, but there was no requirement for stability over time, and they could be selective in their coverage. In contrast, the output measures for national accounts purposes need to be as comprehensive as possible and to be consistent over time. Moreover, while simplicity and transparency of compilation would be desirable, national accountants typically expect to have to make complex adjustments to raw data.

- 1.26** The difference between national income measurement and performance measures is related to the distinction between outputs and outcomes. Examination of the Public Service Agreement (PSA) targets of UK government departments shows that a number are concerned with total outcomes. (Our quotations are all from 2004 PSAs.) In the case of Department of Health, for instance, PSA target 1 is to reduce substantially the mortality rates from the major killer diseases. This is a total outcome target. The same applies to PSA target 9 (reducing the under-18 conception rate) and PSA target 11 (reducing health inequalities). As we have already noted, national income measures the contribution of activities to outcomes, and these may be only part of the story. To give a specific example, the health status of the nation is affected by a range of factors – dietary and exercise habits, incidence of smoking and excessive alcohol consumption, as well as by the activities of the NHS. We would not want to conclude that the output of the NHS was worsening just because the other factors were showing an adverse trend.
- 1.27** The construction of national accounts may make use of similar data sources, but the two activities are different. National accounts provide indicators of broad trends; to try to use them as microeconomic measures of public sector performance misunderstands their nature and limitations. National accounts are not a substitute for performance indicators, and there are risks in attempting to use them for such a purpose. At the same time, national accounts measures need to be coherent with the evidence from performance studies. The reasons for any differences should be understood, especially when the direction of change is different. Circumstances where national accounts measures would provide perverse incentives in respect of the good management of the public resources concerned need, at the least, close scrutiny.

#### The limits of national accounts: conventions and margins of error

- 1.28** National accounts have become so much part of the economic life of the country that their limits are often overlooked. First, we should stress that the definition of national income is a matter of agreed conventions. As described in the CSO *National Income Statistics: Sources and Methods*, ‘the meaning to be attached to the aggregate of national income, product or expenditure is essentially arbitrary and limited. The comprehensiveness of the aggregates is limited by convenience and convention; the valuations placed on goods and services ... do not provide precise measures of changes either in welfare or in productivity.’ (Maurice, 1968, p 15). This does not mean that they are worthless. The quotation continues to say that ‘the significance of the broad trends shown by the aggregates is often unmistakable.’ (Maurice, 1968, p 15).
- 1.29** This means that the findings of national accounts have to be interpreted in the light of these conventions. Particular care is needed at a time of change, as is well illustrated by the measurement of government output. At the present, the United Kingdom has introduced direct output measurement for the government sector for a wide range of spending functions; other countries have introduced it less extensively or not at all. As a consequence, measures of real growth rates are not comparable.



- 1.30** Secondly, national income is an *indicator*, not a precise addition over all the possible constituent parts. The origin of early academic estimates of national income (such as those of Bowley) in the tables of incomes assembled by the Inland Revenue may lead people to suppose that ONS is actually measuring the total of national income in the same way as individuals measure what has flowed into their bank accounts. Even at that time, with a narrow definition of personal income, such aggregates were estimates, extrapolating from a limited base of data.
- 1.31** This brings us to a third point: that the National Accounts variables are *measured with error*. When ONS publishes a figure stating that the government output at 2001 prices was £203,674 million in 2003, this is an estimate surrounded by a considerable margin of error. This should be obvious, but the fact is often overlooked and needs to be stated explicitly. Moreover, national accounts are a system, but different components are measured with differing degrees of accuracy. In order to complete the system, elements have to be included which are less reliable than others. The reader may well ask whether the figure just cited for government output is as reliable as the private sector element of constant price GDP.
- 1.32** The significance of errors of measurement depends on the purpose for which the accounts are to be used. In the present context, focus on the growth of constant price output means that an unknown but fixed bias in the estimate would not matter. If the input into the direct output measure were to be always understated by the same percentage, then we would not need to know the percentage, since we are using only the changes over time.

## Conclusions

**1.33** The main points to be taken away from this introductory chapter are:

- a) This report is about methodology and does not contain any new figures with regard to government output or productivity; the aim of the review is to establish the future strategic direction for work in this area.
- b) The construction of government output measures for national accounts purposes depends very much on cooperation from the relevant government departments, including the Devolved Administrations.
- c) National accounts serve several purposes, and no one single number will serve all purposes; different aggregates are relevant to answering different questions.
- d) National income is an indicator of the contribution to welfare of specified economic activities; it is not a measure of total economic welfare; aggregate welfare is not the only objective of government policy.
- e) National accounts estimates for the government sector are related to, but different from, microeconomic measures of public sector performance, and have different purposes; to try to use them in the same way as public sector performance targets misunderstands their nature and limitations.
- f) National accounts are built on a series of agreed conventions; they are subject to margins of error that vary across different parts of the national accounts; the significance of these errors depends on the purpose for which the figures are used.

# 2 Measuring Government Output in the UK

---

- 2.1** This chapter describes the methods used to measure government output in the United Kingdom, and particularly the direct measures of government output introduced with the *Blue Book 1998*. One of the main reasons for the move to direct measures was that the previous approach assumed no change in productivity in the government sector. In this chapter, we consider the issues that arise in measuring productivity before turning to an examination of the main element.
- 2.2** For the purpose of this review, the term ‘government’ should be read broadly, to cover all those agencies that provide public services. Thus, for example, the National Health Service (NHS) and local authority provision of social services are part of our purview. The precise boundaries of the government sector are important, but are not particularly germane to our report. At a number of points, it will, however, be important to distinguish between *individual* services (those consumed by individual households) and *collective* services provided to society as a whole.
- 2.3** Government output is generally non-market output in the sense that it is supplied free or at prices that are not economically significant. It is the absence of market transactions that underlies many of the problems in measuring output.
- 2.4** Government features as an identifiable component in two different measures of GDP. First, there is the final consumption expenditure of government, a component part of GDP (Expenditure). For 2003, the *Blue Book 2004* showed *individual* government final consumption expenditure of £141bn, and *collective* government final consumption expenditure of £89bn at current prices. Total GDP at current market prices in 2003 was £1,100bn.
- 2.5** Here our concern is primarily with a second measure: GDP at constant prices. This volume measure provides an indicator of the growth rate of the economy. Government output, at constant prices, enters this GDP measure. Its measurement affects, therefore, statements about the relative growth rates of the UK economy compared with those of other countries. When the European Union compares its growth performance with that of the United States, or different countries within the EU compare their growth rates with each other, account has to be taken of differences in the methods employed to measure government output.
- 2.6** Volume measures for the output of the main government functions are published annually in the Blue Book. The *Blue Book 2004* shows that, between 1995 and 2003, there was volume growth of 29 per cent for Health, 7 per cent for Education, and 6 per cent for Social Protection.

## Conventional Approach to Measuring Government Output

- 2.7** In many countries, and in the United Kingdom from the early 1960s to 1998, the output of the government sector has been measured by convention as of value equal to the total value of the inputs; by extension the volume of output has been measured by the volume of inputs. This convention regarding the volume of government output is referred to below as the (output=input) convention, and is contrasted with direct measures of government output. The inputs taken into account in recent years in the United Kingdom are the compensation of employees, the procurement cost of goods and services, and a charge for the consumption of fixed capital. In earlier years, and in other countries, including the United States, the inputs were limited to employment.
- 2.8** Wide use of the convention that (output=input) reflects the difficulties in making alternative estimates. Simply stated, there are two major problems: (a) in the case of collective services such as Defence or Public Administration, it is hard to identify the exact nature of the output, and (b) in the case of services supplied to individuals, such as Health or Education, it is hard to place a value on these services, as there is no market transaction.
- 2.9** The rationale for the convention adopted in the United Kingdom for many years was described by Rita Maurice in her 1968 edition of *National Accounts: Sources and Methods*:
- ‘There are inherent difficulties in measuring, at constant prices, the output of government services, the exact nature of which cannot be precisely determined. ... In general, the solution adopted has been to use changes in numbers employed as an indicator of changes in output. The implied assumption of no change in productivity is obviously not satisfactory since it takes no account of the use of more modern equipment, such as computers. The problem has been discussed at a number of international conferences without any generally acceptable solution being reached. In some countries the assumption has been made that productivity in the public services increases at the same rate as productivity in all other industries, or in all other services ... in the United Kingdom accounts the assumption of no change in productivity has been preferred’ (1968, pp 44–45).
- 2.10** The criticism that this (output=input) convention neglects increases in productivity is clearly well founded, and has been articulated many times by ONS: for example, in *Economic Trends*, February 1998. To the extent that productivity grows, the growth rate of government output is understated, and hence the overall growth rate of GDP is understated. Countries with larger public sectors, such as European economies, will on this account have lower relative growth rates, other things equal, than countries with smaller public sectors, such as the United States. Where, as in Germany, an assumed productivity growth factor has been added in estimating the contribution of government output to GDP, the growth rate will appear higher than in countries which assume that there is no productivity growth. International comparisons are thus affected.

- 2.11** It does not follow that abandoning the (output=input) convention will raise measured growth. It is possible that the productivity indicator for government output is constant or declining. There is no necessary reason to expect productivity to increase. Many public services, like social services, involve an essential human input. In the caring and teaching professions, there may be limits to which labour productivity can be increased. As W J Baumol noted years ago, ‘there are a number of services in which the labour is an end in itself, in which quality is judged directly in terms of the amount of labour’ (1967, p 416). As labour becomes more expensive, there is only very limited scope for substitution. The social worker may be aided by capital, such as use of a car rather than public transport, allowing more clients to be visited in a day. Computerisation may allow care workers to be allocated more efficiently. But there are distinct limits to the extent to which labour can be replaced in services such as teaching and healthcare. Moreover, the labour saving depends on increases in other inputs, and does not necessarily raise overall productivity measured, taking account of total factor inputs.
- 2.12** It is useful here to distinguish between the technical frontier, or ‘best practice’, and actual performance. At any point in time, output per unit of input may be improved, for example by reallocation of administrative staff to service provision. Gains may be achieved by improved organisation or personnel practices. There may be significant savings, or increased output, moving the operation closer to the production frontier. But the production frontier itself may be relatively static. The technical possibilities may not allow continuing long-run gains in productivity.
- 2.13** The expansion of public services may indeed be subject to diminishing returns. Historically, initial reductions in neo-natal mortality may have been relatively easy to achieve, but driving down rates today below their current level may involve much more expensive interventions. When schools have halved their truancy rate, they may find it increasingly difficult to achieve further reductions. When re-offending has been reduced by 5 per cent, the next 5 per cent may mean working with more difficult cases. Diminishing returns do not, of course, mean that the expansion is unjustified. The value of the additional output may still exceed the cost of the inputs.
- 2.14** Again, a distinction has to be made between best practice and actual performance. In the case of health care, for example, patients may be treated in decreasing order of ability to benefit from the treatment. In such a situation, expansion of treatment means that there is a declining benefit per patient. But if the present service does not fully match treatment and benefit, then the additional patients will have a benefit closer to the average of those already treated. In the extreme case where patients were chosen at random from those presenting, there would be no decline. We are not suggesting that this is the case, but the point remains that diminishing returns could in part be offset by gains from improving the coverage of patients most able to benefit.
- 2.15** It is important to recognise that there are lags between inputs and outputs, and that a marked increase in public spending, such as that which has taken place in recent years, may only show up in improved output indicators at a later date. This applies particularly to government output such as in Education and Health. In this situation, measures of productivity, however well based, have to be interpreted carefully.

- 2.16** A move from the (output=input) convention to direct measurement of government output should therefore be carefully interpreted. It is a definite advance in the sense that government output is no longer simply assumed to equal measured inputs, but the move should not be seen as solving at a stroke the complex problem of measuring government performance. The statistic obtained by dividing output by input may no longer be equal to 1 by definition, but no single number, however carefully constructed, can fully capture the performance of complex public services with multiple objectives.

### Developments over Time in ONS (and CSO) Practice

- 2.17** ONS has consistently taken the view that the output of the public sector should be included in GDP, rejecting any suggestion that it should be treated as a purely intermediate output. This is a view that we fully share, not least because it is adopted by the United Nations *System of National Accounts* (SNA) and by the *European System of Accounts* (ESA 95), which is based on the SNA 1993. (The international guidelines are discussed in Chapter 3.)
- 2.18** The SNA has, however, evolved in its approach to measurement of government output. The new approach, introduced in the United Kingdom with the *Blue Book 1998*, with its emphasis on actual personal consumption, opened the way to the direct measurement of the output of the government sector. ONS was in the vanguard of national statistical offices in initiating a project to introduce new measures of output for public sector non-market production. The project was described by Henry Neuburger and David Caplan in *Economic Trends*, February 1998, and its progress can be traced in a series of articles: David Caplan, *Economic Trends*, October 1998, Michael Baxter, *Economic Trends*, September 2000, Alwyn Pritchard, *Economic Trends*, May 2001, Timi Ashaye, *Economic Trends*, November 2001, Alwyn Pritchard, *Economic Trends*, May 2002, and Alwyn Pritchard, *Economic Trends*, July 2003.
- 2.19** Since 1998, ONS has moved increasingly towards the replacement of the (output=input) approach by direct measures of the volume of government output. The major progress made to date is summarised in Table 2.1. Successively, different sectors have been converted to a direct measure of output, beginning with Health, Education and the Administration of Social Security. The direct estimates now cover some two-thirds of general government final consumption, which is an impressive achievement.

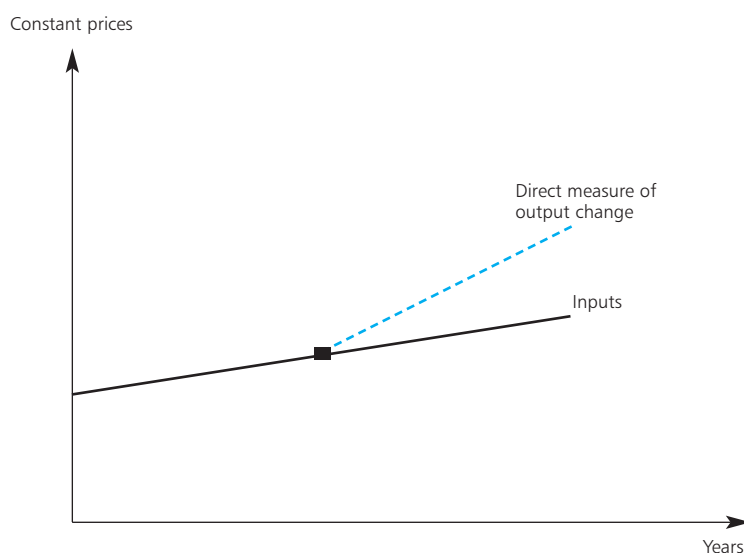
Table 2.1 Post-1998 developments in ONS measurement of government output

| Function                          | Per cent government spending in 2000 | Date introduced   | Main components  | Devolved administrations   | Reference   |
|-----------------------------------|--------------------------------------|---|--|--|---|
| Health                            | 30.3                                 | Introduced in the <i>Blue Book 1998</i> , with data from 1986, method updated 2004  | Hospital cost weighted activity index, Family Health Services (number of GP consultations, etc)  | Separate data for England, Wales, Scotland and Northern Ireland            | <i>Economic Trends</i> , October 1998                                 |
| Education                         | 17.1                                 | Introduced in the <i>Blue Book 1998</i> , with data from 1986   | Pupil numbers – Quality adjustment of 0.25 per cent to primary and secondary schools             | UK figure for pupil numbers in nurseries and primary and secondary schools | <i>Economic Trends</i> , October 1998                                 |
| Administration of Social Security | 2.7                                  | Introduced in the <i>Blue Book 1998</i> , with data from 1986   | Number of benefit claims for 12 largest benefits<br>No allowance for collection of contributions | United Kingdom   | <i>Economic Trends</i> , October 1998                                 |
| Administration of Justice         | 3.0                                  | Partially introduced in the <i>Blue Book 2000</i> , with full impact in the <i>Blue Book 2001</i> , with data back to 1994 Q1 | Number of prisoners, legal aid cases, court cases, and probation cost-weighted activity index    | Great Britain for prisons, otherwise England and Wales                     | <i>Economic Trends</i> , September 2000, for probation, November 2001 |
| Fire                              | 1.1                                  | Introduced in <i>Blue Book 2001</i> , with data from 1994 Q1  | Number of fires, fire prevention and special services  | England, Wales and Northern Ireland  | <i>Economic Trends</i> , November 2001                                |
| Personal Social Services          | 7.4                                  | Introduced in <i>Blue Book 2001</i> , with data from 1994 Q1  | Children and adults in care and provision of home helps  | England  | <i>Economic Trends</i> , November 2001                                |
| Police                            | 5.8                                  | Experimental  | Cleared-up crimes of different types   | England, Wales and Northern Ireland  | <i>Economic Trends</i> , May 2002                                     |

Source: Office for National Statistics

**2.20** In these new estimates, ONS has taken the output, calculated on the basis of inputs, at a reference year, and the direct measures have been used in the form of changes since that date. It is important to understand what these measures do and do not do. The direct measures are of *changes* in output. They are not attaching a monetary value to the *level* of output recorded using the new indicator. The change is shown schematically in Figure 2.1. Starting from a particular base date, shown by the square, the direct output indicators, such as pupil numbers, are used to estimate the growth of output volume. They are not used to estimate the relation between inputs and outputs at the base date. Nor is any attempt made to calculate a current price measure that could be included in the measure of GDP at market prices.

Figure 2.1 Schematic representation of ONS direct output



**2.21** The move to direct output measurement had a perceptible effect on the measured growth rate of the UK economy. Between 1995 and 2003, GDP at constant prices grew at a rate of  $2\frac{3}{4}$  per cent per annum, using the direct output indicators for government output currently employed. If the output had continued to be measured wholly by the inputs, the recorded growth rate would have been 3 per cent per annum. In relation to international comparisons, this difference is significant. GDP growth in the United States was  $3\frac{1}{4}$  per cent per annum over this period. The difference, for the United Kingdom, between the input method (used by the United States) and the direct output method used to date by the United Kingdom, accounts for nearly half the difference in the countries' published growth rates.

**2.22** The move away from the (output=input) convention has introduced a divergence in method between constant price and current price measures of GDP. This may be seen from the fact that the convention that the value of output was equal to the value of inputs meant that there was no net operating surplus or deficit to be attributed to the public sector output. If, as shown in Figure 2.1, output growth exceeds input growth, this creates an operating surplus; the same would arise if there were an assumed productivity growth (as in German estimates).



- 2.23** Although not explicitly recognised, the post-1998 approach of ONS has affinities with that used in the United Kingdom in the 1950s and early 1960s. As argued by the Central Statistical Office (CSO) (the predecessor of ONS) in 1956, ‘even a crude measure of [government] output is assumed to be preferable to an index based on total cost, at constant prices, of the factors of production ... the latter method is only used *faute de mieux*, eg in public administration, where it is difficult to conceive of any sensible measure of service rendered.’ (Central Statistical Office, 1956, pp 42 and 43). ‘Thus the administration of national insurance is represented by the numbers insured and the numbers in receipt of benefit; the hospital services by the number of patients and the number of hospital staff; courts of justice by the number of cases tried.’ (Central Statistical Office, 1956, p 42).
- 2.24** According to Maurice, writing in 1968, the direct indicators ‘proved unsatisfactory and have been abandoned’ (1968, p 87). The reasons she gives are ‘the difficulty of finding indicators’ and ‘the need to keep the output estimates consistent with the expenditure estimates’ (1968, p 87). According to Levitt and Joyce, the direct output measures used in the 1950s and early 1960s were ‘heavily criticised’ (1987, p 50) on the grounds of the arbitrary nature of the weights employed (for example, for teachers and pupils), the tenuous nature of the link with outputs, and the issue of quality change. They cite the example of the impact of government policies designed to reduce class sizes. Since the output indicator for Education gave half weight to pupils and half to teachers, output per teacher was assumed to be a declining function of the number of teachers; hence, a rise in the number of teachers increased output less than proportionately. It is not, however, evident that this is inferior to the assumption that labour productivity is independent of the number of pupils per teacher. Certainly, the estimates of Beales (1967) showed that between 1959 and 1963 the direct method led to estimates of output increase that were lower than those obtained using the (output=input) convention. For Education, the direct method yielded estimates of 13.5 per cent increase in output, compared with 19.4 per cent, and of 6.2 per cent for Health, compared with 9.2 per cent. (Figures cited by Levitt and Joyce, 1987, p 50) Beales noted that this would not always be the case.
- 2.25** From this earlier experience, we draw two main conclusions. The first is that the design of direct output measures needs considerable care. It is not necessarily the case that ‘even a crude measure of [government] output is ... preferable to an index based on total cost’. The fact that it is not easy to obtain direct indicators means that better measures are likely to require significant investment of resources. Direct measures of output need to be continuously monitored to ensure that they are capturing changes in quality. The second conclusion is that ONS has to steer a careful course with regard to changes in government policy, guaranteeing the independence of the approach to measuring government output while ensuring that its implementation reflects the realities of public spending and circumstances.

## Technological and Institutional Change in the Public Sector

- 2.26** There is a strong case for devoting significant resources at this time to improving the measurement of public sector output on account of its increased saliency in policy-making and public debate. Interest in the measurement of government output has become much more intense in recent years as a result of a number of developments in the public sector, reflecting changed government priorities, the concerns of citizens and voters, institutional change, and the new possibilities opened by technological developments. As it was put by the National Statistician when he announced the review, ‘the amount of resources allocated to public services has increased. Delivery and management mechanisms have developed and are more complex. There is an increasing emphasis on the quality of service for the customer. As a result there are greater demands on, and expectations of, measures of government output’.
- 2.27** The public sector is changing rapidly. Functions have been transferred between government departments: for example, the transfer of the levying of National Insurance contributions, and the payment of Child Benefit, from the Department of Work and Pensions to the Inland Revenue. Under successive governments, there have been major policy initiatives directed at changing methods of working and these have often involved shifting institutional boundaries. New delivery mechanisms have been introduced, such as NHS Direct. Policy changes have involved transfers between functions, such as residential or domiciliary care, provided by personal social services, replacing hospital days. An increasing part of service provision may involve sourcing from the private sector.
- 2.28** Ideally, the measure of public sector output should be invariant with respect to changes in the organisation of delivery, but this may not be easy to achieve in statistical practice. Moreover, we have been impressed by the fact that the move to direct output measurement may have made this problem more difficult. With the (output=input) convention, institutional change may not affect the adding up of input outlays within a department, or may involve a relatively simple transfer of input spending. With direct output indicators, there is no guarantee that the effects on the separate output indicators within a department will cancel; where functions are transferred across departments, new output indicators may need to be constructed.
- 2.29** The public sector is also affected by rapid technological change. This may take the form of sector-specific change, as in medicine, or of the general impact of information and communications technology (ICT). Technological change is not confined to the public sector and its impact has been much discussed with regard to the private business economy. In this sense, we may be able to learn from the private sector experience. However, extensive debate in the United States has shown that the measurement of the output of the private service sector is itself a challenging problem. For many years, there was concern that computers were present everywhere except in the productivity statistics (a paradox enunciated by Robert Solow). The impact of technological change may appear only with a delay, and the benefits of ICT may appear in quality change that is not recorded.

## Measures of Government Output, Inputs and Productivity: The Key Elements

**2.30** The key ingredients, with the amounts in 1995 and 2003:

- **Expenditure at current prices on the inputs purchased by government** to produce its outputs, usually referred to as General Government Final Consumption Expenditure at Current Prices: £140bn in 1995 and £230bn in 2003, an increase of 64 per cent;
- Volume of government inputs, adjusted for the increases in the prices of inputs, **using appropriate price indices**: at 2001 prices, £166bn in 1995 and £214bn in 2003, an increase of 29 per cent. This implies that, on average, input prices had risen by some 35 per cent;
- **Volume of government output** at 2001 prices: £171bn in 1995 and £204bn in 2001, a rise of 19 per cent.

**2.31** On occasion, the first series is divided by the third to obtain the ‘implied deflator’ or cost per unit of government output. This deflator includes, however, both price and productivity elements. It is equal to the input price increase divided by the productivity increase. It seems to us preferable to separate the two elements, since they measure different phenomena with different policy implications.

**2.32** In the three definitions above, we have set in bold the key elements. Where output continues to be measured by inputs – the conventional method – only the first two elements are involved. This applies to Defence, General Public Services, Economic services, Environmental Protection, Recreation and Culture, Housing and Community Amenities. For the remainder of public spending, around two thirds, there is an independent measure of output, and hence productivity. (In the case of Police, the output measure is experimental and not yet included in the National Accounts.)

**2.33** The third element, as already explained, has no significance in terms of its level, but changes in this variable can be combined with changes in the second series to arrive at an implied estimate of the change in productivity. If the volume of output directly measured has risen faster than the volume of deflated inputs, then an increase in productivity is implied. At the same time, the accuracy of the productivity figure depends on the accuracy of the three constituent elements. The productivity increase will be **understated** if in the terminal year:

- The direct output measure is too low;
- The measure of expenditure on inputs is too high; or
- The price index for inputs is too low.

The productivity increase will, on the other hand, be **overstated** if in the terminal year:

- The direct output measure is too high;
- The measure of expenditure on inputs is too low; or
- The price index for inputs is too high.

- 2.34** In the market sector of the economy, attention has focused on total factor productivity, taking account of all factor inputs into production. The total productivity gain is then that part of any output increase that cannot be attributed to the inputs into production. It has indeed been argued by D W Jorgenson and Z Griliches (1967) that, if real output and real factor input are fully and accurately accounted for, then the observed growth in productivity is negligible. Without taking a position on their empirical assertion, we fully accept the need for a comprehensive approach to input measurement, a point to which we return in Chapter 4.
- 2.35** Of particular relevance in this argument is the role of quality. Output may be increasing on account of improvements in the quality of inputs, such as better-trained workers, or more reliable equipment. These improvements in inputs need to be taken into account. But the same also applies to the quality of output. If quality improvements (deterioration) in the services delivered are not taken into account then the productivity is under-stated (over-stated).

### Inputs

- 2.36** The changes made to the output measurement methodology mean that we have tended to focus attention on the output side, but it is equally important to investigate the measures of inputs.
- 2.37** The input side is best considered in terms of the three disaggregated input categories given in the National Accounts figures: labour, procurement of goods and services, and capital consumption. In the case of Education, for example, the labour input consists of the wages and salaries paid to teachers, school secretaries, caretakers, and other employees, together with the costs of employing them, such as National Insurance and pension contributions. Goods and services would include expenditure on exercise books, pens, lighting, heating, supply teachers, transport services, and items such as data processing services. Capital consumption is the physical depreciation of the stock of fixed assets, where these would include, in the case of education, buildings, equipment, and computer hardware/software.
- 2.38** Labour is usually assumed to be the most important input for public services, and this is certainly the case for Prisons (58 per cent in 2003), Education (75 per cent), Police (73 per cent) and Fire (81 per cent). In the four other functions, labour is a smaller part of the total cost, reflecting changes in organisation noted above. In Personal Social Services, and the Administration of Social Security, the purchase of goods and services accounts for, respectively, 61 per cent and 65 per cent of current spending in 2003; in Courts the share of goods and services reached 64 per cent in 2003. In Health, labour input and the procurement of goods and services are not dissimilar in magnitude: 45 per cent and 52 per cent respectively in 2003. Capital consumption is 9 per cent in Prisons, 3 per cent in Education and in other areas 2.5 per cent or less.

## Data Sources

- 2.39** This section provides a brief summary of the existing process of data collection and analysis. (Further detail by service area is provided in Chapters 8 to 11.) Table 2.2 shows the sources of data for the existing output volume measures, used to compile total General Government Final Consumption as chained volume measures, as at the time of the publication of the 2004 National Accounts. Where output volumes are measured directly (parts of Public Order and Safety, Health, Education and Social Protection), the coverage of the indicators in terms of countries of the United Kingdom varies, as is shown in the table.
- 2.40** The table includes direct measures of output volume (shown in **Bold**) and deflated input measures, used in implied productivity calculations, where there is a separate direct output measure, or as measures of output volume (in this case shown in *italics*), where there is not. The measures for Police, although only experimental, are shown as direct measures.
- 2.41** The outsider might imagine that the data collection process would be a relatively simple matter for the government sector: that it would be straightforward to arrive at the National Accounts totals using information held in departmental accounts, simply adding in information from the Devolved Administrations, and converting to a calendar year basis. In fact, there is at present a long and complex chain of communication. It involves central government departments, the Treasury, local authority data supplied via the Office of the Deputy Prime Minister (ODPM), and the Devolved Administrations.
- 2.42** A key element is the classification of government expenditure. There is collaboration between ONS and the Treasury on economic categories which is communicated to departments, and this will be further improved when the Treasury supply data consistent with the new Classification of the Functions of Government (COFOG) breakdown in 2004/05. However, because of processing at each stage of the data supply chain, there are still issues in communicating to departments how their figures have been included in the National Accounts, and of the need to reconcile the classifications used by departments and those required by the National Accounts. This is taken up again in Chapter 5.
- 2.43** In the case of local government expenditure data, the data supplied for local authorities in different countries of the United Kingdom differ in their suitability for purpose. English, Welsh, Scottish and Northern Irish local authorities supply budget and outturn information using different economic categories and with different breakdowns of public services. Consolidation of these data from different sources is dependent on a number of assumptions.

- 2.44** The spending figures need to be deflated to arrive at volume measures of inputs. For those functions where output is measured directly, we show in Table 2.2 the deflators that were employed to arrive at the input volumes, and hence the implied productivity estimates for the article published in *Economic Trends* in 2003. For example, the deflated labour input into Health was obtained by dividing the spending on pay by the Pay Cost Index from the Department of Health. It should be noted that this is a different process from assembling staff numbers, with different staff weighted according to their cost. Ideally, the two approaches would yield the same estimate of inputs, but in practice this is not guaranteed.
- 2.45** Again, the first impression from Table 2.2 is of complexity. The table contains 45 non-blank cells. At the same time, many of the cells employ the same deflator. A small number of aggregate deflators were used repeatedly across different services: for example, the average earnings index for the public sector, and a composite price index of the products purchased by Other Central Government. Moreover, we need to be sure the indices capture in all cases (i) shifts between categories of employee, (ii) additional costs such as National Insurance contributions, (iii) earnings increases in excess of pay settlements, (iv) shifts of activity between functions, and (v) changes in the definition of the status of bodies such as NHS Trusts.
- 2.46** Due to the small expenditure on capital consumption for each function, specific deflators were unavailable. So a generic capital consumption implied deflator for central and local government was used.

### Resource Costs of Statistics

- 2.47** Looking back, it seems clear to us that the original move to introduce direct output measures increased the demands on ONS and on departmental resources to an extent not fully appreciated at the time. As brought out well in the *Allsopp Review of Statistics for Economic Policymaking*, good data require resources. The areas within the purview of this review are ones where there is a particular premium on good data. We very much welcome the indications already given by the National Statistician regarding the allocation of staff to this area of work.

Table 2.2 Sources of data for output and input volume measures

|                            | Local government  | Central government   |
|----------------------------|---|--|
| 01 General Public Services | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by local authorities via ODPM.</i>  | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied via the Treasury.</i>  |
| 02 Defence                 | Not applicable  | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by MoD via the Treasury.</i>   |
| 03 Public Order and Safety | <p><b>Police – output volume measures are volumes of police activity, crime-related incidents, patrols, traffic incidents etc.</b> Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by English Local Authorities via ODPM. Coverage is of UK.</p> <p><b>Prisons – not applicable</b></p> <p><b>Probation – not applicable</b></p> <p><b>Courts – output volume measures for magistrates courts are measured directly using caseloads of courts weighted average hours or average costs.</b> Data are supplied by Local Authorities via ODPM. Coverage is of England and Wales.</p> | <p><b>Police – output volume measures are volumes of police activity, crime-related incidents, patrols, traffic incidents etc.</b> Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by the Home Office via the Treasury.</p> <p><b>Prisons – output volume measures are measured directly using total numbers of prisoners.</b> Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by the Home Office. Coverage is of England, Wales and Scotland.</p> <p><b>Probation – output volume measures are measured directly using workload hours of various areas of competence.</b> Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by the Home Office. Coverage is of England.</p> <p><b>Courts – output volume measures for crown and county courts are measured directly using caseloads of courts weighted average hours or average costs.</b> Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by Dept of Constitutional Affairs. Coverage is of England, Scotland and Wales.</p> |

/continued overleaf

Table 2.2 continued

|                                     | Local government   | Central government   |
|-------------------------------------|--|--|
|                                     | Fire – output volume measures for the fire service are measured directly using number of fires attended and numbers of other services. Input volume measures are deflated UK expenditure figures for pay, net procurement and capital consumption. Data are supplied by ODPM. Coverage is UK, but N. Ireland not included in some indicators.  | Fire – not applicable.   |
| 04 Economic Affairs                 | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied by Local Authorities via ODPM.   | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied from DTI via the Treasury.   |
| 05 Environmental Protection         | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied by Local Authorities via ODPM.   | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied from DEFRA etc via the Treasury.   |
| 06 Housing and Community Amenities  | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied by Local Authorities via ODPM.   | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied by the Treasury.   |
| 07 Health                           | Output volume measures are measured directly using:<br>a) treatment numbers and reference costs data from DH. Coverage is England and Wales.<br>b) In addition, further indicator series are used for dental and ophthalmic services with UK coverage. Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. | Output volume measures are measured directly using:<br>a) treatment numbers and reference costs data from DH. Coverage is England and Wales.<br>b) In addition, further indicator series are used for dental and ophthalmic services with UK coverage. Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. |
| 08 Recreation, Culture and Religion | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied by Local Authorities via ODPM.   | <i>Output volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</i> Data are supplied from DCMS etc via the Treasury.  |
| 09 Education                        | Output volume measures are measured directly using pupil numbers in pre-primary, primary and secondary schools obtained from DfES. Also some indicators of numbers of health workers being trained. The coverage is whole UK. Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.                          | Output volume measures are measured directly using pupil numbers in pre-primary, primary and secondary schools obtained from DfES. Also some indicators of numbers of health workers being trained. The coverage is whole UK. Input volume measures are deflated UK expenditure figures for pay, net procurement and capital consumption.  |



Table 2.2 continued

|                      | Local government   | Central government  |  |
|----------------------|--|---|--|
| 10 Social Protection | <p><b>Personal Social Services: Output volume measures are measured directly using:</b></p> <p>a) numbers of adults in care and home help contact hours obtained from DH<br/> b) numbers of children in care from DfES.</p> <p>The coverage is England only. Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption.</p> <p><b>Administration of Social Security: Output volume measures are measured directly for Administration of Social Security using numbers of housing benefit cases.</b></p> <p>Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by DWP. The coverage is England, Wales and Scotland.</p> | <p><b>Social Security: Output volume measures are measured directly for administration of social security using numbers of new benefit claims.</b> Input volume measures are deflated UK expenditure figures for pay, procurement of goods and services and capital consumption. Data are supplied by DWP. The coverage is England, Wales and Scotland.</p> |  |
| DCMS                 | Department for Culture, Media and Sport  | DEFRA   | Department for Environment, Food and Rural Affairs |
| DfES                 | Department for Education and Skills  | DH  | Department of Health                               |
| DTI                  | Department of Trade and Industry   | DWP   | Department for Work and Pensions                   |
| MoD                  | Ministry of Defence  | ODPM  | Office of the Deputy Prime Minister                |

## Conclusions

### 2.48 In conclusion:

- a) Since 1998, ONS has moved progressively towards the replacement of the (output=input) approach by direct measures of the volume of government output. This is an important development. The direct estimates now cover some two-thirds of General Government Final Consumption, which is an impressive achievement.
- b) From the earlier experience in the 1950s and 1960s of the use of the direct measurement approach, we can see that the design of direct output measures needs considerable care and the investment of significant resources. Direct measures of output should be continuously monitored to ensure that they are capturing changes in quality. ONS has to steer a careful course with regard to changes in government policy, guaranteeing the independence of the approach to measuring government output while ensuring that its implementation reflects the realities and circumstances of public spending.
- c) Institutional change in the public sector poses problems for output measurement, and these may be more severe for the direct approach than for the (output=input) convention. Effects of technological change, both specific and general, may not be easily captured, an issue that affects private as well as public services.

- d) The implied measure of productivity for the government sector is obtained from three elements: spending, input price index and direct output measurement. The reliability of all three of these different elements needs to be assessed. While the introduction of direct output measures has received most attention, we attach considerable importance to the measurement and deflation of inputs. In the measurement of productivity, adjustment for quality is important for both inputs and outputs.
- e) The process by which the underlying data are assembled, requiring collaboration between ONS, the Treasury and other government departments, is a highly complex one that warrants closer investigation.
- f) If the government wishes to have reliable estimates of government output and productivity, then the statistical resources have to be supplied, both in ONS and in public service departments. And we welcome the indications already given by the National Statistician regarding the allocation of staff to this area of work.

# 3 The International Context

**3.1** Many users of the National Accounts assume that their form is fully governed by international guidelines. These guidelines, embodied in legal form for EU members by Eurostat (the statistical office of the European Union), are indeed important. The approach taken in these guidelines to the measurement of government output means that, even if ONS had wished to maintain the (output=input) convention, it had no alternative but to develop direct measures. At the same time, the guidelines identify different degrees of conformity, including a distinction between individual and collective public services, and allow some degree of latitude in their implementation. In this chapter, we describe the main features of the guidelines and the experience of other OECD countries. More information is provided in Appendix B.

## International Guidelines: UN SNA and OECD Productivity Manual

**3.2** In this and the next section, we consider in turn the United Nations *System of National Accounts* (SNA), OECD Productivity Manual, *European System of Accounts* (ESA), and the *Eurostat Handbook on Price and Volume Measures in National Accounts*. The main features of the different sources of guidance are summarised in Table 3.1. Appendix B gives more detail.

**3.3** In approaching the guidelines, there are three main questions to which we are seeking answers. The first is the extent to which the international guidelines constrain ONS in its treatment of government output and productivity. As we have already seen, one of the reasons that ONS embarked on the introduction of new measures of government output was the impetus provided by the SNA 1993. The second question is how far the guidelines provide clues as to how we can resolve the issues already identified. Thirdly, the European guidelines form part of an administrative process. To the extent that the United Kingdom has latitude within the legal framework, what are the wider implications of different choices?

### UN System of National Accounts (SNA 1993)

**3.4** The SNA is drawn up by a group on which the major international bodies are represented and is approved by the United Nations Statistics Commission. It is not mandatory, but its recommendations have been taken seriously by all major statistical offices, including Eurostat (see paragraphs 3.15-3.22).

Table 3.1 International guidance

| Publication   | Organisation(s) responsible   | Type of guidance on measurement of government output   | Status  |
|---|---|--|---|
| <i>System of National Accounts SNA (1993)</i> , new version<br>SNA 2008 under preparation | UN, OECD, World Bank, IMF, and European Commission. Document prepared by Inter-secretariat Working Group on National Accounts. Approved by UN Statistics Commission | High level guidance  | International standard  |
| <i>European System of Accounts ESA (1995)</i>   | Eurostat  | Fully consistent with SNA 1993, more focused on the circumstances and data needs of the European Union                               | A legal basis to ensure strict application, providing harmonised statistics   |
| <i>Eurostat Handbook on Price and Volume Measures in National Accounts (2001 edition)</i> | Eurostat  | Expansion of ESA 1995 guidance, distinguishing activities, outputs and outcomes. Introduces A/B/C score for methods of Member States | Develops ESA 1995 to ensure harmonised price and volume data                  |
| OECD Productivity Manual (2001)   | OECD  | Comprehensive guide to productivity measurement  | No formal status, but indicates desirable properties of productivity measures |

**3.5** The SNA has an extensive discussion of price and volume measures for non-market goods and services (paragraphs 16.133-141). It notes ‘in the case of health and education services provided as social transfers to individual households ... the problems are much less, both conceptually and in practice, than for collective services such as public administration or defence. The objective is to measure the quantities of services actually delivered to households. ... For example, individual health services consist of various kinds of consultations and treatments provided to patients’ (paragraph 16.135). It goes on to say, ‘The output of the health services needs to be clearly distinguished from the health of the community.’ (paragraph 16.136).

**3.6** For collective services, the SNA recognises that measuring changes in volume of services is distinctly more demanding: ‘it is difficult to measure the output of preventive services, and this is an area in which further research is needed’ (paragraph 16.139). It goes on to say, ‘in practice, it may not be feasible to avoid using changes in the volumes of inputs into such services as proxies for changes in volumes of outputs, just as it may sometimes be necessary [to do so] in certain market industries, such as agriculture or construction’ (paragraph 16.139). When it is not possible to avoid using an input measure, the SNA states that the input measure should be a comprehensive one, not limited to labour inputs. The SNA then turns to the question of assumed productivity growth where an input measure is employed. ‘A possible alternative method [makes] an explicit assumption about changes in labour productivity: for example, that labour productivity grows at one per cent per year in the production of the non-market service in question. An assumption of zero productivity growth is the most common one in practice because it is felt to be more neutral, even though it is inevitably somewhat arbitrary’ (paragraph 16.141).

- 3.7** The position taken in the SNA 1993 was cited by ONS (*Economic Trends*, February 1998) as one of the main motivations for the programme of work on direct measures; and the approach adopted seems in line with that envisaged in the SNA at that time.

### SNA revision 2008

- 3.8** The process of revising the SNA 1993 is already underway. The work programme is being steered by the Advisory Expert Group (AEG) on National Accounts of the Intersecretariat Working Group on National Accounts. The AEG, in which ONS participates, hopes to have proposals ready for adoption in February 2007.
- 3.9** Of direct relevance to this review is the item on the AEG agenda: ‘government owned assets – cost of capital services’. As noted below, the OECD Productivity Manual indicates that the volume of capital services is the appropriate measure of capital input for productivity analysis, and it has a solid theoretical basis in the work of DW Jorgenson (1963 and 1995), and others. So far, relatively few countries have made estimates of the flow of capital services (Schreyer, 2003), but progress is beginning to be made. The Australian Bureau of Statistics (ABS) publishes two distinct and complementary capital measures, and stands out in that it ensures full consistency between the different measures: (1) a measure of capital services, as part of ABS multifactor productivity series; and (2) an end-year net capital stock, as part of the Australian System of National Accounts.
- 3.10** There appear to be long lead times in introducing new issues into the revision process for the SNA. We quite appreciate the problems in securing agreement among a large number of countries; we also understand that implementation is itself glacial in its pace. Nonetheless, the issues addressed in this review appear pertinent to the revision of the SNA, and we hope that the ideas put forward here will be allowed to enter the process.

### OECD Productivity Manual

- 3.11** The OECD Productivity Manual was produced with the objective of providing an accessible guide to productivity measurement, particularly for use in statistical offices. It identifies desirable characteristics of productivity measures and, although there is no strongly prescriptive element, it seeks to improve international harmonisation. Strong links are made to the underlying economic theory.
- 3.12** The Manual covers the whole of the economy, but it has lessons for our specific concern with the government sector. One important point is that the term ‘productivity’ is used in different ways, and we need to be precise in its application. (This has been clearly recognised by ONS in its work: see for example, *Economic Trends*, May 2002, p 21.) When people talk about the input approach to the public sector ‘assuming zero productivity growth’, this could have several interpretations; and correspondingly the (output=input) approach can have several interpretations. For example, in some cases, the inputs used to estimate output are confined to employment. In this case, it is output per unit of labour input (‘labour productivity’) that is being assumed constant. In other cases, it is total inputs that are used, in which case it is total input productivity that is being assumed constant. Labour productivity in the public sector may be rising because more capital per worker is being applied.

**3.13** The OECD Productivity Manual recommends that:

- for labour inputs, the volume measure should be hours worked by workers at different skill levels, weighted together using expenditure on each of these categories;
- for intermediate consumption, purchases of goods and services of different types should be deflated using an appropriate price index for each category, i.e. an index constructed to reflect changes in the quality of the goods or services measured; and
- for capital consumption, there should be a method such as a perpetual inventory model which estimates capital consumption.

**3.14** It should be noted that the second of these elements involves the deflation of expenditure, which may be regarded as an indirect method of estimating the inputs, whereas the labour input calculation envisages starting directly from the hours worked, with spending only entering at the weighting stage. As observed in paragraph 2.44, this treatment of labour input may lead in practice to different findings from the deflation of spending on pay by an index of pay.

### **European System of Accounts (ESA 95) and the Eurostat Handbook on Price and Volume Measures in National Accounts**

**3.15** ‘The economic accounts in real terms, i.e. adjusted for price changes, are a fundamental tool for analysing a country’s economic and budgetary situation, provided they are compiled on the basis of unique principles that are not open to different interpretations.’ (European Commission Decision of 17 December 2002).

**3.16** The ESA 95 was adopted in the form of a Council Regulation Number 2223/96, dated 25 June 1996. There have been subsequent amendments, and particularly important here has been the publication by Eurostat in 2001 of the *Handbook on Price and Volume Measures in National Accounts*, which seeks to provide a complete discussion of the issues involved in measuring current and constant price quantities, from general principles to the deflation of individual goods and services. The recommendations were embodied in the European Commission Decision of 17 December 2002. Although certain member states have secured derogations (in the case of Denmark until 2012), implementation is due for the accounts covering 2006 data. A primary objective of this Commission Decision is to harmonise measures of GDP growth, which is a key concern of this review.

**3.17** Central to the approach of the Eurostat Handbook is the introduction of an A/B/C classification. This distinguishes between:

- A methods: the most appropriate;
- B methods: methods which can be used where it is not possible to apply an A method; and
- C methods: methods which should not be used.

**3.18** In particular, ‘C methods are too far away from the ideal to be acceptable. They would generate too great a bias or would simply measure the wrong thing’ (Eurostat Handbook, paragraph 1.4). The Commission Decision means that from 2006 (or, in some cases, 2004 or 2005), C methods are no longer allowed.

**3.19** This classification applies to the whole of the national accounts, not just to the government sector, but the Eurostat Handbook discusses its application to non-market output, covering both individual services (those consumed by individual households) and collective services provided to the society as a whole. The Eurostat Handbook rejects the convention that (output=input) on the grounds that it ignores all changes in productivity. It rejects, too, the input approach complemented by an assumed productivity change: ‘there is no reason at all why for example a 1 per cent productivity adjustment would be more plausible than a zero per cent adjustment. Productivity might just as well have declined’ (Eurostat Handbook, paragraph 3.1.2.1). The Eurostat Handbook equally addresses the argument that the input method, if not ideal, can at least ensure comparability across member states if all make the same assumption about productivity. It is robust in dismissing this argument: ‘a harmonised assumption about productivity does nothing to make the resulting estimates of output more comparable. The more different the developments in productivity among member states, the less comparable are the results from using the same productivity change assumption’ (Eurostat Handbook, paragraph 3.1.2.1).

**3.20** Member states are therefore required to develop direct output measures. The requirements for different gradings are summarised in Table 3.3. The criteria for an A grade provide a valuable checklist when considering the individual functions in ONS accounts. The B classification still represents compliance. In the case of collective services, the B classification does allow input methods, provided that they estimate the volume of each indicator separately, taking quality changes of inputs into account. Provided that this criterion is satisfied, it would be open to ONS to continue to use input measures for collective services, although it could not achieve an A classification. For individual services, input measures are unacceptable. It should be noted that the classification of services into collective and individual is itself an issue.

**3.21** In considering alternatives to inputs, the Eurostat Handbook distinguishes between activities, outputs, and outcomes. These are described in more detail below:

- a) *Activity* is, ‘for example, the number of operations in hospitals or number of patrols carried out by the police. Such data can often be found. Activity indicators reflect what the non-market units are actually doing with their inputs and are therefore closer to the output. However, suppose for example that new improved forms of medical treatments reduce the number of operations necessary. Taking the number of operations, as an indicator would imply a decrease of output and productivity, which does not seem appropriate in this case. Using activity indicators often does not lead to reasonable productivity numbers. However, for some collective services, activity indicators may be the only indicators that can be found’ (Eurostat Handbook, paragraph 3.1.2.1).

- b) *Output* ‘is the preferred approach. However, it is not always easy to define exactly what the unit of output is. For individual goods and services it is in principle possible to define the output, since an actual delivery of that output takes place from the producer to the consumer(s) ... For example, for education, the output is the amount of teaching consumed by a pupil. For hospital services, the output is the amount of care received by a patient. For cultural services, the output is the amount of theatre plays consumed. For collective services, however, there is no transaction between producer and consumer since these are provided simultaneously to the society as a whole. It becomes therefore very difficult to define the output. It is very difficult to say for example what the unit of output is of defence or police services’ (Eurostat Handbook, paragraph 3.1.2.1).
- c) *Outcomes* are ‘for example indicators of the level of education of the population, life expectancy, or level of crime. Such indicators might be influenced by factors that are unrelated to the activity, and therefore are generally not representative of the output. In some cases, however, outcome indicators can be used as indicators for the quality of the output’ (Eurostat Handbook, paragraph 3.1.2.1).

**3.22** These are valuable distinctions, and they have informed the approach taken by ONS (see Chapters 8 to 11 below for discussion of their application to individual spending areas). At the same time, the distinctions need some elaboration, and this will be taken up in Chapter 4.

Table 3.2 Eurostat Handbook recommendations for government output

| Type of service   | A/B/C methods  |
|---|--|
| Individual services (such as Education, Health, Social Security, Recreation and Cultural Services)          | <p>A methods – output indicator approach where the indicators satisfy the following criteria:</p> <ul style="list-style-type: none"> <li>a) they should cover all services provided;</li> <li>b) they should be weighted by the cost of each type of output in the base year;</li> <li>c) they should be as detailed as possible; and</li> <li>d) they should be quality adjusted.</li> </ul> <p>B methods – output indicator approach where the criteria are not fully satisfied: eg the level of detail could be improved or the measure does not take into account changes in quality.</p> <p>C methods – if input, activity or outcome is used (unless outcome can be interpreted as quality-adjusted output) or if coverage of output method is not representative.</p> |
| Collective services (such as General Public Administration, Defence, Police, and Research and Development). | <p>Broadly the same as for individual services but:</p> <p>B methods – input methods are B methods, as are the use of volume indicators of activity. If input methods are used they should estimate the volume of each indicator separately, taking quality changes of inputs into account. Applying productivity or quality adjustments to the sum of the volume of inputs is not recommended.</p> <p>C methods – the use of a single input volume indicator is not a B method.</p>   |



## Progress of Other Countries in Measuring Government Output

- 3.23** In 2003, ONS carried out a simple fact-finding survey of the steps being taken in other countries to implement the SNA 1993 recommendation regarding the use of direct volume measures. Questionnaires were sent to many OECD countries, and form one input into this section of the report. The second input has been the consultations undertaken with the statistics offices of Australia, Finland, Italy, the Netherlands, Norway, Sweden, and with Eurostat and OECD. See Appendix A.
- 3.24** The United Kingdom is among the world leaders, both in its extensive use of direct volume measures of output, covering two-thirds of government output, and in the priority attached to developing this dimension of the national accounts. Australia, Italy and the Netherlands also place a priority on developing direct volume measures, and they cover between 20 per cent and 50 per cent of government output. New Zealand covers 60-70 per cent of central government output.
- 3.25** Several countries, including Finland, Germany and Norway, plan to incorporate them for certain sectors in their national accounts in the next few years, although it should be noted that Germany believed that the traditional input measures were more suitable generally, as they offer international comparability and timely data. The experience of the Netherlands suggests that GDP growth is lower using direct volume measures; Italy has seen no systematic impact; Australia, New Zealand and Canada found that estimates of GDP growth rates increased with the introduction of direct volume measures.
- 3.26** One of the key issues is how to capture quality change in government output. In the case of Education, a number of countries make adjustments, but little account is otherwise taken of quality in the measures actually employed. Several countries reported that they are seeking to develop methods to take account of quality change.
- 3.27** The United States does not make output-based estimates of government output, despite the fact that it has had extensive experience of seeking to measure government productivity. From 1973 to 1994, there was a federal productivity measurement programme, covering two-thirds of federal civilian employees, and tracking a sample of state and local government activities, with data going back to 1967 (Fisk and Forte, 1997). The programme built up some 2,500 indicators of productivity, covering such items as medical care provided (weighted composite), letters delivered, acres of fine lawn maintained, cases disposed by the courts, and disaster loans approved. There has been substantial academic research on productivity change: see, for example, Hulten (1984).

**3.28** The productivity measurement series have not been used in the construction of national accounts. In part, this reflects the fact that the federal productivity measurement programme was the responsibility of the Bureau of Labor Statistics, whereas responsibility for the US national accounts is with the Bureau of Economic Analysis at the Department of Commerce. In part, this reflects the fact that their objectives were rather different. But there have been voices calling for a different approach. In his magisterial survey of extended national accounts, Robert Eisner criticised the US official treatment of government service as follows: ‘Government output is counted on the basis of market inputs of labor services. ... The value of government output is understated by the extent to which it ignores inputs of capital and land. And there is no imputation for the value of labor time not paid for.’ (1988, p 1,620). The last sentence highlights the role of unpaid services to which we referred in Chapter 1.

### Summary

- 3.29**
- a) The programme of work initiated by ONS in 1998 was in harmony with the SNA 1993 guidelines; other countries are engaged in the process of revising their methods for estimating government output, although the United Kingdom leads the way in terms of the extent of use of direct volume measures.
  - b) It is hoped that the work of ONS on the output of the government sector will influence the SNA 2008.
  - c) The ESA 1995, and the *Eurostat Handbook on Prices and Volumes Measures in National Accounts*, have expanded the SNA guidance, introducing an A/B/C classification. By 2006, C methods will no longer be acceptable under a European Commission Decision of 2002. In the case of individual services, this precludes use of the (output=input) convention in measuring government output; in the case of collective services, input measures may be retained as a B method providing that they satisfy certain criteria.
  - d) A number of countries are working on the development of direct output measures, including the treatment of quality change, and it would be desirable if cooperation could be formally established.

# 4 Methodology for the Future: The Principles

---

- 4.1** This chapter sets out a framework for considering the principles to be applied in developing the present measures of the change over time in government output at constant prices. The international guidelines described in Chapter 3 provide a point of departure, but a great deal remains to be done before the intentions signalled in these documents can be fully realised. The United Kingdom is in the vanguard of countries seeking to implement the European Commission Decision, and in some cases is attempting to break new ground. It is not therefore surprising that there has been considerable public discussion of the methods employed and their implications, not least on account of the political salience of public spending.
- 4.2** In view of this, we feel that it would be valuable to enunciate a set of principles on which to base the measurement of the output from government spending. These principles build on the current practice, often serving only to make explicit the implicit methodological approach, but a clear statement may inform the professional and public debate. The main principles we recommend are set out below, and cover the direct measurement of output, the measurement of inputs, and the measurement of productivity.
- 4.3** **Recommendation 4.1:** The direct measurement of the output from government spending, and the measurement of inputs and productivity, should be based on a set of principles, within the framework set by international guidelines.
- 4.4** The principles, which follow, are similar to those set out in the Interim Report, since most of them met with general agreement in the comments that we received. We have, however, reworded a number of the principles to clarify and emphasise the key issues. We have, in particular, thought more deeply about the initial Principle A, regarding the objective of output measurement.

- 4.5 At this point, we should stress that our concern is with government non-marketed output. This has two implications which underline our recommendations but which have provoked helpful comments on our Interim Report. First, we are dealing with activities that lie outside the market boundary that has been traditionally set for measuring national income. It can be argued that the concept of GDP should not be extended in this way. However, not only is such an extension entailed by the 1993 SNA and by our terms of reference but it also has intrinsic merits in terms of incorporating government activities into national accounts. Secondly, we are not examining the case for including other non-market activity. We are solely concerned with government output, not for example with household production activities. We appreciate that government services may complement, or substitute for, unpaid work in the home; the treatment of non-market services is being considered by the Panel to Study the Design of Nonmarket Accounts set up by the Committee on National Statistics of the National Research Council of the National Academies in the United States (National Research Council 2003). But our terms of reference are limited to government output.

### Parallel with the Private Sector

- 4.6 The thrust of the SNA 1993 was, as emphasised by Neuburger and Caplan (1998), ‘to treat, as far as possible, public output in the same way as private output: the same general procedure can be used in both the public and the private sector’ (*Economic Trends*, 1998, p 31). This seems clearly right. The issues of measuring output and productivity apply across national accounts as a whole, and the principles applied to their measurement should, as far as feasible, be the same. This is particularly important in view of the transfers of activity that have taken place across the private/public boundary. It is evidently desirable that the relocation of an activity does not in itself lead to a change in the estimate of national output. Our terms of reference identify the need for comparability with measures of private sector services output and costs.
- 4.7 Therefore, we start from **Principle A: the measurement of government non-market output should, as far as possible, follow a procedure parallel to that adopted in national accounts for market output.**
- 4.8 Once we consider the public sector as supplying services, either individual or collective, it is therefore reasonable to ask: how far we can simply borrow from private sector experience, with appropriate modification? Can we learn from the private sector parallel how to implement the activity/output/outcome distinction drawn in the Eurostat Handbook? In the private sector, the concept of output with which we are concerned is the Gross Value Added: i.e. gross output less the goods and services bought in from other producers (intermediate consumption). Estimates of intermediate consumption are not available in time for the short term measure of the National Accounts and so early estimates of the chained volume measure of GDP (real GDP) are compiled using proxies for Gross Value Added. The ONS preferred proxy is turnover (output), deflated using a relevant price index. This assumes that the ratio of intermediate consumption to total output is constant, in chained volume terms, in the short term. The assumption does not always hold, for example if there were major changes to greater outsourcing of parts of production such as facilities management or IT support.

- 4.9** The proxy method just described has no counterpart in the case of the non-market output by the public sector, since there are no sales, but two other methods do have relevance. The first is to use change in the number of employees to represent changes in output. This input method is also currently used for a small number of private institutions, for example private hospitals. Where employment is used in the private sector, arbitrary allowances for changes in labour productivity in these private industries have been made. This approach is currently being reviewed as part of an industry by industry review of the service sector (Drew, *Economic Trends*, 2003).
- 4.10** The second method is to take direct output measures. For example, in the case of post and courier services, there are 14 indicators, such as the number of first class letters, tonnes of overseas letters, and use of courier services, which are combined with appropriate weights. This is a good starting point, but it should be noted that, according to the Eurostat Handbook section on post and courier services, ‘volume indicator methods based on detailed indicators of the many types of services provided, for example number of letters/parcels broken down by different postage rate, are B methods’ (paragraph 4.8.3.1). In order to achieve an A grading, it is necessary to take account of changes in quality.
- 4.11** Differentiation of the service is the standard way in which national accounts have taken quality change into account. In the postal case, we could say that there is differentiation of service, with the recorded delivery offering a higher quality than the standard service, and courier firms offering a different service level altogether. If more post is sent by recorded delivery, or courier, then the switch to a more highly valued service will lead to a recorded increase in output. In the case of transport, TP Hill suggests that ‘the amount of services produced must be based primarily on the number of passengers transported and the distance over which they are transported’ (1977, p 323), but that different qualities of service may be distinguished to take account of comfort, speed, punctuality and safety (Hill, 1977, p 323). On this basis, a punctual bus service is regarded as a different kind of service from an unreliable one. A bus company that becomes more punctual is then seen as selling more of a higher valued product. It may be argued that there is a difference between marketed and non-marketed output in that, in the market case, competition eliminates low-quality suppliers. But this assumes that competition works instantaneously, and means that no account is taken of the quality benefits from increased competition. There is, in this respect, a difference only of degree between the marketed and non-marketed sectors.
- 4.12** If a sufficiently detailed measurement can be conducted that the individual categories can be regarded as homogeneous, then a quality change shows up in the shifting proportions of the different services. As it is put in the Eurostat Handbook, ‘part of the quality change (that part due to compositional changes in an aggregate) can be captured by differentiating as many qualities of a product as possible. These different qualities are then in fact treated as different products’ (paragraph 2.4.3). But it is important to note the word ‘part’. Quality adjustment cannot be limited to differentiation of services.

- 4.13** If we consider a single service, the introduction of quality considerations raises questions concerning the definition of the service. Should quality enter the definition of the quantity unit? In the case of postal services, should the indicator be the number of letters posted or the number of letters successfully delivered? The degree of success in this case is largely under the control of the supplier, so that we may conclude that quality can be incorporated by taking as the unit the letter delivered, and it is for this that the consumer is paying. A reduction in lost letters then shows up directly as a quality gain. But how far should we take this? In measuring the output of a driving school, should we count only those lessons purchased that lead to success in passing the driving test? Or, since the school does not directly control the pass rate, should we count the number of lessons purchased, regardless of success in passing the driving test? One answer can be given in terms of the degree of *attribution*. If we are confident that the outcome is largely attributable to the supplier, then we may incorporate the quality element into the definition of the quantity. An example is where we treat quality change as ‘simple repackaging’: a quality improvement is assumed to be equivalent to getting a larger package. Higher-grade petrol gives you 10 per cent more miles to the litre, so it is equivalent to 1.1 units of the lower grade.
- 4.14** In reality, the situation is typically more complicated, since there are multiple attributes and we may be less confident about the attribution. Where there are multiple attributes these have to be weighted. For example for letters, one attribute is the percentage delivered at all to the right address, and a different attribute is the proportion of letters delivered by a certain time the next day. These different dimensions of quality need to be combined into an overall quality adjustment. In the same way, where we are less confident, or attribute only a fraction of the outcome to the supplier, then we may take the service supplied (number of driving lessons), rather than the service delivered, but make an overall quality adjustment based on expert evidence. Finally, if we are very uncertain of the relationship, we may decide that no quality adjustment is possible.
- 4.15** These examples from the market sector bring out the problems that arise in seeking to define output and show that it is hard to ignore the quality of the outcome. Outcome either enters in the differentiation of the service (recorded delivery) or in the unit measured (letters delivered), or in an overall quality adjustment.
- 4.16** A further issue illustrated by the postal services example is that of variation in cost of supply. Delivering letters to a terrace of houses opening directly onto the street takes less time than when there are long suburban front gardens. Should this be taken into account? On one view, we would not regard these as different services: the delivery of a letter is the unit of service regardless of its cost of production. If more people live in the suburbs, this does not show up as an increase in postal output. At the same time, the higher costs of transporting heavier letters are reflected in the differential tariff, and this is accepted as a differentiation of service. If people write heavier letters, then this is recorded as an increase in output. How does one distinguish these two cases? In the market sector, it can be argued that the producer makes the distinction in deciding on the price list, but it remains the case that the statistician has to decide how to group services. The degree of differentiation is a matter of statistical convention, not just market-determined.

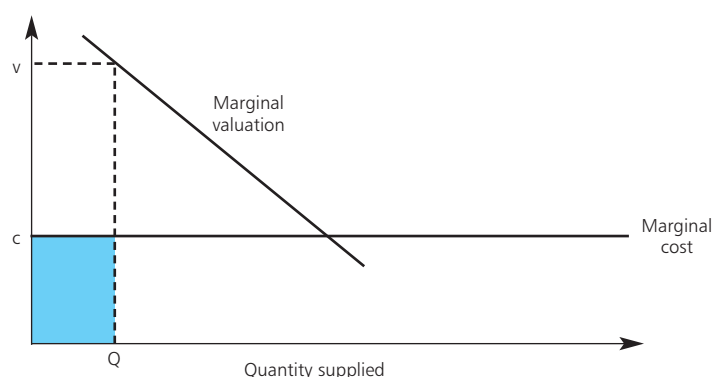
**4.17** A final issue illustrated by the postal service is the ‘option value’ attached to the existence of a service. There is a value to a person even if he or she does not actually make use of the service. The notion is most commonly applied to natural resources, but the same applies to transactions closer to the market. A person derives reassurance from the fact that there is a local plumber, whose services could be secured in the event of a water leak. How is this recorded? If the person takes out central heating repair insurance, securing an option on the services of a plumber, then this market transaction reflects the *ex ante* value. Alternatively, the person pays *ex post*. Clearly, the year-to-year pattern will be different, reflecting the number of days of frost in the year.

### **The Concept of Added Value in Public Services: Individual Services**

**4.18** As we explained in Chapter 1, national income is both a measure of the major economic flows and an indicator of the contribution of economic activity to increasing welfare. GDP is widely used ‘by analysts, politicians, the press, the business community and the public at large as summary, global indicators of economic activity and welfare’ (SNA 1993, paragraph 1.68). In the case of final consumption by households, the justification for the welfare interpretation is that consumers are assumed to purchase an item until its marginal value, measured in terms of money, is equal to the price. If  $X$  denotes the quantity of the good, and  $p$  denotes the price per unit, then the value to the consumer of the marginal unit is  $p$ , and the total value is found by valuing all units at  $p$ , so the contribution to national income is  $pX$ . Goods for which there is a high marginal willingness to pay receive a larger weight in national income than goods for which there is a low marginal willingness to pay. It should be stressed that the resulting measure is not the same as consumer surplus; as noted in paragraph 1.22, we are not taking any account of the fact that the consumer would be willing to pay much more for the first unit of the good. The key element is that the welfare justification lies in measuring the added value to consumers. This value is inferred from the fact that economic agents are undertaking the transactions.

**4.19** The problem in the case of non-market output is that there is no transaction from which the price or quantity can be observed. There are, in fact, two difficulties. First, there is no revealed preference by consumers, but, second, neither can the costs of supplying a marginal unit be taken as a measure of the individual or collective benefit. There is no reason to suppose that government output is supplied to the point where the benefit from a marginal unit is equal to the marginal cost of supply. This is illustrated in Figure 4.1, which shows a declining marginal valuation as more output is supplied, and, to simplify, a constant marginal cost of production. The total cost is found, in this case, by multiplying the marginal cost by the quantity, giving the shaded area. As we have seen, the convention that (output=input) is no longer one that we can regard as acceptable. So we cannot simply take the shaded area. What we have to attempt therefore is to measure the whole rectangle under the marginal valuation curve, i.e.  $vq$ . Even if we can observe  $q$ , the quantity supplied, we still need to construct, or find ways of inferring the marginal valuation,  $v$ , of that quantity supplied. This is particularly difficult in the case of those services where the nature of the service is not adequately defined, i.e. where there are no terms of sale specifying, at least in part, what is constituted by the transaction.

Figure 4.1



**4.20** In order to consider the implementation of this approach with respect to individual services, we turn to the input/activity/output/outcome distinctions made in the Eurostat Handbook. To remind the reader, and taking the health service as an example, we identify the *inputs* as the time of medical and non-medical staff, the drugs, electricity and other inputs purchased, and the capital services from the equipment and buildings used. These resources are used in primary care and hospital *activities*, such as a GP making an examination or the carrying out of a heart operation. These activities are designed to benefit the individual patient. To the extent that they do, the health care provided constitutes the *output* associated with these input activities. Finally there is the health *outcome*, which may depend on a number of factors apart from the output of health care, such as whether or not the person gives up smoking.



- 4.21** Inputs are not an appropriate measure, for reasons already made clear, and, while activities may be the only available indicator and hence have to be used, they, too, are an intermediate variable. The relation between output and outcome, on the other hand, is less obvious, and encounters the problem of defining the quantity unit for the measurement of output that we have discussed above in the case of private services.
- 4.22** The first point to clarify is the difference between measuring total outcomes and measuring the contribution to outcomes of certain activities. A common objection to the use of outcome is that the status of the population is affected by many factors other than public spending. Examination performance depends on the efforts and work done by pupils. Parents who devote more time to teaching their children increase the level of education of a society in a way that cannot be attributed to public spending. This objection is well based, as we explained in paragraph 1.23. But it does not mean that outcomes are irrelevant. What it does suggest is that what we want to measure is the *incremental impact on outcomes arising from the activities of the public sector*. In the case of Education, the objective should be to measure the improvement in individual educational outcomes attributable to the schools.
- 4.23** Ideally, therefore, we want to measure the incremental contribution of the publicly provided service. In practice, it may be very difficult to attribute the outcome to different sources. This appears to be the reason why Hill (1977) argued against using examination results as a measure of the amounts of services produced by educational services. At the same time, he wrote: ‘An educational service is ... the additional skill or knowledge imparted in a pupil directly as a result of the instruction provided by the teacher.’ (1977, p 323). This appears to go beyond measuring the number of hours for which pupils are taught (the driving school case). It may be contrasted with the *Eurostat Handbook* reference to output as ‘the quantity of teaching (that is, the transfer of knowledge, successfully or not)’ (*Eurostat Handbook*, paragraph 4.12). This latter definition sounds more like an activity measure. Certainly, it does not seem reasonable to treat time wasted in the classroom as an output, other than as serving a purely custodial function. To quote Hill, ‘If the pupil’s qualifications and ability are such that he is incapable of understanding and absorbing the teacher’s instruction, there can be no change in his condition as a result of the teacher’s activity and no service is produced in these circumstances. The activity of the teacher is wasted and cannot count as productive’ (1977, p 324).

**4.24** Approaching the question another way, we are firmly of the view that measures of output growth should *in principle* take account of quality change. We appreciate that quality has many dimensions, and that some will prove elusive, but in principle quality changes, whether positive or negative, should be taken into account. This may be seen as no more than an application of Principle A, seeking to follow a parallel procedure to that used in the market economy. As it was put by Professor Rhind, Chair of the Statistics Commission, ‘we cannot talk about the productivity of the car industry and how it has changed over twenty years simply on the number of cars being produced. Cars ... have far more functions, are safer and all the rest of it than twenty years ago. ... some sort of parallel to that may well have to be built into assessments of public sector productivity.’ (House of Commons Treasury Sub-Committee, Minutes of Evidence, 8 September 2004, HC 1039-i, Session 2003-04.) While it may be seen as a corollary of Principle A, we feel that it is best made explicit: **Principle B: the output of the government sector should in principle be measured in a way that is adjusted for quality, taking account of the attributable incremental contribution of the service to the outcome.**

**4.25** As we have seen in the case of private services (paragraphs 4.11-4.15), there are at least three different ways in which we can approach the measurement of quality in the national accounts.

First, we can differentiate the services, with the aim of arriving at categories that can be regarded as homogeneous. A quality change is then captured by changes in the proportions of different categories.

Secondly, we can define the volume measure in terms of the degree of success.

Thirdly, the volume measure may be based on the level of activity, such as the number of lessons taught, but the contribution to outcomes introduced in the form of a quality adjustment. The volume measure would be ‘marked up or down’ by a percentage reflecting indicators of success and the contribution of the service to that success.

### **The Concept of Added Value in Public Services: Collective Services**

**4.26** The discussion so far refers to individual services: those consumed by individual households. The difficulties outlined above become more severe when we turn to collective services provided to society as a whole. Thorny issues are involved in devising direct output measures appropriate for COFOG categories such as General Public Services, Defence, Economic Affairs, and Environmental Protection. The Eurostat Handbook recognises the greater difficulties with collective services by accepting that either input measures or volume indicators of activity may be acceptable (under certain conditions) as B methods.

**4.27** It is not always easy to draw a clear distinction between a collective and an individual service. There are spending functions that are largely individual in nature but which also contain elements of collective services. The same is true in reverse: some predominantly collective services have individual service elements. In both cases, we consider that these should be treated separately within the function. However, if new functions are to be covered, we feel that it should only be done after careful assessment and subject to a number of criteria, which we set out in paragraphs 4.40 to 4.44 below.

### Complementarity between Public and Private Output

**4.28** We begin by taking a long-run perspective, examining what would have happened if the United Kingdom had used direct measures to measure educational output since 1963. In Chapter 2, we noted that the CSO had used direct output measures in the 1950s and early 1960s, and that these showed that between 1959 and 1963, the direct method led to estimates of output increase that were significantly lower than those obtained using the (output=input) convention. The direct output measures were then abandoned in the United Kingdom until their use was revived following the UN SNA 1993.

**4.29** The interpretation of national accounts over a 40-year period is open to debate. It can be argued that constant price series become increasingly unreliable if applied over long periods, even where appropriately linked. The separation of money GDP into price and volume components becomes increasingly difficult. At the end date, the nature of the economy looks less and less like that in the starting year. Goods and services have changed out of all recognition. In 1963 students did not have hand calculators, let alone personal computers. It is hard to construct robust price indicators. On the other side, there are those who accept the qualifications that surround the constant price adjustments but feel that the long-run perspective is a valuable one, and that the broad picture can be trusted. At the very least, taking a long-run perspective is a valuable thought experiment.

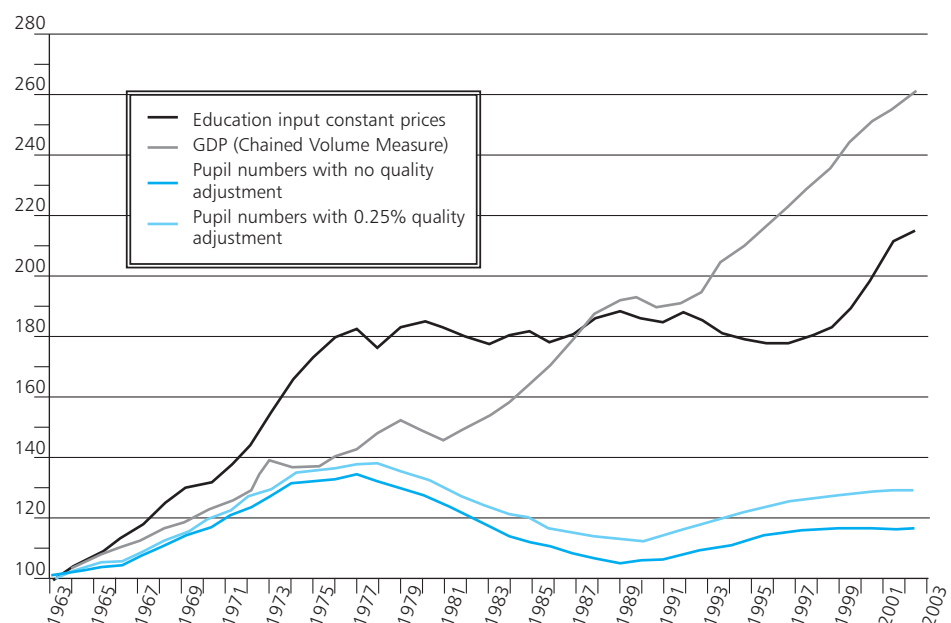
**4.30** Figure 4.2 shows the implications of applying the current direct output measurement method to the education series over the period 1963 to 2003. Also shown for comparison is the deflated educational spending (1963 is the first year for which the Local Authority education constant price series exists; central government expenditure is a relatively small part of the total and is assumed to rise proportionately). Between 1963 and 2003, deflated spending rose by 115 per cent. Over the same period, GDP at constant prices is estimated (with the qualifications in the previous paragraph) to have grown by 162 per cent (shown by the grey line).

**4.31** The starting point for the direct output calculation is the weighted number of full time equivalent pupils, and this is shown by the lowest series, marked by the darker pink line. The series does not include further or higher education, and the relevant spending is also excluded. The pupil numbers rose to reach a peak in 1977, 34 per cent above the 1963 figure, then fell, reaching a value in 1990 only 6 per cent above the 1963 level. The subsequent rise in the 1990s has led to a 2003 figure 17 per cent higher than 40 years earlier.

**4.32** The darker pink line in Figure 4.2 shows the FTE pupil numbers adjusted by the quality factor of 0.25 per cent per year since 1963. Even with the quality adjustment, the growth in output is considerably less than the growth in deflated inputs. Taken together, they imply a substantial fall in productivity over the period as a whole. Between 1979 and 1989, for example, the implied productivity fall was some 19 per cent; in the previous decade it had been 17 per cent. For measured output to have grown at the same rate over the period 1963–2003 as deflated inputs, the quality adjustment would have had to have been some 1.5 per cent per year (geometric). For output to have retained its share of GDP, it would have had to have been 2 per cent. There is no reason to suppose that other periods would have led to very different conclusions. The baby boom may have caused a cycle, but in the long-run a demographic-based output measure is bound to show output of the service falling behind GDP where GDP per head is rising in real terms. As noted above, one has to be cautious in interpreting constant price series over a long run of years, but the effect is exhibited on a year to year basis.

**4.33** There are several possible responses to this long-run picture. One response accepts that in a service like teaching there is little scope for productivity increase. As noted in Chapter 2 (paragraph 2.11), many public services involve an essential human input. There may be some scope for more efficient organisation, and for greater use of supporting equipment and staff, but there is no possibility of reducing the teacher/pupil ratio to the degree that labour productivity has increased in manufacturing.

Figure 4.2



**4.34** The second response is to point to the complementarity between public and private output. To illustrate this, we begin with another example: the fire service. The present output measure is an ex post calculation of the actual number of primary and secondary fires attended (plus an allowance for fire prevention and special services). But this ‘incident’ count takes no account of the benefit derived from putting out a fire. Suppose that we consider the ex ante valuation placed on the existence of the fire service (the ‘option value’ – see paragraph 4.17). This valuation will reflect both the probability of loss and the magnitude of the loss. The direct output measure in effect takes account of the former but not the latter. This neglect of the extent of property protected does not seem reasonable. The ‘benefit’ of saving a house from a fire must have gone up with rising housing standards and increased household contents. (We have in mind here the replacement cost of the property, not the total cost that includes the value of the site.) The same applies to industrial and commercial property. The prison service provides a second example. The value to society may be seen in terms of the ex ante capacity to incarcerate people if the need arises. The value depends in part on the scale of property to be protected and of the economic activity that would be disrupted by criminal activity. The advent of Information Technology, for example, has both increased real GDP and increased the need for protection.

**4.35** It should be stressed that we are talking here about the real value, not the increase due to inflation. Moreover, we are talking about the marginal valuation, not about consumer surplus. We are not seeking to attribute to the fire service the full benefit from its existence. We are not measuring the total area under the demand curve. Rather we are adding the marginal willingness to pay of different citizens. Two centuries ago, when the typical home contained little of value, the value of the fire service or of police protection or the courts in terms of domestic property was quite limited. Today, with homes resembling offices/factories, and with offices and factories full of expensive equipment, the value is many times higher. To this it may be responded that the typical person two centuries ago may have owned very little but he or she could much less afford the loss. This is true, but the fact that £1 meant so much more applies also to private output, to which we are adding public output to form GDP. The person could equally not afford to lose a week’s wages. Finally, we are not suggesting that the value of public sector output necessarily increases proportionately with the value of private sector output. If people chose to spend all of their increased real income on foreign travel, then there would be no increase in the value of home contents (although there would probably be more airports).

- 4.36** The point made here, is a quite general one: to a significant degree, the output of government services rises with the real value of private assets and incomes. We have just seen the force of this argument in the case of the protective services and it can be extended to education and to health care. Again the valuation of the output should reflect rising real output per head in the private sector. If we see the output of Education in terms of the acquisition of skills and qualifications, then their value increases with rising real earnings. If a university degree adds, say, 20 per cent to earnings, then today's degree adds 20 per cent of a larger number (even adjusted for inflation) than the degrees of a generation ago. It should be stressed that these considerations apply to *changes* in the valuation over time. It is the value of output relative to a generation ago that is affected. In practice, real earnings in the United Kingdom have risen by some 1.5 per cent per annum. Moreover, it is the general level of earnings that is relevant. There are clearly large earnings differentials between individuals, and between groups such as men and women, but it is the overall growth of earnings that we are seeking to capture.
- 4.37** It may be argued that education provided by schools is only partly responsible for the increased skills and qualifications. This is certainly true, but it is only relevant here if there has been a *change* in the extent the increase can be attributed to education. If 60 per cent, say, of earnings gain is attributable to school education, then in both years we are taking 60 per cent of a total earnings figure, which has increased, say, by 1.5 per cent per year. Secondly, it may be objected that we are double-counting the future earnings gain. The increased earnings appear both now, in the calculation of public output, and later when the worker receives the earnings. In this respect, however, the outlay is no different from any other purchase of an investment good. Finally, if the increase in the number of people with degrees leads to a fall in the earnings premium for graduates, then the value will not rise in line with average earnings. This is certainly true and needs to be taken into account.
- 4.38** In the case of health, rising real wage rates means that we attach a higher valuation to days lost through sickness absence. An extra week at work today is worth more than forty years ago. The same effect may apply more generally. The literature on Quality Adjusted Life Years has considered how the financial value to be attached should be adjusted over time. The answer given by Gravelle and Smith (2001) is that it should grow at approximately 1.5 per cent per year in real terms. Again, it is the overall change that is relevant. We are not seeking to differentiate between the values of extended life for people alive at a particular date.
- 4.39** In our view, this complementarity is important. Unless it is taken into account, there is a serious risk that the output of the public sector will be understated. This may be summarised in **Principle C: account should be taken of the complementarity between public and private output, allowing for the increased real value of public services in an economy with rising real GDP.**

## Coverage of Output Indicators

- 4.40** The fact that national income is an indicator, not a precise addition over all the possible constituent parts, means that we should not expect an indicator of government output to be based on data that cover every single pound of government spending under a particular heading. At the same time, the international guidelines are right to stress the need for extensive coverage. The Eurostat Handbook requires for the A grading that the indicator should cover all services provided. Realistically, a balance has to be drawn between coverage and cost of implementation. We would expect that, within a government function, all major services should be covered. ONS practice has shown, for example in the new Health measures, that a high level of coverage can be achieved.
- 4.41** To make this more concrete, we believe that the procedure of defining direct output indicators within a government function should start by seeking to identify the services provided by government to households and firms, and attempts made to find data to reflect these services as comprehensively as possible, with appropriate allowance for quality change. The services should be the starting point, not the available indicators. If, initially, it is necessary to apply an indicator from another service, this should be explicit. A condition for the introduction of a new indicator should be that it covers adequately the full range of services for the functional area. The coverage of indicators within a function should be reassessed on a regular basis. Development of new output measures is discussed further in Chapter 6, but we would expect that the effects of its introduction had been tested service by service. A comparison would be made with the input-based estimates, and an examination made of the implied productivity estimate (see below).
- 4.42** We recognise that these criteria set a high standard. As in the existing functions covered in the United Kingdom, the initial estimates may not meet all these criteria, and there will need to be a continual process of revision and improvement. In order to meet the Eurostat deadlines, it may be necessary to introduce indicators before proper allowance can be made for quality change. As we have emphasised earlier, there are conceptual and practical problems to be overcome. But it is important that an initial evaluation be made of the proposed indicator, and that the shortcomings be clearly identified before the direct output measures are introduced, if only to warn users of the limitations of the output measures.
- 4.43** Once a new measure has been introduced, there should be provision for regular statistical review. Particular attention should be made to the consequences of changes in the machinery of government and in the methods of service delivery. The proposed method should be robust with respect to changes in the allocation of responsibilities between government departments. The method needs to be reviewed in the light of new developments, such as in the UK health care case the introduction of NHS Direct.

- 4.44** To sum up, we commend **Principle D: formal criteria should be set in place for the extension of direct output measurement to new functions of government. Specifically, the conditions for introducing a new directly measured output indicator should be that (i) it covers adequately the full range of services for that functional area, (ii) it makes appropriate allowance for quality change, (iii) the effects of its introduction have been tested service by service, (iv) the context in which it will be published has been fully assessed, in particular the implied productivity estimate, and (v) there should be provision for regular statistical review.**

### Geographical Coverage

- 4.45** As was clear from the presentation in Table 2.1, the present direct output measures differ in their coverage across the United Kingdom. This is italicised in Table 4.1, where the marked entries indicate situations where the indicators fail to cover the whole of the United Kingdom. The reader of a volume entitled *United Kingdom National Accounts* might expect the coverage to be UK-wide, but this is not the case.
- 4.46** This lack of full geographic coverage is of concern because of the sums involved. It is particularly of concern given the long-standing differences between the constituent countries in services, methods of service delivery, and machinery of government. These differences have become even more important as a result of devolution. The output indicators should reflect the variation in services.
- 4.47** Moreover, the devolved governments, or their citizens, may well wish to have separate output estimates. These are of interest in their own right, allowing comparisons across countries. They also enter into the macroeconomic statistics for the different countries, such as growth rate of GDP. The same issues of comparability that have concerned Eurostat when dealing with EU Member States apply within the United Kingdom to the Devolved Administrations.
- 4.48** We have therefore been encouraged by the response of the authorities in the other three countries over the past year to the need for progress in meeting these challenges. We hope that they continue to give priority and adequate resourcing to this endeavour.
- 4.49** **Principle E: measures should cover the whole of the United Kingdom; where systems for public service delivery and/or data collection differ across the different countries of the United Kingdom, it is necessary to reflect this variation in the choice of indicators.**

### Inputs

- 4.50** In Chapter 2, we stressed the need to consider not only the output side of the equation but also the input side. Correct measurement of inputs is necessary for several reasons. First, for most collective services inputs are likely to be the basis for output measurement for some time to come. Secondly, where there are direct measures of output, the deflated inputs provide a natural point of comparison, helping us to interpret the observed output changes. Thirdly, the deflated inputs have been used as the basis for statements about the implied productivity of the public services (see below).



Table 4.1

| Function  | Coverage | Main components of existing output indicator   |
|---|----------|--|
| Health  | 30.3%    | <i>DH cost-weighted activity index</i>   |
| Education   | 17.1%    | <i>Pupil numbers with 0.25% quality adjustment</i>   |
| Social Protection – Administration of Social Security   | 2.7%     | Number of benefit claims for 12 largest benefits   |
| Public Order and Safety – Prisons, Courts and Probation | 3.0%     | <i>Number of prisoner nights, number of court cases and cost-weighted activity index for probation</i> |
| Public Order and Safety – Fire                          | 1.1%     | Number of fires attended of different types, other special services                                    |
| Social Protection – Personal Social Services            | 7.4%     | <i>Number of adults and children in care. Number of hours of home help.</i>                            |

**4.51** We therefore commend two principles for the measurement of inputs. The first concerns coverage: the inputs taken into account should be as extensive as possible in their coverage. The inputs currently considered by ONS include all three of those listed above: capital, labour, and goods and services. However, the capital element is limited to capital consumption. Capital consumption refers to the depreciation of fixed capital, not to the opportunity cost of the capital being employed in the public sector, rather than in another, use. For any given type of asset, there is a flow of productive services from the cumulative stock of past investments. To illustrate, take the example of an office building. Service flows of an office building are the protection against rain, the comfort and storage services that the building provides to personnel during a given period.

**4.52** We recommend that the appropriate measure of capital input for production and productivity analysis is the flow of *capital services* of an asset type. This involves adding to the capital consumption an interest charge, with an agreed interest rate, on the entire owned capital. It would be this total cost of the capital which would influence the leasing charge or the user charge under the Private Finance Initiative (PFI) where these alternative routes to securing capital services for the public sector were employed. Conceptually, capital services reflect a quantity, or physical concept, not to be confused with the value, or price concept of capital. Because flows of the quantity of capital services are not usually directly observable, they have to be approximated by assuming that the service flows are in proportion to the stock of assets.

- 4.53** The introduction of capital services is, as noted in Chapter 3, on the agenda for the revision of the SNA. This is a significant step. Given the capital-intensive nature of many government services, the inclusion of capital services ‘can give an entirely different picture of the costs of providing government services’ (Bos, 2003, p 122). In the present, more limited, context, it is not the initial levels that are affected but the rate of growth. Government services may always have been capital-intensive, so that their services remain relatively constant. If, for example, there has been a more rapid increase in the other inputs, notably labour, then the inclusion of capital services will mean that the measured increase in total inputs is lower than without the inclusion of capital services.
- 4.54** Capital services can be included in a variety of different ways, and the implementation of this recommendation will involve agreement on an appropriate convention. In considering such a convention, it will be useful to draw on the relation with the determination of the social discount rate to be applied in the ex ante appraisal of public projects (see for example Drèze and Stern, 1987, section 3.5.2). While it may be tempting to attribute a cost of capital related to the cost of government borrowing, it is not clear that this would be correct on either theoretical or practical grounds. The valuation of capital services should certainly not be affected by short-term changes in the sources of government financing.
- 4.55** As noted in Chapter 3, labour input may be measured directly in terms of the number of hours worked, with different skill categories being weighted. Alternatively, the labour input may be measured indirectly from total spending on payroll by deflating by an appropriate labour cost index. Ideally, both should yield comparable figures, but in practice approximations have to be made and the results may differ. We recommend that both methods be employed, and the findings compared and reconciled.
- 4.56** A significant element in the expansion of public spending in the United Kingdom in recent years has indeed been investment in human capital. Recruiting and training staff may appear as a recurrent cost but the benefits will only be seen later. This suggests that we consider the introduction of measures of human capital formation. The SNA argues that ‘while knowledge, skills and qualifications are clearly assets in a broad sense of the term, they cannot be equated with fixed assets as understood in the System.’ (SNA 1993, paragraph 1.52). It would, however, be possible and useful to create satellite accounts for human capital formation.
- 4.57** We therefore put forward **Principle F: the measurement of inputs should be as comprehensive as possible and in particular should include capital services; labour inputs should be compiled using both direct and indirect methods, compared and reconciled.**

## Deflators

- 4.58** For each of the three main inputs (labour, goods and services, and capital), we need price indices appropriate to each of the spending functions. Each of these poses problems, as we illustrate for the first two.

- 4.59** In the case of goods and services, the requirements may be taken from the *Eurostat Handbook on Price and Volume Measures in National Accounts*. Specifically, to constitute an A method, it is required that (i) there be complete coverage, (ii) the prices should be purchasers' prices, (iii) quality change be taken into account, and (iv) there be consistency between the indicator and national accounts concepts. To these criteria, we would add the requirement that they should be sufficiently disaggregated to allow for changes in the input mix.
- 4.60** In the case of labour, the problems of indices for earnings are well known. Arguing by analogy with the Eurostat Handbook requirements for the prices of goods and services, we would expect that (i) there be complete coverage, (ii) the index should relate to actual earnings and not just wage settlements, (iii) the wage indicator should reflect total employment cost, including National Insurance and pension contributions, and (iv) that there be consistency between the indicator and national accounts concepts. There should also be sufficient disaggregation between types of labour to allow for changes in the input mix, eg a shift towards more highly skilled workers at higher earnings, or the reverse.
- 4.61** To summarise on pay and price deflators we propose **Principle G: criteria should be established for the quality of pay and price deflators to be applied to the input spending series; they should be sufficiently disaggregated to take account of changes in the mix of inputs and should reflect full and actual costs.** In the next chapter, we develop this principle by describing the criteria we believe should be applied.

### Productivity and Triangulation

- 4.62** As noted in Chapter 2, the direct approach to the measurement of government output yields an *implied* measure of 'government productivity'. It is a residual. However, there is clearly a risk that the residual will behave in unexpected ways and that it will be dominated by the vagaries of the two measured variables. This implied measure may or may not be consistent with independent evidence on the productivity performance of the public sector. The national accounts necessarily reduce productivity measurement to a single number, and this aggregate statistic may need to be supplemented by richer information. In this section, we point to the need to obtain independent evidence on productivity, as part of a process of 'triangulation'. The independent evidence may be partial in its coverage or based on small-scale surveys, and would be assessed accordingly, but it should be part of the picture.
- 4.63** Starting from the equation  $\text{Productivity} = \text{Output}/\text{Input}$ , we would be seeking to combine evidence on all three elements, rather than assuming that productivity is simply the solution of this equation. This approach would be in the tradition of national accounts, where information from different sources has to be reconciled. This takes us back to the relation with microeconomic measures of public sector performance. As explained in Chapter 1, the national accounts measures do not have the same function. At the same time, they need to be coherent with the evidence from performance studies.

- 4.64** This leads us to propose **Principle H: independent corroborative evidence should be sought on government productivity, as part of a process of ‘triangulation’, recognising the limitations in reducing productivity to a single number.**
- 4.65** This process of triangulation can be conducted at different levels, involving different levels of statistical resources. How far it should be taken is therefore a decision that depends on the availability of resources. Here we distinguish three levels at which the issue could be approached.
- 4.66** As a *minimum*, the production process for the statistics of government output should involve a stage at which they are examined for coherence with other evidence. ‘Looking at the data’ should form part of the existing data production process, but this may need to be made more systematic. To draw an analogy with existing practice, if ONS finds that its statistics imply a sizeable reduction in the output of the oil and gas extraction industry, then this is discussed with industry representatives to see if the finding is consistent with industry experience. An explanation should be obtained for any divergence. The same applies to public sector output and productivity measurement.
- 4.67** In the present context, such cross-checking would involve consideration of the relation of the implied productivity estimates to departmental indicators of performance. As stressed above, these are not measuring the same thing, and there is no necessary reason why there should be agreement. It is, however, necessary that the reasons for any difference should be understood, particularly when the direction of change is different. It is possible for example that departmental performance indicators cover only part of the activities, and that resources have been transferred to ensure their fulfilment. The activities not recorded in the performance indicators may have seen a lower growth, causing an overall measure of output to show a lower rate of increase than the increase in overall inputs. Or it may be that the departmental targets are directed at quality improvements, and that these have been achieved but are not adequately captured in the output measure. The cross-checking may also reveal areas of the process that need further checking and refinement. The end product of such cross-checking would be, we envisage, published estimates of inputs, output and implied productivity that give due weight to the evidence and data regarding each – reconciled data, in fact, in line with long standing national accounting practice. It would be natural and helpful to accompany the published estimates by explanation. Equally, reference has been made to the relation between the indices of labour input obtained by deflating spending on pay and employment figures obtained directly from manpower or other sources. Such comparisons are undoubtedly made within ONS, but it would be helpful to the user if this kind of coherence check could be made more overt.

- 4.68** A *second level* would be an explicit attempt to relate the output and input indicators to departmental performance measures. From the side of ONS, this would mean a systematic examination of the relation between the direct output indicators and the PSA targets. In some cases, it will be clear that the PSA targets are concerned with total outcomes (such as reducing mortality rates from the major killer diseases), whereas the national income measure is concerned with the incremental contribution of government activities. These may well be moving in opposite directions for understandable reasons. From the side of departments, evidence should be assembled regarding productivity increase. Together, these actions should increase the degree of understanding of the relation between these two different sets of indicators.
- 4.69** The first and second levels could be encompassed within the regular ‘productivity articles’ that ONS has already decided to introduce. These articles can discuss measures of productivity in a particular sector of government output, help interpret the findings, and provide commentary on the underlying data issues. This commentary could have regard to the various relevant considerations discussed above. The articles could also bring together ‘triangulation’ evidence on productivity in the sector from different sources that may not be appropriate for the National Accounts but would help clarify the efficiency with which inputs are being used, in the context of the main policy and delivery priorities.
- 4.70** The Government is committed to improving efficiency in public services, following the Gershon Review whose conclusions were announced by the Chancellor in the Spending Review White Paper 2004. Departments have agreed Efficiency Technical Notes with the Treasury, setting out how they will achieve improvements in efficiency – the delivery of more or better services for the same inputs, or of the same service for reduced inputs. The methods of measurement proposed by departments will be of interest for ‘triangulation’: some examples are discussed in later chapters.
- 4.71** The *third, and most ambitious, level*, would be to initiate a government productivity measurement programme. This could draw on the US experience with the Federal Productivity Measurement Program conducted by the Bureau of Labor Statistics (BLS). This was brought to a close in 1994, but statistics produced covered a period as long as 27 years. The reasons cited for its closure were ‘budgetary constraints’ (Fisk and Forte, 1997, pp 19). This serves as a warning as to the resource costs, but does not indicate that the approach as such was a failure. As described in Chapter 3 (3.27-3.28), the programme used a large number of output indicators (more than 2,500 in 1994) to generate an output measure, disaggregated by functions, such as social services and benefits, or legal and judicial activities. But it would not be necessary to collect anything like this number of indicators to achieve a major improvement in the information available regarding public sector performance. In our view the design of such a programme for the United Kingdom deserves serious consideration.

**4.72** On the input side, the programme collected indicators of the number of full-time equivalent employees (not adjusted for skill or experience) and of total employee compensation. From this, the BLS estimated indices for output per employee year (a 34.3 per cent increase between 1967 and 1994) and for unit labour cost. Two major limitations from our standpoint are that labour was the only input taken into consideration and that no allowance was made for changes in the skill composition of the labour force. It would however be possible, with sufficient resources, to overcome these shortcomings in a new government productivity measurement programme.

### Margins of Error

**4.73** Consideration of the national accounts estimates for government output, inputs and productivity raises for many users the question about the margins of error that surround these estimates. For 2003, the *Blue Book 2004* (Table 1.2) showed *individual* government final consumption expenditure of £140,870m, and *collective* government final consumption expenditure of £89,022m at current prices. How many of these figures are significant? Norbert Wiener, the physicist, may not have been wholly right to say that ‘economics is a one or two digit science’ (as reported by Morgenstern, 1963, p 116), but it might be more helpful to say that the latter figure is £89bn plus or minus (hypothetically) £2bn. On this basis the figure for 2003 would be clearly larger than that for 2002 (£81,835m), but the position would be unclear when comparing 1997 (£60,437m) with 1996 (£60,843m).

**4.74** In the past, the Central Statistical Office gave such margins of error, in that it had an A, B and C classification, which corresponded to margins of error of  $\pm 3$  per cent, from  $\pm 3$  per cent to  $\pm 10$  per cent, and more than  $\pm 10$  per cent (Maurice, 1968, pp 40). These were described broadly as ‘good’, ‘fair’ and ‘poor’. These ratings were based on a subjective assessment. They were later dropped.

**4.75** The current interest of ONS in this issue has been demonstrated by the project carried out under the auspices of Eurostat on ‘accuracy assessment of National Accounts statistics’. As the report of this project by Akritidis notes, ‘the quality of the statistical results is dependent not only in the quality of the underlying data, but also on the quality of the statistical process’ (2002, page 38). Part of the error is sampling error, where data are obtained by sample survey. Non-sampling errors are less easily quantified and can arise for a variety of reasons: incomplete coverage, failure to collect data, reporting error, processing error, and errors in making adjustments to the data collected. Moreover, the construction of national accounts involves combining data from many sources with complex interactions. Some elements are more reliable than others, but it may not be easy to determine their contribution to the resulting aggregates. It has also to be recognised that the reliability of estimates depends on the purpose for which they are being used. One user may be concerned with the level of GDP; another may be concerned with the growth rate over time. The first user might find a A/B/C classification of GDP sufficient; the second user would need to know about the correlation of errors in GDP over time.

**4.76** We appreciate the difficulty of treating errors within the national accounts framework, but we would like to encourage ONS to give priority to work on accuracy assessment. We believe that users should be given as much information as possible about the margins of error surrounding the estimates: **Principle I: explicit reference should be made to the margins of error surrounding national accounts estimates.**

**4.77** One issue that bears on the accuracy of the estimates of government output and inputs is the relation between the collection of statistical data and the auditing process. A statistical agency may rely more heavily on sampling, and may prefer more up-to-date, but less accurate, statistics to those that are more accurate but delayed. These differences are, however, ones of degree, and there are good reasons to suppose that a closer integration with the auditing process might lead to greater accuracy and reduce the reporting burden.

### Summary of Principles

**4.78** The principles are:

**Principle A:** the measurement of government non-market output should, as far as possible, follow a procedure parallel to that adopted in the national accounts for market output.

**Principle B:** the output of the government sector should in principle be measured in a way that is adjusted for quality, taking account of the attributable incremental contribution of the service to the outcome.

**Principle C:** account should be taken of the complementarity between public and private output, allowing for the increased real value of public services in an economy with rising real GDP.

**Principle D:** formal criteria should be set in place for the extension of direct output measurement to new functions of government. Specifically, the conditions for introducing a new directly measured output indicator should be that (i) it covers adequately the full range of services for that functional area, (ii) it makes appropriate allowance for quality change, (iii) the effects of its introduction have been tested service by service, (iv) the context in which it will be published has been fully assessed, in particular the implied productivity estimate, and (v) there should be provision for regular statistical review.

**Principle E:** measures should cover the whole of the United Kingdom; where systems for public service delivery and/or data collection differ across the different countries of the United Kingdom, it is necessary to reflect this variation in the choice of indicators.

**Principle F:** the measurement of inputs should be as comprehensive as possible, and in particular should include capital services; labour inputs should be compiled using both direct and indirect methods, compared and reconciled.

**Principle G:** criteria should be established for the quality of pay and price deflators to be applied to the input spending series; they should be sufficiently disaggregated to take account of changes in the mix of inputs and should reflect full and actual costs.

**Principle H:** independent corroborative evidence should be sought on government productivity, as part of a process of ‘triangulation’, recognising the limitations in reducing productivity to a single number.

**Principle I:** explicit reference should be made to the margins of error surrounding national accounts estimates.



# 5 Inputs and Deflators

---

## Introduction

**5.1** In the next three chapters, we consider the process of putting into effect the principles outlined in Chapter 4. This chapter sets out the issues and progress made under the review with regard to measurement of inputs processing of input data, and pay and price deflators. Application to specific functions of the work to date concerning inputs and pay and price deflators will be covered in Chapters 8-11.

## Input Measures

**5.2** The previous chapter proposed general principles on the measurement of inputs and their deflators (Principles F and G). These point to significant changes. The consideration of the measurement of inputs, and of the price deflators applied, has turned out to be an important element of the review. Moreover, it is an element that applies to all functions of government. Correctly measuring and deflating inputs is, indeed, even more important for those functions where output is not measured directly, in that the deflated input figures themselves enter the GDP growth rate calculation.

**5.3** In assessing the availability and supply of data used in the National Accounts, we have concluded that there is insufficient recognition across government of the importance of data on government spending to produce accurate national accounts. In turn, ONS and the Treasury need to develop stronger relationships with data suppliers.

**5.4** **Recommendation 5.1:** we recommend that the importance of accurate data on government spending for the National Accounts be recognised at the highest level, for example, by including suitable requirements in the letters of appointment of Accounting Officers and Principal Finance Officers.

**5.5** The following main issues have been identified:

1. complex data flows involving multiple suppliers;
2. data classification;
3. poor data timeliness and periodicity;
4. possible solutions offered by the new Treasury data system, Combined On-line Information System (COINS);
5. measurement of capital inputs to production; and
6. measurement of labour inputs to production.

- 5.6** ODPM, ONS and Treasury action plans have moved work on this area forward since the beginning of the review. This work is important and the departments should continue to work collaboratively.

### **New Developments**

- 5.7** Before discussing these issues in detail, we describe new developments which should provide better mechanisms for joined up working across government and facilitate the process of acquiring better quality financial information.
- 5.8** New sources of consolidated audited financial year data are gradually becoming available through the 'dry run' processes leading to the publication of accounts based on the Generally Accepted Accounting Practice (GAAP) – the 'Whole of Government Accounts' (WGA) – covering first central government, then in due course expanding to include local government and public corporations. (It is important to note that individual departmental resource accounts, Non-Departmental Public Bodies (NDPBs) accounts and public corporation accounts are already available on a GAAP basis.)
- 5.9** These new consolidated outturn financial year data will also be integrated with the quarterly and monthly central government data, and other financial year data produced by the Treasury through its Single Data System project. The new Treasury data system COINS is due to be implemented during 2005/06 and is discussed in more detail in paragraphs 5.37-5.47 below. The financial management systems of individual central government departments are also coming under scrutiny in a series of reviews led by Mary Keegan, Head of the Government Accountancy Service. These aim to simplify and strengthen government financial management frameworks and processes.
- 5.10** We now set out our concerns about input measures and processes which became apparent during the review, report on progress made by the review team in collaboration with departments, and recommend where further work is needed.

## Issue 1: Complex Data Flows

**5.11** There are a multitude of data sources for inputs, processed within a complex structure. The data required have at least the following main sources:

- central government departments and the Devolved Administrations, via the Treasury;
- English local authorities, via the ODPM;
- Scottish local authorities, via the Scottish Executive;
- Welsh local authorities, via the Welsh Assembly Government;
- Northern Ireland local authorities data, via the Central Expenditure Division in the Department of Finance & Personnel for Northern Ireland and then the Treasury;
- Customs and Excise; and
- NHS Trusts and NHS Foundation Trusts (England), via the Department of Health and the Treasury.

The annex at the end of this chapter provides more detail on data flows and sources.

**5.12** There is a lack of communication and understanding in how the data are used to produce the National Accounts. People upstream in the processing chain are often unaware of what will happen to the data further down the chain. Equally, people downstream often find it difficult to obtain explanations for apparent oddities, paradoxes and strange movement in the data they receive. Yet the validity of the data depends on end-user requirements being communicated to the data suppliers, and those later in the chain documenting the sources and methods of adjustment applied (see Annex paragraph 3 for further detail). Of particular importance is the need for contextual information. If, for example, there are large year-on-year changes in the data returns or large revisions, these need to be accompanied by explanatory material. This may involve ONS making reclassifications to the National Accounts to reflect changing methods of service delivery, or following through to other figures to ensure consistency when there has been a change in responsibilities between departments. The lack of documentation not only contributes to a lack of clarity across key players in the data processing chain but there is also a risk to business continuity in the accurate compilation of the National Accounts, when key staff move posts.

**5.13** Data go through several processing stages before being published in the National Accounts. All of these stages require various people at central government departments, the Treasury, ONS, local authorities and the Devolved Administrations to provide information which is then transformed into various formats to meet the needs of the National Accounts. The multiple stages of the procedure are illustrated in paragraphs 5 and 6 in the Annex.

- 5.14** We have identified a number of weaknesses in the processing chain regarding central and local government data. Some of these are purely about the process itself and should be rectified once COINS is implemented. Other weaknesses may not be resolved by COINS and will need to be addressed by ONS and the Treasury with the departments involved by other means. A more detailed analysis of the issues and discussion of whether they may or may not be addressed by COINS can be found in paragraphs 5.39-5.46.
- 5.15** Good progress has been made by ONS on documenting the data processing chain. This documentation will also need to incorporate new processes as they come on stream from COINS. ONS should be ready to adapt and improve its current processes to take full advantage of COINS.
- 5.16** At present, a service level agreement covers the relationship between ONS and the Treasury, including specification of work on data supply for the National Accounts. We think that ONS and the Treasury should establish similar joint agreements with all the data suppliers, as a framework for establishing roles, responsibilities and timetables to underpin Recommendation 5.1.
- 5.17** **Recommendation 5.2:** we recommend that ONS should continue work to document the data flows on government spending on public services in the National Accounts, both inside and outside ONS. This should be kept up to date as the Treasury's single data system, COINS, is implemented, and ONS should be ready to adapt and improve its current processes to take full advantage of COINS. The requirements for supply of data to ONS from COINS should be managed as part of the Service Level Agreement between the Treasury and ONS, and similar formal relationships may be needed in other areas.

## Issue 2: Data Classification

- 5.18** Before illustrating the issues surrounding data classification, it may be helpful to explain some of the terminology used in the compilation of the National Accounts.
- COFOG – stands for Classification of the Functions of Government, which is the international standard used for classification of government activities for the purposes of national accounts. ONS use COFOG categories based on the UN standard, whereas the Treasury use a functional classification which is wholly consistent with UN COFOG at the high level ('Level 1') and partially consistent at a more detailed level ('Level 2') – this is further explained in paragraphs 5.23-5.26. Examples of high level functional categories are Public Order and Safety, Education and Health.
  - Economic Categories – these are based on the European System of Accounts (1995) classification of transactions. Examples of economic categories are pay, expenditure on goods and services, current grants and transfers.

- 5.19** A key element of the processing of government expenditure data is its classification into Economic Categories and functional categories. Data do not arrive from departments in the formats in which they are required. Given the complexity of the data supply chain, there are difficulties in reconciling the classifications (both economic and functional) used by departments and those required in the National Accounts. A poor match of data breakdown to National Accounts categories requires statisticians to make a number of further assumptions to enable compilation of components and hence final figures.
- 5.20** For the compilation of Local Government Final Consumption, the data supplied for local authorities in different countries of the United Kingdom vary in suitability for purpose. English, Welsh, Scottish and Northern Irish local authorities all supply budget and outturn information to their central administrations using different versions of economic categories and with different breakdowns of public services. In no case are the economic category requirements for the National Accounts completely met by the information supplied. Conversion of these data from different sources to the data formats required by the National Accounts is dependent on a number of assumptions by ONS statisticians. The validity of these assumptions, which may vary from one year to the next, can seriously affect the quality of the data.
- 5.21** The work carried out by the review team has identified problems with English Local Authority data. These, together with proposals for change (including assessment of plans for the provision of quarterly information) have been presented to stakeholders, including Local Authority Associations and the Chartered Institute of Public Finance Accountants (CIPFA). As a result, steps have been taken to set up a small, high level working group to take forward proposals for change. The working group will be chaired by ODPM, with representation by stakeholders such as ONS, the Treasury, CIPFA, LGA and the Audit Commission. This is an important development. Discussions are taking place to achieve similar improvements to the local authority data provided by devolved administrations. The data collections systems in Scotland for collecting local government expenditure have recently been reviewed in line with Best Value Accounting Code of Practice (BVACoP) classifications and advice from CIPFA. Local Authorities in Scotland were heavily involved in this review. The data quality has been improved significantly as a result.
- 5.22** There are still some outstanding issues with classification of data provided by departments. Departmental expenditure data supplied to the Treasury is attributed to a COFOG-like category (i.e. it is based on the UN COFOG category, and is compatible at Level 1, but not entirely comparable at Level 2), for use by ONS in the National Accounts and by the Treasury in *Public Expenditure Statistical Analyses* (PESA). Until recently, the attribution was of poor quality, to the extent that it did not involve departments in the process. In order to provide better data, the Treasury undertook in 2003–04 a detailed exercise, in consultation with departments, to classify departmental expenditure into a more accurate functional breakdown based on COFOG. The Treasury and ONS have recently introduced new procedures. These clarify the process for departments to use the correct functional classification for their data and for ONS to report misclassifications back to the Treasury and ultimately the departments. This allows the relevant guidance to be updated to ensure consistent coding on the correct basis in the future.

- 5.23** This new classification system used for PESA is consistent with the top-level functional breakdown of COFOG as used by ONS in the National Accounts. A more detailed breakdown is collected for PESA purposes, but this two-digit PESA breakdown is not the same as the more detailed level of UN COFOG (i.e. 'groups' or Level 2), although there is considerable overlap. ONS, however, do need to use data based on the more detailed classification of the UN COFOG (i.e. Level 2) for volume measures of government consumption. This is not consistent with the information provided by the Treasury. To overcome this, Treasury officials provide estimates of the information required by ONS based on a series of assumptions. Expenditure data at this level of detail are likely to be required for more accurate analyses of productivity in the future.
- 5.24** Although there is currently no international requirement for COFOG Level 2, we note with interest a recent move by Eurostat to request data from Member States at this more detailed breakdown of COFOG on the pure UN basis. In the short term, partial reports or estimation will be required where the PESA Level 2 COFOG does not exactly match the detailed UN Level 2 COFOG requirements. In the longer term, more detailed data will need to be collected.
- 5.25** The impending move to the international use of Level 2 COFOG data should lead to better quality output indicators and analysis of productivity measures. While we understand that ONS and the Treasury are planning to work with departments to be able to comply with this request, it must be recognised that the ability of departments to provide good quality information will also depend on the investment, in the form of training and guidance, made to collect it.
- 5.26** We welcome the ongoing work by ONS and the review team to assess the issues on COFOG: this should result in clearly defined roles and responsibilities for ONS, the Treasury and departments with respect to COFOG. In addition, we recommend that any inconsistencies are rectified in the National Accounts as soon as practically possible and that guidance is amended to reflect relevant issues. As arrangements currently stand, the Treasury advises departments how to allocate their expenditure to the most appropriate activity (i.e. function), for example, spending on Health, Police. This advisory role does involve ONS. However we question whether the current arrangements are the best that could be achieved and recommend that ONS and the Treasury review these procedures; in particular whether joint governance would be a better approach or whether the various components should be brought together in one unit.
- 5.27** Similar data classification issues have arisen with the correct use of economic categories. In some cases, for example, expenditure which should be classified as expenditure on goods and services (and hence part of General Government Final Consumption (GGFC)) has been wrongly classified as a transfer (i.e. not part of GGFC): work in the context of this review has led ONS to conclude that this was the case for Legal Aid. These types of misclassifications will affect the total for GGFC, as transfers are excluded from this figure. ONS is reviewing the extent of this problem, and we recommend they should draw up a work programme to develop guidance and rectify inaccuracies. This is important work which must continue.

## Data by Country and Function

- 5.28** Analysis of expenditure data by government function and UK country is needed to match the new measures for functions, which departments in Scotland, Wales and Northern Ireland are developing, as set out later in this chapter. This is currently challenging because of the complexity of compilation. The National Accounts show spending figures by government function, but only at a UK level, and these functional figures are not disaggregated into the four countries. Meanwhile, the Regional Accounts, which provide an overview of the economic performance of the United Kingdom at a regional level, show spending figures for the four countries, but they are not split by government function.
- 5.29** It is possible to estimate a breakdown of spending by country and government function by using the source data behind the National Accounts. However, the results yielded by this method are not satisfactory:
- The source data do not include capital consumption or adjustments, which are added at a UK level. These can be allocated to each country by pro-rating according to the shares of each country in total expenditure before the addition of capital consumption and adjustments, but this is not ideal. This problem should be remedied, at least for central government, when ONS move to using capital consumption figures provided by Resource Accounting Budgeting data rather than via its own Perpetual Inventory Model (PIM) – see paragraphs 5.53-5.56.
  - Secondly, the source data reflect spending by each of the four governments, rather than functional spending within the country. For example, using this method, spending on certain functions in Wales and Northern Ireland appears extremely low, due to much of it being the responsibility of, and thus classified under, England.
- 5.30** The Treasury publication *Public Expenditure Statistical Analyses* (PESA) publishes analyses of public expenditure split by both the country and region for whose benefit the expenditure is incurred and by Treasury COFOG function and sub-function. However, these analyses exclude capital consumption and various National Accounts adjustments. They use different data sources in places. They do not distinguish between final consumption and transfers in the published analyses.
- 5.31** These problems need to be addressed. It should be possible to make progress in the context of work already under way to implement the recommendations of the McLean report.
- 5.32** In light of the above, it is clear that further work is needed if a clear split of functional spending between countries is to be obtained. ONS should therefore work with the Treasury, ODPM and the Devolved Administrations in improving data collection procedures at this, more disaggregated level.

**5.33 Recommendation 5.3:** We recommend that ONS and the Treasury should work together, and with ODPM and the Devolved Administrations, to improve the accuracy of data classification for government spending on public services in the National Accounts. In particular:

- ONS should engage actively in the Local Authority Working Group which ODPM are setting up, aiming for data to be collected at source in ways consistent with ONS economic categories, and to improve timeliness.
- ONS and the Treasury should plan to collect Level 2 COFOG data, as now required by Eurostat, and should work with departments to ensure they understand what is required so that data are classified accurately at source.
- ONS should review accuracy of current classification in the National Accounts, by Government function and by economic category, and should rectify any inconsistencies.
- ONS and the Treasury should review their respective roles in advising departments on classification issues to assess whether current arrangements are the best that could be achieved, in the interests of clarity for data suppliers and accuracy in compiling the National Accounts, and other purposes for which the same data are used.
- ONS and the Treasury should develop a satisfactory basis for attributing government spending, consistent with the National Accounts, between functional classification, economic category and country within the United Kingdom, as this will be required for productivity analysis (e.g. matching appropriate deflators for different countries).

### Issue 3: Poor Data Timeliness and Periodicity

**5.34** Poor data timeliness and lack of appropriate periodicity for some components of the National Accounts mean that ONS statisticians often have to make assumptions, use forecasts or budget estimates, so as not to delay production of final figures. These estimates may or may not correspond to actual outturns. This principally applies to local authority data, where the data supplied for the compilation of current price GGFC are provided only on an annual basis, often up to a year after the financial year to which they relate. However, for central government (except for the Northern Ireland Executive and some non-departmental public bodies (NDPBs) at present), high-level monthly outturn and more detailed quarterly outturn by COFOG are supplied via the Treasury. Where there is slow delivery of financial year data and an absence of quarterly outturns, there is a heavy reliance on budget estimates or forecasting for the most recent time periods and interpolation for earlier quarters. This means that this aggregate is subject to frequent revisions. This links with a series of reviews which the Head of the Government Accountancy Service is leading.



- 5.35** In line with international standards, ONS publish National Accounts data on a calendar year basis, whereas all UK financial accounting, including that of the government, is on a financial year basis. As calendar year covers different parts of two financial years, the transition between quarterly and financial years is dependent on good quality quarterly information. So, in compiling data for calendar year 2002, the last quarter of financial year 2001/02 and the first three quarters of 2002/03 are needed. Where there is little quarterly information available, such as for local government and Northern Ireland, estimation is required. An example covering both central and local government is given in the Annex at the end of this chapter (Tables A5.2 and A5.3).
- 5.36** For central government, all departmental expenditure information is provided to the Treasury using either high level in-year monitoring systems or more detailed financial year submissions. Monthly and quarterly data from most departments are provided as part of the Treasury's in-year monitoring of expenditure against financial year budgets; data are supplied for the current year only. More detailed financial year information are updated several times a year to give budget (in-year as well as forecast), provisional outturn and finally audited data for all departments. This detail informs all COFOG allocations and in conjunction with the latest quarterly data, allows the Treasury to provide all required COFOG information on a quarterly basis. Quarterly and monthly audited information is not required from departments, but where there are significant revisions between in-year and audited data, a best estimate of the new quarterly profile is requested.
- 5.37** For local authorities, data are supplied by OPDM and the Devolved Administrations at the budget forecast and outturn stages. There is little quarterly in-year monitoring except for capital expenditure. Issues relating to coverage mean that quarterly information relating to wages and salaries and debt interest can only be used as a guide in the estimation process. Even when data are final, they remain unaudited. Until recently final outturn financial year data was only available from almost 12 months after the end of the financial year, but improvements have already been made and there are further improvements to come. These improvements come partly through acceleration of the timetable for local authorities approving and auditing their accounts, and partly through acceleration of the internal compilation process by ODPM.
- 5.38** It might be feasible for local authorities to provide expenditure information on a sample basis rather than a full census; though at a risk of loss of accuracy. Further consideration should be given to the options for sampling to reduce the respondent burden in the work programme to be undertaken by a newly formed high level working group (see paragraph 5.21).

## Issue 4: Possible Solutions Offered by COINS

- 5.39** The processing of input data should be facilitated once the Treasury's single data system COINS is rolled out in 2005/06 (see paragraph 5.9). COINS, one of the drivers for which was the recommendation in the National Statistics Quality Review of Government Accounts and Indicators, will replace the Treasury's existing three data systems (General Expenditure and Monitoring System (GEMS), Public Expenditure System (PES) Database and GOLD) used to collect expenditure data from central government departments, Devolved Administrations and NDPBs (via their parent department). Local authority data for England for financial years will continue to be sent to the Treasury (via COINS) by ODPM.
- 5.40** Delivering this new combined system will require a strong partnership between central government departments, the Devolved Administrations and the Treasury, in order to integrate budgeting, in-year reporting and end-year reporting processes. Among the planned benefits cited by the Treasury are:
- improved data quality at reduced costs;
  - collecting information that the centre needs once and putting it into a shared data warehouse;
  - improvements in quality of departmental data through greater ability to cross-check, and therefore reduced staff time involved in reconciling and/or explaining differences between data sources; and
  - easier comparison and reconciliation between the different measures of the public finances that ONS and the Treasury use.
- 5.41** Once COINS is fully operational, additional monthly and quarterly data will be available through COINS, for review by the spending teams within the Treasury, which should remove some of the issues with duplication of data collection. Data will be validated when entered into COINS against a number of system checks and balances, addressing some of the quality issues.
- 5.42** We discussed earlier some of the weaknesses found in the processing chain. Many procedural issues should be rectified once COINS is implemented (see Table A5.4). Examples of these are:
- Certain machinery of government changes which result in quarterly and annual data being adjusted differently.
  - Devolved Administrations' data not broken down by standard economic categories.
- 5.43** However, some issues will not be solved by a new system and will need to be addressed by ONS and the Treasury with the departments involved via other means (see Table A5.4 in the Annex). Examples of these are:

- The monthly and quarterly path of some departmental data can be implausible – revisions to previous periods' data are sometimes attributed to the latest month rather than in the actual months in which they occurred.
- No outturn data are provided by some departments for their NDPBs.
- No adequate breakdown of spending on goods and services is currently available, other than some limited information on Health expenditure and Defence expenditure. This information is required for accurate deflation of current price expenditure.

**5.44** COINS is a welcome improvement to the existing three, and often inconsistent, data systems and it should alleviate some of the processing problems found to date. However, it would be unwise simply to believe that a new system will 'deliver all'. It will be important to ensure that users are trained properly to input data directly onto the database and that a well-resourced user support is maintained. This applies not only for existing users of the system, but also for those in the future. Training is needed to ensure staff who input financial data understand why it is that the information is important. Guidance should be comprehensive and evolutionary.

**5.45** The Treasury is formulating a training plan, with documentation for end users of the system. Work started in November 2004 and is due to be completed by April 2005 when COINS implementation begins, and will involve several government departments as pilot users. The type and level of training being planned is consistent with general practice for new IT developments such as COINS. However, we strongly recommend that ONS and the Treasury seize this opportunity to improve the overall training programme for data suppliers to ensure that the right information gets into the system at source.

**5.46** It is crucial that ONS is viewed as an important customer once COINS is implemented and that it plays an influential role in the further development of COINS.

**5.47** **Recommendation 5.4:** we recommend that ONS and the Treasury should regard ONS as an important end-user of the COINS system, fully engaged in plans for future development. We suggest that ONS is involved in a thorough Post-Implementation Review of COINS; ensure there is an ongoing mechanism by which issues of data quality can be addressed; and is involved in the design and delivery of enhanced training for data suppliers.

## Issue 5: Measurement of Capital Inputs to Production

**5.48** As set out in paragraphs 4.50-4.53, capital inputs to production should be measured as capital services. However, compilation of estimates of capital services is in its infancy. The publication of the OECD manual *Measuring Productivity* should bring about more work worldwide in the development of estimates of capital services.

- 5.49** In the United Kingdom, ONS has published experimental estimates of the growth in capital services. These estimates are presented for broad industry and type of asset groupings over the period 1991 to 2002. No disaggregation by function or between public and private sector is given. The development of these estimates should be continued in order to improve their quality as well as the level of detail presented. In particular, distinguishing between the growth by function and between the public and private sectors is essential for understanding the productivity associated with public expenditure on, say Health or Education.
- 5.50 Recommendation 5.5:** We recommend that ONS should continue to develop estimates of capital services, aiming to increase the level of detail presented to distinguish between functions and public and private sectors, to assist in analysis of productivity of public service spending.
- 5.51** In the interim, the capital consumption figures themselves require improvement. There are inconsistencies in the data held to measure aspects of capital within government. The main issues are:
- inconsistencies regarding the measurement of capital consumption of government assets; and
  - under-estimation of investment in Information and Communication Technology (ICT), particularly software.
- 5.52** There are currently two sources of data for central government capital consumption. Capital consumption is described as the reduction in the value of the stock of fixed assets used in the production of goods and services, such as wear and tear, normal obsolescence or normal accidental damage.
- 5.53** For National Accounts purposes, capital consumption estimates are produced by ONS using PIM. However, a second and more reliable source of data is that collected by the Treasury as part of WGA, using data supplied by individual government bodies. WGA are based on UK GAAP and are fully audited by the National Audit Office (NAO). At present, the Treasury have undertaken two dry runs for preparing Central Government Accounts (CGA) (2001/02 and 2002/03); data quality has improved during the dry run process, with publication of the 2003/04 CGA planned by the Treasury. Expanding this exercise to cover the whole of the public sector, as defined for WGA purposes (that is, including local government, public corporations, NHS Trusts and NHS Foundation Trusts) will also start with two dry runs (2004/05 and 2005/06) before publication of data for 2006/07. GAAP based depreciation data have been collected by the Treasury since the introduction of Resource Accounting.

- 5.54** Following the recommendation made in the Interim Report (paragraph 6.18), ONS and the Treasury have carried out an assessment of the two data sources and have agreed that capital consumption of central government assets for the National Accounts should be measured using the departments' own data. However, there are a number of issues that need to be addressed in moving to using WGA estimates. Firstly, they are a new source of data and thus do not provide a history of the government assets in terms of capital consumption or capital stock. So the very significant potential improvement in quality for recent and future estimates will have to be linked to the back series now in the National Accounts. Secondly, there are several data classification issues where existing WGA data do not directly meet the needs of the National Accounts.
- 5.55** A work programme to ensure a smooth transition to the new data source has already begun. This will resolve the various data classification issues between existing WGA data and National Accounts requirements: for example, land is not included in National Accounts estimates of capital stock but is treated by WGA, as a result of valuation methodology issues, in a combined category of 'other land and buildings'. This work programme will also incorporate an assessment of the treatment of expenditure on roads, in particular whether UK practice is consistent with European statistical guidelines. ONS have given a commitment to publish these revised data for central government at the first feasible opportunity (likely to be in the latter half of 2005) and expects to incorporate the new series in the *Blue Book 2006*. NHS Trust accounts for capital consumption have already been used in the *Blue Book 2004*.
- 5.56 Recommendation 5.6:** we endorse the ONS decision to move towards use of the accounts of departments and other public bodies as a basis for estimating capital consumption, rather than its own Perpetual Inventory Model, and recommend that transition should continue, as technical issues are resolved.
- 5.57** The second issue is inconsistency regarding capitalisation of ICT software. Investigative work under the review has shown that, relative to comparable databases like the Groningen Growth and Development (GGDC) database and similar work by OECD and the Bank of England, the National Accounts in aggregate significantly underestimate software investment compared to other western countries. ONS official estimates are provided in current prices in Table 6 of the annual Input-Output Supply and Use Tables. The official data published by ONS on ICT hardware are no different from the GGDC database, supporting the external view that the primary discrepancy between ONS data and the GGDC data is in software. The discrepancy in the figures may be due to 'own account' software (i.e. software which is written in-house) not being capitalised and because purchased software is being recorded under other capital items (i.e. software is being 'bundled' with computer hardware or the product mix of investment is incorrect). It is possible that the purchased software that should be measured as investment may instead be misclassified as intermediate consumption. This would lead to an underestimate of productivity growth in times when there is an increase in the rate of purchase of software.

- 5.58** New ONS data sources, such as the results of additional questions about software added to the quarterly Business Investment release from 2002, and the annual Business Spending of Capital Items survey, will allow improvements to the estimates for businesses. This will help in estimating public sector investment only insofar as business sector IT software investment patterns can be used to proxy for government investment. The product detail available in data on government investment is too aggregated for use in the compilation of Supply and Use Tables or weighting together price indices. For example, this would mean government software purchases would be included in the larger category of ‘plant and machinery’. While this would mean that the total level of investment can be calculated, national accounting methods such as supply-use balancing for products or deflation by asset would be less reliable. Further work on ICT software would improve the measure of software used in GGFC within the National Accounts. This is important if we are to capture the true worth in productivity calculations of advances in technology, and when making international comparisons.
- 5.59** We welcome the work undertaken by ONS and the Treasury in this area and note that a work programme to revise ICT software data for the government sector in the National Accounts has begun. This will lead to better quality information being published in the National Accounts.
- 5.60** The work done so far has shown that there are still some unexplained divergences in the amount of capitalised ICT software when comparing UK national accounts information with other countries. It would be reasonable to expect that these countries would be capitalising roughly the same amount of ICT software. We are clear that there is not a divergence in formal accounting standards, but further work is needed to establish what is causing these divergences.
- 5.61** **Recommendation 5.7:** we recommend that ONS should continue work to clarify why there is a divergence between the amount of capitalised ICT software in the UK national accounts compared with other countries, with particular reference to public sector spending, and should publish revised estimates and commentary when available.

## Issue 6: Measurement of Labour Inputs to Production

- 5.62** Principle F recommends that labour inputs be measured using both direct (number of hours worked, with different skill categories being weighted) and indirect (deflation of pay by a labour cost index) methods. Conceptually, the two approaches should lead to the same results. In practice, there are many reasons why the two may differ, including different coverage of indicators, use of differing assumptions, differential sampling error associated with a given survey, and so on. It is therefore important that the relative merits and demerits of each approach are fully understood.

- 5.63** ONS estimates from their direct measure of labour inputs are available only as a series of total hours worked and with a broad industry breakdown. The figures take no account of any change in the composition of the skills of the workforce. Further development work is needed to construct estimates of public service labour inputs using the direct approach which are suitable for analyses of productivity for individual government functions. These must take account of changes in the quality of labour, that is skill mix.
- 5.64** The indirect approach to estimating labour inputs requires data on labour costs as well as on 'price' movements associated with those labour costs (deflators). Expenditure on labour in the public sector is presented in accounts submitted to Parliament and these are audited by the NAO. The quality of the indirect estimates of labour inputs therefore depends mainly on the quality of the deflators, discussed in paragraphs 5.66-5.68.
- 5.65** **Recommendation 5.8:** we recommend that ONS should continue to develop its estimates of labour inputs using both the direct and indirect approaches, exploring issues on data availability and interpretation in the light of comparisons between the results of both methods. For the direct approach, ONS should expand the analysis by function, introduce a public/private split and incorporate information on changes in skill mix. On the indirect approach, ONS should improve the quality of the deflators used for public spending on labour services.

## Deflators

- 5.66** In paragraph 6.18 of our Interim Report, we noted that it would be helpful for ONS to review the pay and price deflators that it uses. This work needs to be taken forward across all of the functions of government. Indeed, the deflators are even more important in those areas for which there are no direct indicators of output, since deflated input volumes appear directly as part of constant price GDP in such cases. As a benchmark for the purpose of this programme of work, it is evidently helpful to have a clear idea of the criteria against which the adequacy of individual deflators might be judged. Work with ONS in the context of this review has produced the possible list of criteria set out in Table 5.1.

Table 5.1 Quality Criteria for Deflators for Government Services

| Label                          | Short description   | Examples /explanation   |
|--------------------------------|---|---|
| 1 Comprehensiveness            | The set of deflators should cover all components of expenditure to be deflated.                                   | UK expenditure should be deflated using UK, not just English deflators; Health deflators should cover the whole of the NHS, not just hospitals. |
| 2 Coverage                     | The individual deflator should relate to all expenditure on the individual item to be deflated.                   | Deflators for labour expenditure should cover NI contributions, pensions as well as earnings.   |
| 3 Relevance                    | The deflator should correspond to the expenditure item to be deflated.  | Expenditure on books should be deflated using an indicator of price change in books.  |
| 4 Sustainability               | The deflator should be available for the foreseeable future, and for a reasonable number of periods in the past.  | Micro studies on changes in price for only a single year have limited use: long time series are preferable.                                     |
| 5 Homogeneity                  | Deflation should be carried out at a level of disaggregation that maximises homogeneity of items within category. | Significant difference in the movement of pay between staff grades would suggest that separate deflators are needed.                            |
| 6 Timeliness                   | The deflator should be available in good time after the end of the reference period.                              | Estimation for missing periods may introduce bias.  |
| 7 Periodicity                  | The deflator should be available on a quarterly basis.  | Annual figures may be satisfactory but only where there is evidence of insignificant short-term change.   |
| 8 Quality change               | Where changes in characteristics of a good/service occur, price indices should reflect pure price changes only.   | Improvements in composition and consequently effectiveness of a drug should be distinguished from pure price change.                            |
| 9 Availability of cost weights | Corresponding weights (of the same periodicity) for deflators should also be available.                           |   |

**5.67** ONS is developing a specific set of quality criteria for the use of Corporate Services Price Indices as deflators to remove the price effect when compiling estimates of the output of service industries. It would be beneficial to subsume these sets of quality criteria for deflators into a single set, drawing out the common elements that are material to all deflators and the specific elements that reflect a particular use.

**5.68 Recommendation 5.9:** we recommend that ONS should agree quality criteria for price deflators for public services such as those in Table 5.1 (ONS might prefer to subsume them as part of wider work on quality criteria for deflators), and use them to improve deflators used in measurement of volume of public service spending and productivity.



## Annex

1. As discussed above, the flow of financial data from government departments, the Devolved Administrations and local authorities to ONS via the Treasury is a complex one. To illustrate the complexities involved, we have detailed the various data flows within this Annex and where relevant included case studies.
2. There are four sections:
  - (i) Complexity of data flows: a case study;
  - (ii) Stages in the data processes;
  - (iii) Data timeliness and periodicity; and
  - (iv) Impact of the new COINS database.

### (i) Complexity of data flows: a case study

3. The following case study (Figure A5.1), showing how expenditure data on police procurement are compiled, is one illustration of how complicated the flows are.
4. As discussed in Chapter 5 above, departments providing data may not always recognise the final figures as published by ONS in the National Accounts. Table A5.1 sets out an illustrative example of the types of adjustments which can take place.
5. Data initially provided by the Department of Health and other sources for Health spending show that total Health pay and procurement for 2002/03 was £66.7bn. A series of adjustments followed: revisions by departments, National Account adjustments made by ONS (such as VAT refunds), correction of misallocation of some economic category classifications, adjustments made to cover the fact that NHS Trusts and NHS Foundation Trusts were excluded from central government expenditure for Treasury purposes but included under central government for the National Accounts. The end result was that pay was now £31bn (rather than £3.4bn), net procurement was £32.7bn (rather than £63.3bn) and capital consumption was £1.6bn. The total which now appears in the National Accounts is £65.3bn (non-seasonally adjusted) and £65.5bn (seasonally adjusted). The total is broadly the same, but the components within the total are very different from the original data provided by departments.

Figure A5.1 Data flow diagram For Police procurement data from source into the National Accounts

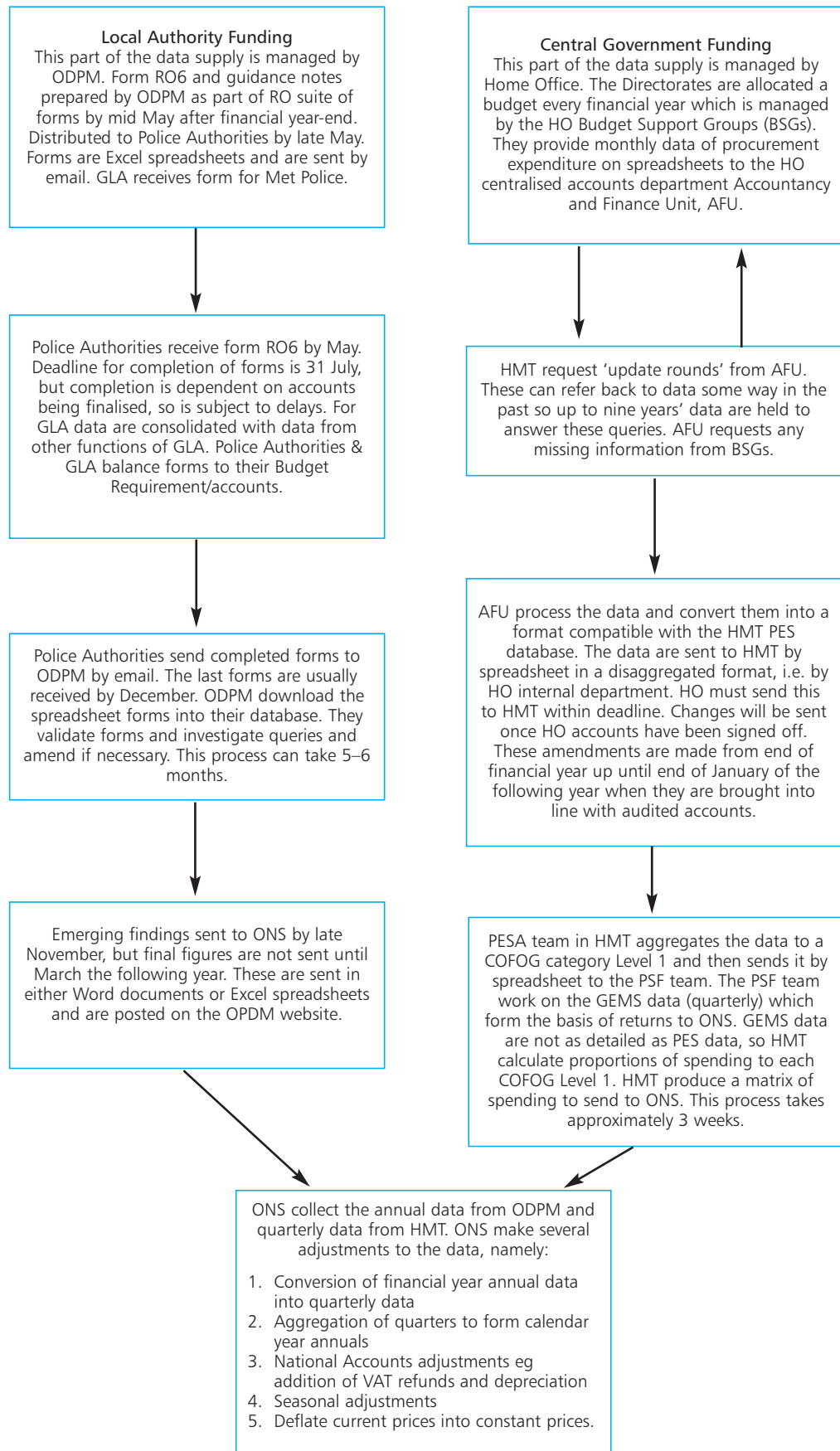


Table A5.1 Example of adjustments made to Health data (as defined under the Health government functional category) for 2002/03 as published in the *Blue Book 2004*

| Data   | Economic category within General Government Final Consumption | Amount (billions) (may not sum exactly due to rounding) | Reason for change/ adjustment  |
|--|---|---|--|
| Initial financial year data reported by Department of Health (DH) and other departments, including Scottish Executive, Welsh Assembly and Northern Ireland Executive and allocated to the Health COFOG | Pay   | £3.4  |  |
|  | Net procurement   | £63.3   |  |
|  | Total   | £66.7   |  |
| Revisions to departments' data made by departments   | Net procurement   | -£0.3   | ONS queried DH's data via the Treasury for the last quarter of 2002/03 because it looked too high. DH agreed and provided an indication of likely data revision.   |
|  | Net procurement   | -£0.4   | DH and Welsh Assembly revised their data when producing data for the Public Expenditure Outturn White Paper  |
|  | Net procurement   | -£0.1   | DH and Welsh Assembly revised their data in line with finalised Resource Accounts submitted to the National Audit Office.  |
|  | Total   | -£0.8   |  |
| National accounts adjustments  | Net procurement   | + £0.2  | Coverage adjustment because net procurement as reported by departments does not cover VAT refunded or EU reciprocal health schemes.  |
|  | Net procurement   | -£0.6   | ONS reclassification decision: Cash settlements for medical negligence had been wrongly included as net procurement on GEMS (should have been a transfer).   |
|  | Capital consumption   | + £0.2  | Estimate of Department of Health and Primary Care Trust depreciation from the ONS's Perpetual Inventory Model (PIM).   |
|  | Total   | -£0.2   |  |
| NHS Trust Reclassification Adjustments   | Pay   | + £27.4   | NHS Trusts are re-classified to Central Government in the Health COFOG. NHS Trusts' pay and capital consumption are added to Health COFOG data but net procurement no longer includes the NHS procuring services from NHS trusts so the change is largely offsetting within final consumption. The estimates for capital consumption are sourced from NHS Trusts reported data not from the PIM. |
|  | Procurement   | -£29.5  |  |
|  | Capital Consumption   | + £1.3  |  |
|  | Total   | -£0.8   |  |

/continued overleaf

Table A5.1 continued

| Data  | Economic category within General Government Final Consumption | Amount (billions) (may not sum exactly due to rounding) | Reason for change/ adjustment   |
|---|---|---|---|
| <i>Blue Book 2004</i> health COFOG improvements                 | Net procurement   | -£0.1   | Various classification changes to detailed COFOG data within Government Final Consumption to reflect revised administrative arrangements for prison health, better data for military hospitals and the reclassification of nursing training to Education. |
|   | Total   | -£0.1   |   |
| Local Government data for health COFOG                          | Pay   | +£0.1   | Local government data in the health COFOG reflecting nursing care for elderly people in nursing homes.  |
|   | Net procurement   | +£0.2   |   |
|   | Total   | +£0.3   |   |
| Total non-seasonally adjusted data for Health Final Consumption | Pay   | 31.0  |   |
|   | Net procurement   | 32.7  |   |
|   | Capital consumption   | 1.6   |   |
|   | Total   | £65.3   |   |
| Seasonal adjustment   | Pay procurement and capital consumption                       | +£0.2   | ONS seasonal adjustment works on a calendar year basis so financial year totals are affected by the seasonal adjustment process.  |
| Total seasonally adjusted data                                  | Pay procurement and capital consumption                       | £65.5   |   |

### (ii) Stages in the data processing

6. The data go through several processing stages before being published by ONS in the National Accounts. All these stages require various people at central government departments, the Treasury, ONS, local authorities and the Devolved Administrations providing information which is then transformed into various formats to meet the needs of the National Accounts. For central government, the following stages are typical in the processing of data for the National Accounts:

- a) **Stage 1: Departments to the Treasury** – Finance teams in departments input annual spending data, categorised by economic categories on to the Treasury’s PES database, which is maintained by the General Expenditure Policy (GEP) and Spending Teams within the Treasury. (Departments update the PES database regularly with outturn data and spending plans.) Departments also report spending by monthly and quarterly returns to the Treasury in GEMS, maintained by the Public Sector Finance (PSF) team within the Treasury. GEMS is used to monitor in-year spending against Parliamentary Supply Estimates and is the main source of outturn data for the National Accounts and the regular Public Sector Finances Press Release.

- b) **Stage 2: Treasury processing I** – The PESA branch in the Treasury assign all the data on the PES database that fall within Total Expenditure on Services (TES) to the Treasury Level 2 functional category based on COFOG, (e.g., Education and Training – primary schools; Education and Training – secondary schools, etc.) This is done in consultation with departments if the correct Level 2 category is not clear. Data are still shown by Economic Category.

The PSF team in the Treasury convert the quarterly departmental data into COFOG categories using a financial year matrix provided by the PESA branch – these data are still shown by Economic Category. PESA branch use PES data to produce PESA functional analyses and National Statistics releases at the time of the Public Expenditure Outturn White Paper (PEOWP), Pre-Budget Report and Budget. ONS also extract financial year final outturn data from the PES database.

- c) **Stage 3: Treasury processing II** – For quarterly data, PESA branch send PES Level 2 analyses to PSF (within the Treasury), which are used to create GEMS data by PESA Level 2 COFOG function. It is at this point that data needed by ONS beyond PESA Level 2 functional breakdown are apportioned by PSF to ONS COFOG Level 2 categories. PSF produce quarterly GEMS data by supply estimate, economic category and COFOG, which ONS use to produce COFOG and sub-COFOG analyses and to assign input-output categories.
- d) **Stage 4: Transfer of data from the Treasury to ONS** – The above processing produces the following output: (i) an aggregated, estimated, quarterly PESA level 2 COFOG by Economic Category matrix and (ii) a department by Economic Category matrix for all central government departments, Scotland, Wales and NDPBs; this is supplied to National Accounts Group within ONS.
- e) **Stage 5: ONS processing I** – Figures for Northern Ireland are obtained from the Treasury database via PSF and added to the GB Treasury figures to achieve total UK figures. National Accounts adjustments are applied where necessary to convert onto a correct National Accounts basis. At this stage, any data which have not been allocated COFOG categories will be pro-rated across the COFOG breakdown.
- f) **Stage 6: ONS processing II** – quarterly data are seasonally adjusted across calendar years, using a method that constrains the calendar year totals for seasonally adjusted data to be the same as the non-seasonally adjusted data. This means that financial year (seasonally adjusted) totals calculated at this point will no longer be consistent with those in departmental accounts. The adjustment process removes seasonal effects and maintains the underlying trend. Genuine step changes, such as reclassifications, remain in the data.
- g) **Stage 7: In-year revisions to GEMS data** – departments revise their quarterly GEMS data as later and better information are available towards the end of the financial year. Stages 3 to 6 are repeated with the revised data.

- h) **Stage 8: Revisions to PES data after the end of the financial year** – departments put revised data on PES, during the process of finalising their annual outturns. This happens, in particular, in connection with two main outputs; initially, for the presentation of the PEOWP to Parliament in the July following the end of the financial year; PEOWP is largely produced from the PES database. Departments again update the PES database following the production of audited Resource Accounts in the following Autumn. These revisions to data are not included in the National Accounts via a full repetition of stages 2 to 6, as departments are not required to resubmit quarterly GEMS returns in line with outturn data. The revisions are made to the National Accounts via co-operation between GEP, PSF and ONS and some liaison with departments to attempt to ensure that large revisions are allocated to the correct quarters and COFOG categories.

7. The above stages cover only the central government parts of the data supply and processing chain. The process is even more complicated for local authority data (although this may be provided by COINS sometime in the future). This is not provided to ONS by the Treasury but instead comes from ODPM for English local authorities. The respective Devolved Administrations provide ONS with data for their local authorities. The only exception is Northern Ireland who do provide financial data for their local authorities to the Treasury databases; the Treasury makes some adjustments and supplies information to ONS. ONS have no direct contact with the providers of the information for the local authorities in Northern Ireland (i.e. the Central Expenditure Division, Department of Finance & Personnel for Northern Ireland).

**(iii) Data timeliness and periodicity**

8. Poor timeliness and periodicity of financial data are discussed in the above chapter (see paragraphs 5.34-5.38). The following tables (A5.2 and A5.3) illustrate the timeliness and periodicity of current price expenditure data as they appear in the *Blue Book 2004*.

Table A5.2 Periodicity of central government current price expenditure data for *Blue Book 2004*

| Country                     | 2002 figures in <i>BB 2004</i>   | 2003 figures in <i>BB 2004</i>   |
|-----------------------------|--|--|
| England, Wales and Scotland | Based on final audited financial year data and final unaudited quarterly data for all periods:<br><br>Quarter 1: last quarter of 2001/02<br>Quarter 2: first quarter of 2002/03<br>Quarter 3: second quarter of 2002/03<br>Quarter 4: third quarter of 2002/03 | Quarter 1: based on final audited data for the last quarter of 2002/03.<br><br>Quarters 2-4: first three quarters of in-year monitoring data for 2003/04 used.           |
| Northern Ireland            | Based on final audited financial year data for 2001/02 and 2002/03.<br>All quarters are estimate.<br><br>Financial year to calendar year mapping as above  | Quarter 1: based on estimate of final quarter of audited 2002/03 data.<br><br>Quarters 2-4: based on quarterly estimates derived from budget year forecasts for 2003/04. |

Table A5.3 Periodicity of local government current price expenditure data for *Blue Book 2004*

| Country                      | 2002 figures in <i>BB 2004</i>  | 2003 figures in <i>BB 2004</i>  |
|------------------------------|---|---|
| England, Wales and Scotland* | Based on final outturn data (unaudited) financial year data, and final quarterly estimates for all periods:<br><br>Quarter 1: last quarter of 2001/02<br>Quarter 2: first quarter of 2002/03<br>Quarter 3: second quarter of 2002/03<br>Quarter 4: third quarter of 2002/03 | Quarter 1: based on final (unaudited) data for the last quarter of 2002/03.<br><br>Quarters 2-4: estimate of first three quarters of 2003/04 budget forecasts plus any quarterly information available. |
| Northern Ireland             | Based on final (unaudited) financial year data for 2001/02 and 2002/03.<br>All quarters are estimates.<br><br>Financial year to calendar year mapping as above  | Quarter One: based on estimate of fourth quarter of final 2002/03 data<br><br>Quarters two to four: based on quarterly estimates derived from budget year forecasts for 2003/04                         |

\* Data for Scotland are based on provisional outturn information rather than final outturn.

## (iv) Impact of the new COINS database

9. Paragraphs 5.39-5.47 in Chapter 5 discuss examples of some of the process issues that may or may not be rectified once the Treasury's new database, COINS, comes into effect from 2005/06 onwards. Table A5.4 below gives a more complete list of the processing issues as identified under this review.

Table A5.4 Process issues identified concerning the supply of central government expenditure data to ONS from the Treasury

| Type                | Issue   | Cause  | Likely to be resolved by COINS?   |
|---------------------|---|--|---|
| Data Classification | Product breakdown information required for accurate deflation (other than those supplied by DH and MoD) are not available                                   | No product breakdown of procurement expenditure is collected on Treasury databases. ONS has to get this from MoD and Health (England Scotland and Wales) direct but estimate for the remaining departments.  | <b>No.</b><br>Currently seen as outside of scope of COINS.  |
| Data Classification | Functional data (COFOG 2-digit) estimated by the Treasury   | The new PESA functional breakdown used on PES does not give ONS 2-digit COFOG without PSF estimating more detailed information.  | <b>Maybe.</b><br>Potentially resolved by using 2-digit COFOG as functional dimension, but departments may not be able to provide this as readily as PESA Level 2.   |
| Data Classification | Machinery of Government (MoG) changes may cause processing problems for total expenditure, functional data and data consistency.                            | MoG changes may distort the functional data if the various Treasury databases (GEMS and PES) are not consistent in their treatment.<br><br>Potential for double-counting or omitting data if no co-ordination between departments.<br><br>MoG changes may result in inconsistencies in the data supplied to the Treasury databases (PES and/or GEMS) as departments may have different accountancy procedures. | <b>Yes.</b><br>Should resolve, as functional analysis should be picked up from COINS at source (rather than as part of Treasury processing).<br><br><b>Maybe.</b><br>Will not in itself be resolved by COINS but detailed guidance on how to handle MoG changes will be included in COINS guidance.<br><br><b>Yes.</b><br>Will be resolved under COINS as each department will have to set up a new 'programme object' (i.e. line of expenditure) which will have a standard functional allocation. |
| Data Classification | Quality of departments' allocation of expenditure to Economic Categories is variable and can be inconsistent between the Treasury databases (GEMS and PES). | Mistakes in allocation by departments either from carelessness or lack of knowledge of national account concepts. Maybe also due to departments concentrating on full-year data at the expense of quarterly data or different people in departments provide data for the various Treasury databases.   | <b>Maybe.</b><br>COINS may address: <ul style="list-style-type: none"> <li>• by emphasising coherence of quarterly and financial year data;</li> <li>• by having better checking facilities; and</li> <li>• by ensuring better training available for departments.</li> </ul> However, initial COINS training is focused on process rather data quality issues. Needs to be addressed by good process documentation.  |



Table A5.4 continued

| Type                | Issue   | Cause  | Likely to be resolved by COINS?   |
|---------------------|---|--|---|
| Data Classification | Devolved Administrations monthly and quarterly data not broken down by standard Economic Categories. (Full year data are fully set out by Economic Categories). | <p>Quarterly Scotland data have no Economic Category breakdown. (Each programme is currently allocated to an Economic Category following discussion with Scotland on the basis of its major component.)</p> <p>No quarterly data from Northern Ireland. ONS currently align PES data to the format of the previous return and estimate quarterly paths.</p> <p>Data provided for Wales are not in the standard quarterly GEMS format. The Treasury currently convert to GEMS format and include it in the Economic Category matrix. This means that its functional data are not separately available to ONS and there is potential for mistakes in the transfer.</p> | <p><b>Yes.</b></p> <p>Should resolve. Devolved Administrations will report quarterly/ monthly data on COINS to the required level.</p>  |
| Data Classification | National Accounts Codes (NACS) data are inaccurate on GEMS.   | <p>Departments tend not to fill in National Accounts Codes (Economic Categories required on GEMS but not PES) with due care and attention. The most important ones for ONS are the asset splits of GFCF and gross procurement receipts and expenditure.</p>  | <p><b>Maybe.</b></p> <p>May resolve. Dependent on departmental behaviour. NAC level data will be available monthly and quarterly.</p>   |
| Data Classification | The monthly and quarterly path of Scotland's (and some departments') data can be implausible.   | <p>Scotland revisions affect only the latest period supplied. Scotland (and probably some departments) supply year to date data – so any revisions to previous periods automatically appear in the latest month not the months in which they actually happen.</p>  | <p><b>No.</b></p> <p>Unlikely to resolve, unless departmental behaviour changes. However, in the long term, the Financial Management Review and the introduction of quarterly balance sheets may lead to improved quarterly data.</p> |
| Data Classification | Internal inconsistency between the Treasury supplied, functional and departmental matrices and FANDA.   | <p>ONS use data from both the COFOG and the departmental matrices the national accounts; hence these need to be consistent. Sometimes they are not, normally because Scotland or NDPBs' latest data has not been included in the latest COFOG calculations</p>   | <p><b>Yes.</b></p> <p>Should resolve. COFOG calculations no longer necessary.</p>   |

/continued overleaf

Table A5.4 continued

| Type                | Issue  | Cause  | Likely to be resolved by COINS?  |
|---------------------|--|--|--|
| Data Classification | The Treasury COFOG breakdowns of Gross Fixed Capital Formation (GFCF) do not include receipts from sales.                | The COFOG breakdowns of GFCF are based on asset breakdowns (NACS) which only cover expenditure. The receipts from sales are not broken down by asset so are not added to GFCF. ONS has to do this manually.  | Yes.<br>Should resolve. COFOG calculations no longer necessary.<br>Also there should be a better breakdown of receipts data.   |
| Data Classification | Incorporation of outturn data by ONS/PSF may be inaccurate even at a financial year level (see periodicity issue below). | Currently revisions to outturn data from PEOWP and provisional and audited resource accounts are identified by PSF by comparing GEMS and PES financial year data and then current and previous PES data. ONS incorporates these on a best endeavours basis, including allocating EC changes to NACS but both PSF and ONS processes have considerable potential for errors. | Yes.<br>Should resolve by providing revised output from COINS in line with the outturn finalisation processes, but this will not happen until 2005/06 outturn.   |
| Periodicity         | No quarterly path for NDPB, PECT and CFER data   | No quarterly NDPB data are reported by a number of departments (DEFRA, FCO, DH, HO, DCA, NIO, and DTI).  | Yes.<br>Should resolve.<br>Departments will report quarterly NDPB (and PECT and CFER data) on COINS. (DfT and DCMS have objected.) There will be £1m per year threshold so departments may have to report for slightly fewer organisations.<br>NHS Trusts may complicate the situation for DH. |
| Periodicity         | No quarterly allocation of outturn revisions.  | Revisions to quarterly and monthly GEMS data as a result of the finalisation of outturn for PEOWP, provisional and audited Resource Accounts are not allocated to months/ quarters. ONS currently allocates as sees fit.   | Yes.<br>Should resolve but not immediately.<br>Audited data will be reconciled with provisional data, at a department level and for financial years for 2005/06.<br>Subsequently departments will need to allocate to months.  |
| Timeliness          | Timeliness for ONS.  | Quarterly GEMS data are received late for ONS purposes due to a combination of<br>i) Conflict in PSF resources between monthly and quarterly GEMS. (First 12 working days of month concentrate on monthly GEMS – ONS would ideally like quarterly delivery by 15th working day).<br>ii) Need to reflect latest monthly GEMS data in quarterly numbers.                     | Yes.<br>Should resolve. Less dependency on PSF resources.<br><br>Yes.<br>Should resolve.<br>Quarters will be built up from monthly data after 2005/06.   |

Table A5.4 continued

| Type | Issue | Cause  | Likely to be resolved by COINS?   |
|------|-------|--|---|
|      |       | iii) The ECs (GFCF) that PSF find hardest to produce COFOG data for are required the earliest by ONS | Yes.<br>Should resolve, as long as ONS data-specification is clear.<br>COFOG processing should not be required as will be on COINS. |
|      |       | iv) PSF COFOG all the ECs not just those required by ONS   | Yes.<br>Should resolve, as long as ONS data-specification is clear.   |
|      |       | v) Late reporting by a number of departments (MoD DWP Scotland)                                      | Yes.<br>Should resolve.<br>Either quarterly profile used or departments will have to supply data.                                   |

# 6 Outputs

---

## Introduction

- 6.1** In the main part of this chapter we consider the application to new or different direct measures of government output of the principles described in Chapter 4. The last section of the chapter considers the implications for productivity measurement. This is on the basis that the move to direct output measures is justified both by its intrinsic merits and by the obligations placed on the United Kingdom by the Eurostat procedures.
- 6.2** The chapter deals with output measures in general, illustrating the issues by reference to specific spending areas. Individual spending areas are covered in depth in Chapters 8-11. In Chapter 4, we considered the issues theoretically, starting from the desired objective and seeking to derive principles to be applied. This approach is, we hope, of value to people grappling with these problems in other countries. In this chapter, we turn explicitly to the UK situation. It recognises that ONS does not start from a zero base, but from an existing set of measures covering more than a decade. We believe that these ‘first generation’ estimates have been pioneering, but that, as improvements become possible, they will become more refined. So, starting from existing ONS practice, the present chapter examines how we can move towards implementing more fully the principles set out in Chapter 4.
- 6.3** The fact that we are not starting from a zero base means that we have to tailor our recommendations to the point of departure. This is well illustrated by the issue of quality adjustment. In Chapter 4, we argued that the long-run goal is to incorporate an appropriate measure of quality change (Principles A and B). We discuss further the approach to devising quality measures and advise a threshold of acceptability for their use. We also recognise that it may take time to devise robust measures of quality and that it may be some time before the threshold of acceptability is reached. This applies to spending areas where no quality adjustment is currently made. Where, as in the case of Education, a quality adjustment is already in place, the question becomes one of comparing any proposed quality measure with that already in place. It is conceivable that the new measure would fall below the threshold if starting from scratch but that it represents a sufficient improvement over the existing measure to warrant its introduction.
- 6.4** Implementation of the principles set out in Chapter 4 means that we have to consider separately:
- what changes, if any, should be made in those spending areas where direct measures have already been introduced; and

- whether direct output measurement should be extended to new spending areas.

We begin with the first question, and then turn (much more briefly) to the extension of direct output measures to new functions.

## Introduction of New Indicators for Existing Functions

**6.5 Recommendation 6.1:** we recommend current direct measures of output should be improved, where needed, by:

- widening the coverage of output volume indicators for each function;
- increasing the level of detail at which output indicators are measured;
- adopting a more reliable data source;
- revisions of the weighting process;
- replacing activity indicators with output measures that reflect changes in quality or outcome attributable to a unit of output;
- introducing or revising an overall quality adjustment;
- improving timeliness and in-year indicators; and
- improving UK coverage by making full use of measures from Scotland, Wales and Northern Ireland.

**6.6** For example, in the case of the new measures of general government Health output introduced in the *Blue Book 2004*, there were improvements in several respects. There was a large increase in the degree of detail (1,700 treatment types in place of 16); the new data capture a wider range of NHS activity (adding NHS Direct and Walk-in clinics); the new source data are fully reconcilable with audited accounts; weightings were updated; and both annual and quarterly estimates are timelier. Improvements were therefore made under headings a, b, c, d and g.

**6.7** The conditions under which new output measures should be introduced are a matter for careful judgment. On the one hand, ONS is rightly concerned to improve its methods, and to take advantage of advances in methodology and data availability. On the other hand, the measurement of government output is a matter of considerable public sensitivity, and the public is often concerned about departures from previous practice. In our view, ONS, with its Code of Practice and the other elaborate arrangements surrounding national statistics, has achieved a good balance. We were happy with the way in which the Health changes were made, which followed the criteria set out in the Interim Report, which we re-iterate in Recommendation 6.2.

**6.8 Recommendation 6.2:** We recommend that ONS should be satisfied on the following conditions, before introducing a replacement output measure:

- a) there should be evidence of significant improvement in one or more of the directions listed above, giving particular emphasis to completeness of coverage and to measures that reflect quality change;
- b) an analysis should have been carried out of the relevant output data from past years, with sensitivity testing for possible future changes;
- c) the validity of the proposed measure should be tested by those with expert knowledge of the relevant function; and
- d) there is assurance of the likely continuation of the key data sources.

**6.9** In the case of Health, ONS demonstrated to the peer review process that there are significant advantages to the new, more detailed, indicator. Before adoption, the proposed new method was compared with the existing estimates over the period 1996 to 2003. The new estimates reflected the increased availability of detailed unit cost and activity data from the Department of Health, and the new measure was devised in close cooperation with Department of Health officials.

**6.10** Changes in output indicators may also be necessary to take account of changes in government services or in the machinery of government. We have already referred to the extension of health output measurement to cover new services such as NHS Direct. ONS evidently needs to monitor government initiatives, in order to assess any implications for output measurement. Changes in the organisation of government may also affect output measurement, and this is an aspect of the switch from the (output=input) convention that seems to have received inadequate attention. As has happened in recent years, an activity costing £X million may be transferred from a function currently measured on an (output=input) basis to a function with a direct output measure. Under the 'old' heading, both input and output are reduced by £X million; under the 'new' heading, input increases by £X million, but the impact on output depends on the construction of the direct output indicator.

**6.11 Recommendation 6.3:** we recommend that ONS should monitor changes in government services, and in the machinery of government, with regard to their impact on direct output measurement and the need to add further output indicators or to transfer activities.

### Treatment of Collective Elements

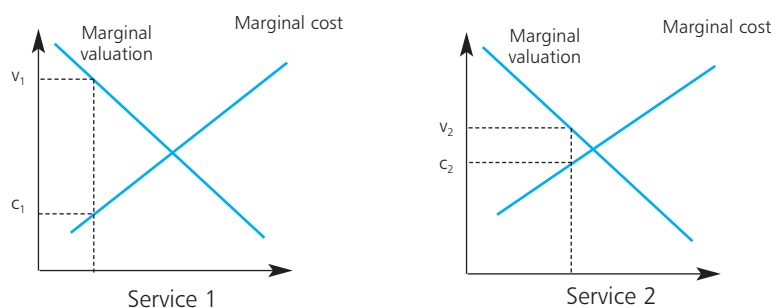
**6.12** The classification of government output into individual and collective services follows in general the COFOG classification (Appendix B), but it is recognised (ESA 1995, paragraph 3.85) that part of the spending under the functions identified there as 'collective' should be treated as individual. The collection of household refuse, for instance, is an individual service, unlike other elements of collective environmental protection. As already noted, ONS has embarked on the introduction of direct output measures for Public Order and Safety, which is classified as a collective service.

- 6.13** The reverse is also true. Functions classified as ‘individual’ also provide outputs that are better seen as collective. A public health campaign against smoking is an example. As was noted in the chapter on Public Order and Safety in the Interim Report, this can be said to apply to a number of activities under this heading, such as fire prevention advice, crime prevention, and indeed the criminal justice system as a whole. Here we are concerned with the implications for output measurement.
- 6.14** In order to achieve an A grade in the Eurostat Handbook classification, a direct output measure appears to be necessary for collective services, just as for individual services. The Handbook recognises ‘the difficulty in defining the output of collective services’ (p 35), but does not provide much guidance as to how they are to be resolved. In our view, the considerable obstacles to the development of output indicators mean that it is acceptable to settle for a B classification for the collective elements of spending on functions such as public health, and fire and crime prevention.
- 6.15** This, however, leaves open the question as to how this should be achieved. One approach, used by ONS at present, is to assume that areas like public health campaigns, with no direct output measure, grow pro rata to all areas where outputs are measured. This is not an ideal assumption. Another option is to divide expenditure into two, applying direct output measures to part and reverting to an input method for the collective part. But, in order to qualify as a B method, we would need to estimate ‘the volume of each indicator separately, taking quality changes of inputs into account’. An alternative offered in the Handbook’s B classification for collective services is to use a volume index of activity. In that case, we use a direct method throughout, but are willing to accept activity indicators for areas like fire prevention. We consider that it is acceptable to use an activity indicator for the collective elements included in a function classified overall as individual.
- 6.16** **Recommendation 6.4:** we recommend that collective services should be measured by the appropriate international standard, i.e. either a volume index of activity or the volume of inputs, aiming to satisfy Eurostat’s requirements for a ‘B’ method, taking account of quality change of inputs. The same approach should be used for collective elements included in a function classified overall as ‘individual’, rather than assuming their output changes pro rata to other areas for which there are direct output measures.

## Weighting

- 6.17** An important issue in the construction of a single output indicator for a function is the choice of weights for the different elements that make up the aggregate. Some algebra is necessary. Let us denote by  $Y_i(t)$  the output  $i$  in a particular function: for example, elective inpatient care or GP consultations. The number of GP consultations in year  $t$ , say 2003, is then compared with that  $Y_i(1)$  in a base year numbered 1, say 1996. We can then draw conclusions about the growth or fall in GP consultations. But we wish to combine this with the number of inpatients. As required in the SNA, the growth of each item ‘must be weighted by their economic importance as measured by their values.’ If an inpatient episode is five times as valuable as a GP consultation, then its growth rate is weighted correspondingly. In the case of marketed output, the value may be taken as the purchase price or, equivalently (under certain assumptions, notably competitive supply), the marginal cost. If we denote the marginal cost of output  $i$  in year  $t$  by  $c_i(t)$ , then the cost-weighted output in year  $t$ , using cost weights in the reference year 1, is  $\sum_i c_i(1) Y_i(t)$ . It should be noted that this requires *marginal* costs: i.e. the additional cost of an extra GP consultation, not the cost found by dividing total cost by the total number of consultations (average cost). In practice, the costs used in output measurement are average costs, and this is the first shortcoming of the method. The Centre for Health Economics / NIESR / NPCRDC project on measuring output and productivity in the UK health care sector (see paragraph 8.49) is investigating the relation between marginal and average costs.

Figure 6.1





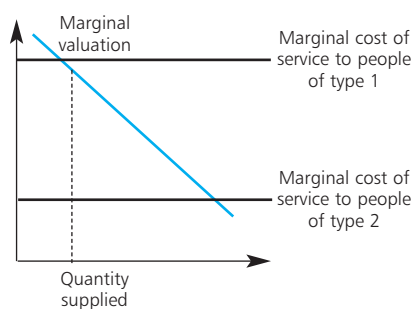
**6.18** For non-marketed output, we have the further problem that the output valuation cannot be observed, and there is no reason why it should coincide with the marginal cost. This is illustrated in Figure 6.1. (This graph is based on the earlier Figure 4.1, but allows for a rising marginal cost of supply.) In neither case is the output being supplied to the level where the marginal value of an additional unit is equal to the marginal cost of supply. The quantity supplied is indicated by the dotted vertical line, associated in one case with marginal cost of  $c_1$  and marginal valuation  $v_1$ , and in the other case with  $c_2$  and  $v_2$ , respectively. Ideally, we would like to use the marginal valuations, denoted by  $v_i$ , so that weighted output is  $\sum_i v_i(1) Y_i(t)$ . However, this requires indicators of output values that are comparable across the different  $i$ . In some cases, such indicators may be at hand. This may be the case where there are marketed services that provide an alternative. In the case of road use, for example, we may attach value weights to passenger miles and to freight tonne miles, based on the alternative costs of using rail. It should be noted that this valuation would not take into account any difference in the cost imposed on the road system (this would be  $c_i$ ), so that even if heavier lorries damaged roads more per tonne this would not affect the output (although it would show up in higher maintenance inputs). A second example would be the provision of personal care by social services, where there is a parallel market. If people are willing to pay  $p_i$  for daily care, then this can be used for the marginal valuation. It is sometimes objected that the parallel market is artificial, dominated by public purchasing, or that, in other cases, prices are monopolistic. The basis for the pricing is irrelevant; it is sufficient that consumers are willing to pay those prices (providing, of course, that there is a sufficiently wide market to obtain reasonable price observations). The prices may not be equal to marginal costs, but that does not matter if we are seeking to measure  $v_i$ , not  $c_i$ .

**6.19** In other cases, we may not be able at present to apply estimates of  $v_i$ . In the case of health care and adult social services, this is the subject of on-going research. So, for the present, the only feasible approach appears to be to continue to use cost weights. Nonetheless, it is clear from Figure 6.1 that this gives a rather different pattern of weights. In the case shown, they are negatively correlated. An expansion of service 1 will be given less weight under cost weights and more weight if a marginal valuation is applied.

**6.20** In considering output measures, we have argued for a fine differentiation. Should the same argument be applied to services whose costs differ? Suppose, for example, in the field of Personal Social Services, people require more hours of care in order to achieve a specified level of functioning. A service is provided by a local authority to ensure that people achieve that level of functioning. Should we differentiate people according to cost? This situation is illustrated in Figure 6.2 for the case where the demand for the service is the same for the two types of person. Following the parallel with the private sector discussed in paragraphs 4.6-4.10, where the service is specified in that way, the answer is that we should not differentiate. Rural and urban postal deliveries cost different amounts, but the output is the total number of letters delivered. To differentiate between people of types 1 and 2 in Figure 6.2 would mean that changes in the mix of clients would cause cost-weighted output to rise or fall, whereas the marginal valuation is the same in both cases.

- 6.21** The case discussed in the previous paragraph referred to the situation where the demands were identical. It could of course be that people of type 2 live next door to their grown-up children and have less need for care, but this is a different issue. We are then saying that there is variation around the ‘averaged’ marginal valuation per unit shown in Figure 6.2. A service may raise output by reallocating its services. This may require increased, but unrecorded (in the National Accounts) input from the family, an example of the interface between the paid and unpaid economy to which we referred in Chapter 1 (paragraph 1.3).

Figure 6.2



### Joint Products and Joint Producers

- 6.22** Government services may produce more than one output. Schools are educating children and providing childcare. These are not joint products like wool and mutton, since parents cannot opt for only one part of the package. The products cannot be separated on the cost side, so that there is no way of combining them in a cost-weighted output index, but if we use marginal value weights (for example, applying the market price of childcare), then in principle the values can be added. Lest this appear an over-radical proposal, we should note that its impact is limited to the relative weights applied to output indicators. Placing a value on childcare would increase the relative weight on the number of younger children.
- 6.23** The inverse problem is that government services may be a joint input into the final outcome. Many factors contribute to outcomes in health, education, law and order, and social protection. We have referred on a number of occasions to the problem of identifying the contribution of public spending. Here we are concerned with the attribution of changes in outcome to different spending functions. How much of reduced crime is due to the police force? How much is due to the courts? And should part be attributed to education or children’s social services?
- 6.24** In general, this is a major problem. It may be very difficult to calculate the relative contributions. For this reason, it may be necessary to remain with cost weights. On this basis, the attribution is of the change in the contribution to outcome, and it may be reasonable to assume as a first approximation that the relative contributions of different services are constant over time.

**6.25 Recommendation 6.5:** we recommend that the ideal approach to developing a single aggregate output measure for a function is to weight together different elements by weights based on their marginal valuation. This requires indicators of output values that are comparable for different components. If that is not possible, it may be necessary to use marginal costs. In practice, average costs may be the only information available. Cost weights may be most appropriate where an outcome is affected by several government services and it is not possible to calculate the value of relative contributions.

### Quality Adjustment

**6.26** In Chapter 4 we discussed three ways in which the measurement of quality in the National Accounts could be approached.

- First, we can differentiate services.
- Secondly, we can define the volume measure in terms of the degree of success.
- Thirdly, the volume measure may be based on the level of activity but the contribution to outcomes introduced in the form of a quality adjustment.

**6.27 Recommendation 6.6:** we recommend that ONS choose on a case by case basis whether to measure quality by differentiation of service, success of activity or attributable contribution to outcome, having regard to:

- the nature of the service;
- the extent to which the service is, or should be, differentiated; and
- the degree to which the change in outcome can be directly and confidently attributed to the service concerned.

**6.28** In the case of Health, for example, we can see the effect of the first method. By adopting a detailed classification of outputs, it is possible to represent quality change by structural change within the aggregate. Suppose that there are two treatments. One is of a higher quality and is more expensive. If the output indicator combines the two volume measures with weights according to their cost, then a shift towards increased use of the higher quality treatment will be properly recorded. There will be an increase in expenditure, and a corresponding increase in output. Thus, the move to a more detailed treatment classification (see Chapter 8) has been a step towards taking account of this kind of quality change.

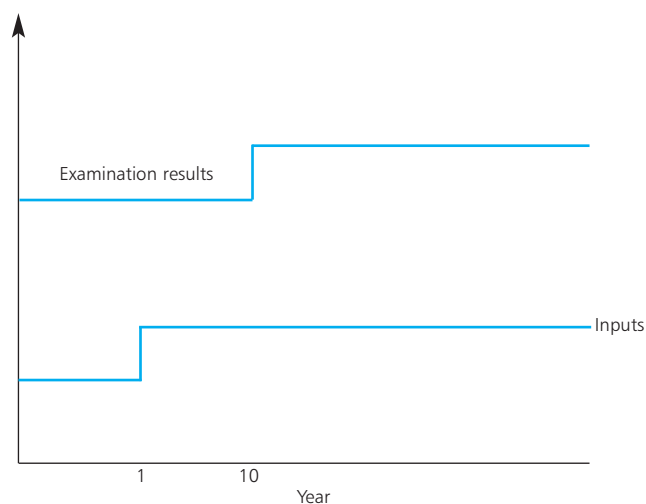
**6.29** But a cost-weighted index cannot capture all quality improvements, as may be seen from the example of an improvement in technique such that a lower cost treatment (eg day surgery) can assure the same (or better) outcome as a more expensive treatment. This is recorded as a reduction in output, when no change has occurred (and there has been a saving in inputs). One response to this problem is to seek to weight activities not by cost but by an indicator of the increment in quality of outcome, such as Quality Adjusted Life Years. In Education, the same role may be played by performance on tests. However, as discussed in the section on weighting (see paragraphs 6.17-6.19), this requires that the units be comparable in level terms.

- 6.30** The second method is based on a simple repackaging hypothesis. Higher-grade petrol gives you 10 per cent more miles to the gallon, so it is equivalent to 1.1 units of the lower grade. In the case of government output, the same can apply. A hip operation may use a superior technique that gives you an extra 10 per cent expected use of the new joint; change in the school methods may give 10 per cent improvement in examination performance. In this case, no comparison of levels across activities is necessary. All that is required is that the *change* in the quality is correctly measured.
- 6.31** In the third case, the adjustment could be made in two different ways. The first is to choose a particular indicator, or set of indicators, measured regularly, and to apply these on a formulaic basis in making quality adjustments. As discussed in Chapter 9 (see paragraph 9.28), the quality of education could be made a function of the annual results in pupil attainment. An improvement in key stage results, relative to the expected transitions, would be translated into an increase in productivity. The second approach is to employ a range of evidence to make a judgement about the rate of quality change. This approach has the disadvantage that it involves judgements being made *ex post* (rather than in the *ex ante* selection of indicators), but the advantage that it is less at risk from changes in examination structures or school inspection.
- 6.32** Quality adjustment of government output is a particularly challenging area, given the intrinsic difficulty and the relatively limited experience – both in the United Kingdom and in other countries – with such adjustments. It is to be expected that the initial measures will be approximate. It will be necessary to make do with partial information, applying quality adjustments from one part of the service to another for which information is not available (as is the case with volume indicators). At the same time, the greater degree of subjectivity in making quality adjustments, compared with volume measures, and the diversity of dimensions to quality, mean that we should apply a higher standard when judging acceptability. It is essential that the measures employed in the National Accounts should command support from appropriate service experts and from end users. While we believe that the end goal should be to make quality adjustments to all services, we consider that a relatively high threshold should be set before implementation. ONS may well wish to publish quality information in the first instance in some other way – for example, in an experimental series or in an explanatory article or a productivity article, before adjustments are introduced into the National Accounts.
- 6.33** **Recommendation 6.7:** we recommend that ONS should give priority to work on quality adjustments, but consider that a relatively high threshold should be set for their introduction into the National Accounts; in particular, ONS should not introduce quality adjustments until it is assured that the dimensions covered are sufficiently representative.

## Timing and Attribution

- 6.34** In the previous chapter, we have presented a detailed analysis of the issues of timeliness and periodicity with regard to government inputs. Many of the same issues apply to output indicators. In brief:
- a) Much of the information relates to financial years, and has to be converted to a calendar-year basis for National Accounts purposes.
  - b) Quarterly data are necessary to make this adjustment, and are necessary in their own right to produce quarterly GDP estimates. Quarterly GDP estimates are of lower quality than annual figures and make use of extrapolation. (See *Economic Trends*, November 2001).
  - c) There are considerable delays in the supply of financial year data; although the moves towards faster closure of accounts in both central and local government should help reduce these over the next few years.
- 6.35** The issue of timeliness is a general one for the National Accounts, but we are concerned here specifically with government output. A priori, one would expect that output growth is more stable than private marketed output and that changes can be forecast from legislative and known budget changes. It is not therefore evident that the improvement of quarterly series for government output should be a first call on ONS resources. Best use should be made of timely, audited data, but priority should be given to improving the annual estimates.
- 6.36** **Recommendation 6.8:** we recommend that ONS should seek to improve the timeliness of annual estimates of outputs of public services (as a greater priority than more accurate estimates for quarterly outputs).
- 6.37** Data need not only to be timely but also correct, as far as possible, in their attribution of the timing of output. The fact that output is now being measured separately from input means that we have to consider its time path. To which period should output be attributed? The issue may be illustrated by reference to Education. No one would seriously suggest that school output should be recorded as falling during the summer holiday; there should simply be a smoothed annual series. But how should we treat an improvement in education that takes the form of an investment paying off in recorded examination performance at the age of 16? (See Figure 6.3.) Increased inputs take place in year 1 but the improved examination results first occur in year 10. It may be possible to replace the examination measure by use of earlier test scores, and the issue of attribution of timing may be one consideration influencing the choice between different measures. But it is conceivable that the increase in inputs is indeed an investment, the effect not being observable until later. The interpretation of these time paths depends on the particular context and subject matter, and should be discussed in the productivity articles.

Figure 6.3



### Output and productivity measurement

- 6.38** The existence of direct output measures means that they can be divided by the corresponding input measure to derive an indicator of the change in government productivity. However, as we have emphasised in earlier chapters, this is not simply a matter of arithmetic. A number of pre-conditions have to be satisfied. We end therefore the two chapters on inputs and outputs with a resume of the points to be considered before drawing conclusions about government productivity.
- 6.39** The first requirement is self-evidently that the input indicators satisfy the criteria set out above. The input indicators should be comprehensive, notably including capital services, so as to provide a basis equivalent to that in total factor productivity calculations (see paragraph 2.33). The inputs should be properly deflated, using deflators that satisfy criteria such as those set out in Table 5.1. Appropriate account should be taken of quality change, such as better-trained workers.
- 6.40** Equally self-evidently, the output indicators should satisfy the criteria set out earlier. They should meet the conditions set out in Principle D and Recommendation 6.2. These include adequate coverage of the range of services, appropriate allowance for quality change, and full geographic coverage.
- 6.41** It is not however sufficient that the above conditions are satisfied. As we have emphasised in Principle H (Triangulation), we need to look at the two numbers in conjunction. The output and input indicators may each be satisfactory in their own terms but the ratio may not be satisfactory. This may happen on account of measurement errors and their joint distribution. The margin of error (see paragraph 4.72) may be acceptable for each series taken independently but unacceptable for the ratio. There may be issues surrounding the timing and attribution, as just discussed, where the top and bottom of the ratio are affected differently, with consequences that are serious for the implied productivity estimate.

**6.42** More generally, we have stressed the need for interpretation. No single ratio, however carefully constructed, can fully capture the performance of complex public services with multiple objectives. As we made clear at the outset, there is a difference between National Accounts estimates of output and performance indicators for the management of the public services.

# 7 Implementation

## Introduction

- 7.1** Earlier chapters have explained the purpose for measuring output of public services in national accounts, the story so far in the United Kingdom and the international context, and have proposed principles to underlie the measurement of government output, inputs and productivity. The treatment of inputs and outputs have been developed further in, respectively, Chapters 5 and 6. Later chapters explain the current position for different areas of the UK National Accounts (Health, Education, Public Order and Safety, Social Protection) and make proposals for change. This chapter sets out some general issues about implementing change.

## Moving from Concepts to Robust Statistical Series

- 7.2** There are rich sources of information in departments and regulatory bodies, often developed to support management information including performance measurement. Changes in priorities and definitions of performance targets often make it difficult to establish a long time series of consistent data in these areas, but experts may be able to advise on ways of combining different sources, where they are relevant to the underlying concepts of an output measure. Data discontinuities, perhaps due to legislative changes, should be recognised and understood. For example, the measure of adult social services proposed in Chapter 11 has a discontinuity when certain social security payments (transfers) ended and equivalent provision was made through local authority funding of nursing home fees (government consumption).
- 7.3** Chapters 8-11 report progress in working with departments to develop new or revised measures of government output which meet the criteria described in Recommendation 6.1. ONS practice is to accept such new measures only after it has submitted each proposal to rigorous quality assurance, as is done for other methodological changes in the National Accounts. We strongly support this rigour. The quality assurance will no doubt take account both of specific requirements for public service outputs and other wider criteria for the National Accounts. Criteria should be explicit.



- 7.4** One particularly important issue for ONS is confirmation of commitment by the departments responsible for source data, including Devolved Administrations, to supply required information regularly in future, with agreed timing and formats, and to be vigilant to discuss any relevant changes and developments in the services and potential measurement issues. Recognition by government departments of their important role in ensuring the validity of the National Accounts would be invaluable. This will require regular discussion by ONS with key contacts in departments to ensure that the context of National Accounts work is understood, as concepts are sometimes rather different from those which departments use in other work. Our review has valued the strong commitments from departments, including the Devolved Administrations, to engage in work to improve current measures and we hope the same spirit of joint responsibility will continue.
- 7.5** **Recommendation 7.1:** we recommend that the National Statistician and Statistical Heads of Profession in relevant government departments should discuss arrangements for formalising their joint responsibilities in respect of the National Accounts.
- 7.6** Once ONS has taken a decision to include a new or revised output series as part of government final consumption in the National Accounts, on the basis of a quality assurance process, it would be very desirable to make public the detailed methods to be adopted, documenting the source data and commenting on the extent to which the change met all the criteria. It would be helpful if ONS made clear whether there are further development plans. Publication should be no later than the time at which revisions are incorporated into the National Accounts.
- 7.7** In view of the high level of public interest in the government output measures, the National Statistician may wish to consider whether an internal quality assurance process is sufficient to assess the measurement of public services which depend on expert knowledge of the services, or which make significant changes to established methods. The first introduction of quality measures in an area, for example, might warrant extra scrutiny, including steps to take the view of those with specialist knowledge of service objectives and methods of measurement. How do service users regard the proposed approach to quality measurement? If wider consultation is undertaken, it would be helpful for results to be documented as part of the process of explaining any agreed changes to the National Accounts methodology.
- 7.8** **Recommendation 7.2:** we recommend that ONS should make public information about new or revised output series, once decisions have been taken that they are fit for use in the National Accounts, including information about the basis for that decision.
- 7.9** Changes to the National Accounts would of course only be made in line with the established ONS Revisions Policy. ONS practice is that revisions going back several years are normally made only at one point during the year – when the annual *Blue Book* is published. Substantial revisions are pre-announced. ONS made clear in its response dated 27 May 2004 to the *Statistical Commission's Review of Revisions to Economic Statistics Report No 17, Vols 1–3*, that it would endeavour to ensure that users understand the reason for revisions.

- 7.10** The following chapters will propose improvements to the measures of government output which have been adopted in recent years. The scope for improvement reflects wider changes in the National Accounts, such as the move to chain linking, and in some cases new sources of data which could not have been used any earlier. It is also an indication of change in public services, to which we referred in Chapter 2. The shape and policies of the public sector change with changing political priorities.
- 7.11** Methods of measuring the output of public services, therefore, need regular review to keep in touch with changing legislation, new approaches to service delivery, changing cost weights, changes in data sources and in some cases changes in the machinery of government. These require ONS to work with departments, including the Devolved Administrations, to understand the services which are being measured and be alert to the need to change methods of measurement. It would be desirable to undertake a formal review of each area of output measurement at regular planned intervals – perhaps about every three years. Reviews should reassess whether the ONS measures continue to meet the real need, and have taken advantage of available improvements in information sources used by departments and other external bodies. These reviews should take account of international developments in guidance and measurement practice. It would be desirable to engage some external expertise in each such review, and to make the results public, with any recommendations for change and actions taken.
- 7.12** **Recommendation 7.3:** we recommend that ONS should undertake a formal review, with external expertise, of each area of public service output measurement about every three years, and that the results should be made public, with any recommendations for change and action taken.

### **Publishing Analysis of Public Service Output and Productivity**

- 7.13** The terms of reference for the review relate to the National Accounts. One prime purpose of figures to measure the output of public services is to incorporate them in the National Accounts, and the recommendations in the later chapters of the report are intended to meet this need. However, output figures are of interest in their own right, and it is desirable for them to be published and analysed in ways which allow more scope for commentary than the format of the National Accounts. Separate publication is particularly important where the methodology changes, so that the difference between the results of the old and new series can be understood, with analysis of drivers in the rate of increase or decrease in the preferred measure. Explanation of data discontinuities, for example, caused by changes in classification or machinery of government changes, is essential for the public record and to aid those using the National Accounts. While use of the internet for dissemination is clearly a valuable means of communication, we believe that ‘publication’ should always include a permanent paper form.

**7.14** Separate publication of output series could also be helpful if alternative approaches are being compared before a decision is taken to change the basis of the National Accounts. Sometimes methods and data sets may be judged useful and fit for publication, but not appropriate for the National Accounts. Given the risks that National Accounts measures of government output and productivity will be misunderstood, we consider it most important to provide full information about different methodologies, explaining their limitations, and interpreting the available data in that light. The series of *Economic Trends* articles from 1998 to 2003, which published the estimates and underlying methodology for government output, performed a valuable service. We therefore welcome that ONS has made clear its intention to continue with the productivity article series, following *Public Service Productivity: Health* in October 2004.

**7.15 Recommendation 7.4:** we recommend that ONS should continue to publish articles about outputs, inputs, deflators and productivity, commenting on data sources, methods and results, explaining limitations of different methodologies and interpreting the available data in that light.

### Satellite Accounts

**7.16** Another fruitful way forward is greater use of satellite accounts. The ESA notes that ‘for some specific data needs the best solution is to draw up separate satellite accounts ... Satellite accounts can serve such data needs by:

- showing more detail where necessary and leaving out superfluous detail;
- enlarging the scope of the accounting framework by adding non-monetary information, eg on pollution and environmental assets; and
- changing some basic concepts, eg by enlarging the concept of capital formation by amount of the expenditure on research & development or the expenditure on education’ (see paragraphs 1.18 and 1.19).

**7.17** It is important that satellite accounts be consistent with national accounts principles. ESA states that ‘an important feature of satellite accounts is that in principle all basic concepts and classifications of the standard framework are retained. Only when the specific purpose of a satellite account definitely requires a modification, are changes in concepts introduced. In such instances, the satellite account should also contain a table showing the link between the major aggregates in the satellite account and those in the standard framework. In this way, the standard framework retains its role as a framework of reference and at the same time justice is done to more specific needs’ (paragraph 1.20).

- 7.18** A number of countries have developed satellite accounts. INSEE, the French national statistical institute, for example, has developed satellite accounts for Education, the Environment, Tourism and Health. It has also been at the forefront of the development of satellite analyses, which are similar in nature but are less closely intertwined with the main National Accounts allowing for quicker delivery and greater flexibility. The United Kingdom currently produces satellite accounts for two areas (environment and households) and is developing prototype satellite accounts for tourism. ONS has also been developing health expenditure accounts for the United Kingdom which have some characteristics of health satellite accounts (see paragraphs 8.77-8.79). It is aware of interest in the potential for development of satellite accounts for transport and for culture.
- 7.19** We have suggested in Chapter 4 that it would be useful to have a satellite account for human capital formation. This could make use of analysis of the economic value of education, whether provided by schools, universities or employers.
- 7.20** **Recommendation 7.5:** we recommend that ONS should explore ways of analysing and publishing information about public service outputs in parallel to the National Accounts, such as satellite accounts. In particular, it would be useful to have a satellite account on human capital resource formation.

## International Cooperation

- 7.21** During the review, we have had a number of helpful discussions with international bodies and individual national statistical institutes. There is clearly a strong desire in EU Member States and other countries to make progress on output measurement, and to learn from each other. While every country has distinctive public services and measurement issues, there are common principles and joint work may reduce the overall problems and costs of improving statistics in this area. Joint agreement on the broad techniques to be used would aid comparability between measures of government final consumption in different countries.
- 7.22** Any steps that OECD or Eurostat were to make to foster further international discussion and joint development work would, we believe, be helpful to the United Kingdom, and, perhaps, to other countries. However, we do not suggest that UK developments should necessarily be delayed until international agreement on technical issues can be reached.
- 7.23** **Recommendation 7.6:** we recommend that ONS should work collaboratively with other countries on public service output measurement, as joint agreement on the broad techniques to be used would aid comparability between measures of government final consumption in different countries.

## Extension to New Functions

- 7.24** The next four chapters describe our work in four main areas of Government spending: Health, Education, Public Order and Safety, and Social Protection. We now consider whether work on output measures should be extended to other aspects of government consumption.

- 7.25** Pragmatically, given that the United Kingdom has already moved substantially towards direct output measures, covering some two-thirds of General Government Final Consumption, there are, in our view, strong arguments for seeking to consolidate ONS treatment of the spending covered. This should be a priority. Other countries are working on direct measurement of the functional areas covered in Chapters 8-11 and there will be mutual benefit in joint work in these areas.
- 7.26** Where coverage can be extended relatively easily and to good effect across COFOG categories such as General Public Services, Economic Affairs, and Environmental Protection, it should be. For example, in the course of our work on Social Protection, we have identified a direct output measure of work done by DWP, which relates to the Economic Affairs classification of COFOG and this could be adopted. Direct measures might be possible for some areas of Recreation and Culture, Transport and Public Administration.
- 7.27** As far as collective services more generally are concerned, we recognise the intrinsic merits of a direct measurement approach, but believe that ONS should proceed circumspectly. A number of those we have consulted have urged caution and we believe this counsel to be wise. Caution does not, however, equate with neglecting this agenda. Prudence in decision-making is fully consistent with the continuing vigorous work programme we believe to be necessary.
- 7.28** **Recommendation 7.7:** we recommend that ONS should give priority to consolidating the treatment of that part of General Government Final Consumption covered by existing direct output measures. Extension to other areas should proceed circumspectly, where opportunities present themselves and as resources allow.

## Country and Regional Accounts

- 7.29** This review has been on UK national accounts. We identified in the Interim Report the need to improve measures of output for public services in Scotland, Wales and Northern Ireland, since in too many cases the English output figures were used as a proxy. The Scottish Executive, Welsh Assembly Government and Northern Ireland Departments have each made clear their commitment to find appropriate measures, and progress is reported in later chapters. We welcome this commitment to make the UK national accounts for government final consumption a genuine UK measure.
- 7.30** Building up output figures from four separate countries (where services are devolved), together with corresponding input figures, raises the issue of how far ‘national accounts’ might be published, at least for government final consumption, for the four countries separately. This brings us to regional accounts.
- 7.31** Within the United Kingdom, separate regional accounts are already prepared for GDP at current prices. The recent Allsopp Review recommended that progress should be made in developing estimates of real gross value added by region. Since most of the volume indicators used in estimating government output – hospital operations, school lessons etc – have a known geographical dimension, this information is generally available.

- 7.32** Development of more informative state or regional accounts using figures for government output in different parts of the United Kingdom is a possibility for the future, but the importance of accurate measurement should not be underestimated. Premature comparisons of approximated estimates could be unhelpful. Comparison of productivity change in different parts of the United Kingdom would require the use of pay and price deflators which were appropriate for the inputs – for example, Scottish teachers have a different pay system from English teachers so it would not be appropriate to deflate Scottish school spending by a deflator based on data for English teachers. Obtaining and analysing this necessary information needs proper resourcing if progress is to be made.
- 7.33** **Recommendation 7.8:** we recommend that ONS, with the Devolved Administrations, should consider how to make progress towards separate regional accounts.

### Resource Costs of Statistics

- 7.34** This report makes clear the depth and breadth of information required if ONS is to be sure that measures of government output used in the National Accounts are robust. There is considerable potential, and interest, in wider publications about government output and productivity; each would need to be prepared meticulously, to document methods and sources and aid those who will scrutinise the information and comment on it. Scrutiny of inputs and deflators is as important as scrutiny of outputs. In each area, co-operation between ONS and experts in the responsible departments, including Devolved Administrations, will be necessary. Those specialising in the measurement of government output will need good understanding of the services in question.
- 7.35** We should therefore be clear that good progress in this area will place continuing additional demands both on ONS and on government departments. We appreciate the current pressures on departmental staffing levels. But in our view, greater priority will have to be given to data provision and analysis if improvements in the measurement of government output are to be achieved. We consider that the level of public interest, and proper concern for accountability on public spending, justify an improvement in the information available. This will involve additional statistical and analytical resources to set up a new system and to continue to provide regular information. The areas within the purview of this review are ones where there is a particular premium on good data. Placing reasonable compliance requirements on public sector bodies is no less justifiable than for the rest of the economy, having regard to the benefits to be gained.
- 7.36** **Recommendation 7.9:** we recommend that ONS make resources available to support the developments we have proposed; resources will also be needed in other departments, including the Devolved Administrations.

# 8 Health

---

## Introduction

**8.1** This chapter explains the current UK Health output measure, and recommendations for the future, in five sections.

- Introduction – including scope and objectives of health care
- Current methods of output measurement, and a critique against the criteria in Recommendation 6.1 (paragraph 6.5)
- Future methods of output measurement
- Inputs and deflators
- Triangulation and productivity measurement

**8.2** Health is the largest government service, measured by spending: 31 per cent of government final consumption in 2003. In the United Kingdom, central government and the Devolved Administrations provide, through the National Health Service (NHS), a comprehensive health care service funded from general taxation. The provision of health care services in the United Kingdom is a devolved responsibility and there are important differences in the organisation of services in England, Wales, Scotland and Northern Ireland.

**8.3** The Department of Health (DH) in England provides funds to Primary Care Trusts (PCTs), which in turn fund NHS Trusts for providing hospital and some community health services. PCTs arrange for primary care for their local populations, and may provide some community health services directly. PCTs have an important role in planning and providing public health services, including health promotion. Hospitals are operated by NHS Trusts, which were classified as public corporations until June 2004 but, following reconsideration of their status, have now been reclassified as part of the general government sector. PCTs may also purchase services from independent sector hospitals; this is part of NHS output as included in GDP (Expenditure). Services are free of charge at the point of delivery except where patients are liable to pay, for example, prescription and dental charges.

**8.4** The Welsh Assembly Government provides funds to 22 Local Health Boards, which assess local needs and pay primary and secondary health care providers.

- 8.5** The Scottish Executive Health Department funds 15 Health Boards responsible for planning health services for people in their area. The NHS in Scotland was restructured on 1 April 2004, with NHS Trusts in Scotland abolished to create single, unified local health systems. Hospital and community health services are delivered by Boards through their operating divisions, and new community health partnerships (CHPs) have been established to work closely with local authorities in planning services and promoting health improvement.
- 8.6** In Northern Ireland, health and personal social services are provided as an integrated service and an institutionally separate NHS does not exist. For convenience, this report uses the term NHS in the Northern Ireland context as if there were an institutional separation. The Department of Health, Social Services and Public Safety (DHSSPS) the four health and social service boards plan, commission and purchase services. Nineteen Health and Social Service Trusts provide health and social services.
- 8.7** The aims of DH, under the 2004 Public Service Agreement, are to improve the health and well-being of the population, to improve patients' experience of care, to reduce inequalities in both, and to continue to deliver value for the taxpayer. Specific targets include:
- Health of the population: improving health outcomes by tackling key risk factors such as smoking, child obesity and teenage pregnancy and reductions in mortality from key diseases and health inequalities;
  - Chronic care management: improving health outcomes by providing a personalised chronic care management plan for those most at risk;
  - Access to services: introducing a maximum waiting time of 18 weeks from GP referral to hospital treatment;
  - Increasing participation in drug treatment programmes: increasing the proportion of users of illegal drugs successfully sustaining or completing treatment programmes;
  - Improving the patient, user or carer's experience: securing sustained improvement in patient experience of the NHS.
- 8.8** The Welsh Assembly Government's aim is to promote the health and well-being of everyone living in Wales and provide effective and efficient health services. The aim is to shift the balance from the acute sector towards preventing ill health in the first place and then to addressing problems at an early stage. The Welsh Assembly Government has made commitments to phase out prescription charges and scrap home care charges for disabled people. The NHS and local government work closely together to deliver integrated health and social care services and to promote well-being and an effective anti-poverty agenda.



**8.9** The Scottish Executive Health Department's key aims are to improve health and quality of life, and deliver integrated health and community care services, making sure there is support and protection for those members of society who are in greatest need. The Department has set out 12 National Priorities, including targets for:

- Health improvement: to improve the health of everyone in Scotland and to reduce the gap between the health status of people living in affluent and more deprived communities by tackling teenage pregnancy, dental health, alcohol and drugs misuse;
- 48-hour access: to ensure that anyone contacting their GP surgery has guaranteed access to a GP, nurse or other health care professional within 48 hours;
- Patient focus/public involvement: to actively involve the people of Scotland, including communities, patients and carers, in planning and delivering NHS services; and
- Three clinical priorities, cancer, coronary heart disease/stroke and mental illness: particular priority to tackle Scotland's two biggest killer diseases and improve services for people with mental health problems.

**8.10** The aim of the DHSSPS, under the 2004 Public Service Agreement, is to improve health and well-being through a reduction in preventable disease and ill health and by providing effective, high quality, equitable and efficient health, social and public safety services to the people of Northern Ireland. There are specific targets on:

- Improving outcomes from life threatening diseases (circulatory, cancer and renal disease) and incidents;
- Reducing maximum waiting time for all patients requiring inpatient or day case treatment (other than in exceptional circumstances) to six months by March 2010;
- Improving health outcomes for people with long-term conditions by offering a personalised care plan for people most at risk;
- All patients to be able to see an appropriate primary care professional within two working days; and
- Improving the quality of life and independence of people in need so that 40 per cent of all people who receive care managed community services, and at least 88 per cent of all people aged 75 or over, are supported as necessary in their own homes.

**8.11** These objectives indicate the aspects of quality which are intrinsically part of health output, but are not included in current measures. This is discussed further in paragraphs 8.46-8.66.

**8.12** Specific international guidance on measurement of health care is found in *Eurostat Handbook on Price and Volume Measures in National Accounts* (section 4.13):

‘For hospital services, output (= treatments) can be measured on the basis of so-called Diagnosis Related Groups (DRGs) type classifications. DRG systems are used to classify hospital stays into groups that are medically meaningful and as homogeneous as possible with regard to resource use ... In recent years DRG systems have been introduced in many countries to assist hospital management and funding decisions. DRG systems vary across countries, but they are sufficiently similar. They are always very detailed, consisting of several hundreds of diagnosis related groups.’

**8.13** The Handbook suggests a number of possible methods together with their A/B/C ranking.

- For services to inpatients by general and specialised hospitals: ‘the use of fully quality-adjusted DRGs is an A method. While DRGs capture changes in the treatment mix well, changes in the quality of individual treatments are difficult to measure. They may be due to better performing equipment, better performing doctors and nurses or changes in the “hospital environment” such as the occurrence of infectious diseases in the hospital, medical errors, additional facilities for patients etc. Further research on appropriate indicators is needed.

DRGs that cover only changes in the treatment mix will fulfil the requirements for a B method ... Use of crude output indicators like the simple number of discharges is classified as a C method.’

- For medical practice services (general practitioners): ‘the services of GPs are such that each visit can be considered as constituting one treatment. Consequently, the recommended A method is the number of consultations by type of treatment, adjusted for changes in quality. It might be difficult, however, to obtain the corresponding cost weights. In the case of proxy weights or only partial quality adjustment the number of consultations by treatment is a B method. The simple number of consultations can also be accepted as a B method if the different types of treatment are sufficiently homogeneous with regard to the resource requirements (similar cost weights).’

### **Current and Previous Methods of Output Measurement, and Critique**

**8.14** The UK Health output measure used before June 2004 reflected movements in 16 different activity series measuring health care in England. A single series counting total inpatient and day cases accounted for about half the expenditure covered by the index; outpatient and community health treatments, GP prescribing and dental treatments were measured separately. All the series were taken from NHS operational data systems, except the measure of general practitioner consultations, which was taken from the General Household Survey (GHS) (see paragraphs 8.20-8.22). An aggregate index was formed by weighting the separate series together to reflect the amount spent on each. This index was therefore heavily influenced by movements in the count of inpatients and day cases. Only annual figures were available, after a substantial delay: the *Blue Book 2003* used figures from 2001/02.

- 8.15** As a result of work carried out by the review team and ONS, in close cooperation with Department of Health officials, an improved version of this methodology was introduced into the National Accounts published on 30 June 2004, and is described in articles on the ONS website dated 30 June 2004 (ONS 2004a) and 18 October 2004 (ONS 2004b). The method uses information about volume and cost weights for the 1,200 Healthcare Resource Groups (similar to Diagnosis Related Groups used internationally) and 400 other activity groupings from DH's National Schedule of Reference Costs, of 200 categories of general practice prescribing and includes other activity such as NHS Direct. They range from a GP prescribed drug valued at less than £10 to a bone marrow transplant costing £45,000. The main data source, the National Schedule of Reference Costs, is updated annually and is audited, enhancing the reliability of the estimates.
- 8.16** As noted in paragraph 6.6, the improvement in the June 2004 measure over the previous one comes from wider coverage, an increased level of detail, better cost weights and improved timeliness. This became possible because the NHS has developed robust costs for a standard list of treatments, known as reference costs, which are being introduced progressively as a basis for 'payment by results'. These give detailed cost weights with matching counts of activities, within what were previously broad categories like 'inpatient and day case treatment'. This avoids the weakness that any inpatient treatment was regarded as giving equal output, despite very different costs and clinical benefits. The categories used in the current measure are each more homogenous than previously. As a result, changes in the mix of activities carried out will be reflected in total output proportionately to relative cost, as with most other indices in the National Accounts. Since a higher priced treatment adds more to the overall volume than a lower priced one, the more differentiated index captures some of the increase in the quality received by patients, as set out in paragraph 6.28.
- 8.17** In principle, the more differentiated method might have led to either an increase or decrease in the growth rate of measured output. The impact depends on the changes in the mix of treatments that has actually taken place. Comparison between the May 2004 and June 2004 lines in Table 8.1 shows the impact on NHS output growth from the change to the new method. The third line, for October 2004, shows information published by ONS later (ONS 2004b), using further improvements to the methodology, i.e. an improved link between the old and new series, and replacing gross expenditure weights with net (the weights should refer only to government expenditure and exclude private payments such as prescription charges and dental fees). Comparison shows that changes in methodology can have a substantial effect on the annual growth rates, affecting both the increase in output over the period as a whole and the attribution to individual years.

Table 8.1 General government final consumption expenditure on Health, chained volume measure: annual growth, UK, 1996-2003, per cent

| Dataset      | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | Cumulative change<br>1996-2003 |
|--------------|------|------|------|------|------|------|------|------|--------------------------------|
| May 2004     | 2.6  | 2.3  | 2.6  | 2.1  | 0.9  | 1.9  | 2.6  | 2.6  | 16.0                           |
| June 2004    | 3.9  | 1.3  | 1.8  | 3.1  | 3.0  | 4.2  | 4.1  | 4.1  | 23.7                           |
| October 2004 | 2.9  | 1.5  | 1.8  | 3.2  | 3.0  | 4.2  | 4.1  | 4.1  | 23.9                           |

Source: Office for National Statistics

- 8.18** The June 2004 method covers a wider range of NHS activities, but not all. It has added measures for the new NHS Direct and NHS walk-in centres (less than 1 per cent of spending). DH estimates that the activity volume measures used in the new output measure cover about three-quarters of all expenditure on NHS health care activity in England, measured by expenditure in 2002/03. Work underway, as a result of the extension of reference costs, will increase coverage to 81 per cent in 2003/04 and even further in subsequent years. This is consistent with Principle D (see paragraph 4.43) on coverage of output measures. Areas not yet covered include a wide range of activities, each with relatively low expenditure. They include continuing and intermediate care, services for people with learning and physical disabilities, national screening programmes and certain other public health interventions.
- 8.19** Timeliness is much improved, as is the availability of information on within year changes. Estimates of GDP and its components are published by ONS on a quarterly basis. A first estimate is published about a month after the end of the quarter being measured. Two further estimates then follow at monthly intervals. These three separate estimates appear because there is a demand for regular updates and new information becomes available that users want to see included in GDP estimates as soon as possible. The introduction of the latest methodological change has advanced the date at which health care activity estimates are available. The ONS First Release *UK Output, Income and Expenditure, 3rd quarter 2004*, published on 26 November 2004, contained an estimate of Health output based on data on just over half of the activities actually carried out in that quarter, measured by value. This represents a substantial increase in timeliness as compared with the previous method. This achievement goes some way towards removing the criticism that early estimates of GDP are based almost wholly on data from business while data from government activities take much longer to become available.
- 8.20** The Health output measure data source for general practice consultations is the GHS, a sample survey of 20,000 people living in Great Britain. One question asks respondents if they have made contact with their GP practice in the previous two weeks. This includes contacts such as a visit or a telephone consultation with a GP or practice nurse; respondents are asked on how many occasions each of these occurred.

- 8.21** As paragraph 2.20 explained, output indicators are used to estimate growth in output volume, year on year. It is therefore important to consider the likely error in the estimated growth rate of GP consultations, given the use of a sample survey and the particular calculations used. Calculations based on the GHS indicate that, between 2001/02 and 2002/03, the number of consultations with a general practitioner went up from 217m to 241m, an apparent increase of 11 per cent. However, the characteristics of the sampling scheme and the nature of the target population are such that the 95 per cent confidence interval around this growth rate is estimated at +/- 7 percentage points. Knowing that the annual growth rate of consultations with GPs is between 4 per cent and 18 per cent is not precise enough, given the national accounts focus on growth rather than levels. The GHS is widely acknowledged as a useful source for data such as consultation rates for different age groups, and as a snapshot for any one year. However, it is not sufficiently robust as a way of measuring growth in consultations with GP practices from one year to the next.
- 8.22** The output measure for GPs also depends on the weight given to each type of consultation. The weight used is the average cost of each type of consultation. It is calculated for DH by the Personal Social Services Research Unit at the University of Kent (see <http://www.pssru.ac.uk/uc/uc2004.htm>) as a function of the average length of each type of consultation – including any travel time – and the cost of the GP's time and immediate overheads. Clearly, a home visit is likely to cost more than the average consultation in the surgery and this is reflected in the weights currently used. PSSRU calculations make use of up to date information on GP earnings and other cost elements, but the information on the length of GP consultations of various types dates back to 1992, using a survey commissioned by the Doctors and Dentists Review Body (DDRB) to inform pay determination. There have been many developments in general practice since 1992 and consultation lengths may have changed. There may also be an issue on the adequacy of the DDRB survey sample size for calculating length of the rarer events like telephone consultation. There are thus weaknesses in both the volume and cost weights used for GP consultations in the current Health output measure.
- 8.23** The output estimates currently used in the National Accounts take data from England and gross up by expenditure weights to the United Kingdom. Health care activity in Scotland, Wales and Northern Ireland might exhibit different trends from those in England, and – in line with Principle E (see paragraph 4.48) – steps should be taken to include relevant data from those countries.
- 8.24** The current methods capture *activities* carried out. Under Principle B (see paragraph 4.24), an output measure should be adjusted for the attributable incremental contribution of the activity to individual or collective welfare. This should include capturing any change in outcomes which is attributable to the use of the inputs. A basic count of activities does not measure the quality of the output such as change in quality of patient experience or clinical effectiveness. This is a continued weakness of the current method and is discussed further in paragraphs 8.46-8.66.

## Future Methods of Output Measurement

**8.25** In the light of the critique above, improvements are needed in a number of areas, including primary care, UK coverage and quality measurement. This section presents proposals for change under five headings:

- Primary care.
- Extending the coverage of output volume indicators.
- Improving UK coverage.
- Whole courses of treatment, technical change and substitution.
- Measuring quality change.

**8.26** Improvements are already planned in respect of the first three areas, which are relatively straightforward. The last two areas, measurement of output in terms of whole courses of treatment and measurement of quality change (including attribution of outcomes to NHS activities), are more difficult and will not be resolved in the short term. In line with Recommendation 6.7 (see paragraph 6.33), a relatively high threshold should be set for inclusion of quality adjustments in the National Accounts. A preliminary period where possible measures are published for discussion by relevant experts, including user views, would be helpful. The development work on quality measurement proposed below may lead to such publications.

### Primary care

**8.27** Primary care is the first point of contact with the NHS for most patients. It includes general dental services, pharmacies and ophthalmic services, but this section is limited to general medical services provided by general practitioners, practice nurses and support staff. Services include primary diagnosis, advice and reassurance, prescribing medicines, health promotion, screening for disease and referral to specialists. Some minor surgical procedures are carried out in primary care.

**8.28** The output of primary care would ideally be measured in a way that took account of the range of different activities and resulting benefits for patients, and any change in the mix of services and their quality. Many patient health episodes are treated entirely within primary care. Where other parts of the NHS are also involved, it would be best if the general practice contribution could be measured as part of a package (a care pathway) that also involves diagnosis and treatment provided by hospitals or community health staff.

- 8.29** Keeping those objectives in view, the immediate priority is to consider whether a better data source could be found for estimating the number of GP consultations, and their cost weights. The review team, with DH officials, have been discussing the use of more accurate and more timely data on GP consultations – annually and quarterly – from anonymised research databases created from GPs’ computer records. Arrangements are being made by DH for this work to be done by QResearch, based at the University of Nottingham. It is likely that first results will be available, following quality assurance work, in March 2005. Thereafter, results will normally be available within four weeks of the end of each quarter. The database contains records of approximately 6 per cent of all patients registered with general practice. These come from nearly 500 practices widely spread through the United Kingdom. The sample data can be re-weighted to make it more representative of the UK population. This source will provide data on a much larger number of consultations than currently obtained from the GHS. The likely error ranges of the growth rate have not yet been determined but they are expected to be lower than those from the GHS.
- 8.30** The Scottish Executive are considering use of data on GP consultations from the Practice Team Information (PTI) Database, which has been expanded in 2003/04 to collect information on GPs, practice nurses, district nurses and health visitor activity. The information is collected from 45 PTI practices, covering around 6 per cent of the Scottish practice population. The PTI Database allows for analysis of the number of consultations with GPs (and other staff), including information on patients’ condition, treatment, age, gender and deprivation characteristics. It is available quarterly. In Wales, data on GP consultations could be taken from the GP Morbidity database, which contains information from 43 practices covering over 10 per cent of the population. Other similar databases exist or are in development, covering different groups of general practices (including one for Northern Ireland), and it might also be useful to determine whether they should be substitutes or complements, and take account of any apparent differences in trends from different sources.
- 8.31** Further work is also needed to update cost weights used to combine different types of general practice consultation. If it continues to be necessary to estimate the number of minutes spent on each type of activity, a means should be found of verifying or updating the 1992 survey estimate.
- 8.32** **Recommendation 8.1:** we recommend that ONS should continue working with the four health departments to make use of information from computerised GP research databases to improve measurement of GP output, and should update cost weights.

### Extending the coverage of output volume indicators for each function

- 8.33** As the coverage of the National Schedule of Reference Costs expands, we expect ONS to continue to work with DH to extend the coverage of the current activity measure, to 81 per cent (see paragraph 8.18) and beyond. Failure to measure every type of activity does not automatically lead to an understatement of the volume of output. The ONS convention is to assume that the excluded activities, as a group, are growing at the same rate as those that are measured. This may either understate or overstate actual change. The potential error from this assumption reduces as the proportion of all activity covered by specific measures increases. While further extension of the output measure to capture change in all distinct activities is desirable in principle, there may be diminishing returns from effort to extend coverage once it reaches about 90 per cent, and other areas of change may be more important. The timeliness of Health output data is already much improved (see paragraph 8.19), but it may be possible to increase further the proportion of actual data used in the first estimate of each quarter's GDP.
- 8.34** ONS and DH are continuing to examine areas of expenditure for which the corresponding activity is not yet included in the overall volume of output measure. Even if statistics are not available at national level, health service managers and clinicians may be able to advise on changes in case mix which might lead to a particular area of excluded activity becoming more (or less) important and so affecting the overall measure. Regular review is needed to ensure that new areas of activity, or new ways of providing existing activity, are identified and considered for inclusion in the overall measure.
- 8.35** The output estimates currently used in the National Accounts presume that all expenditure on Health is on individual services. However, some expenditure provides a collective service, eg public health campaigns and, under Recommendation 6.4 (see paragraph 6.16), should be measured by a volume index of activity or by the volume of inputs, taking account of quality change of inputs. Where the expenditure provides neither individual nor collective services, the costs should be seen as overheads and only included as inputs; they play a role in producing output, but the output will be measured against the expenditure incurred in delivering either the individual or collective services. ONS and DH are discussing the borderlines between individual and collective services, and between service provision and overheads and this should lead to further improvements in the methodology.
- 8.36** **Recommendation 8.2:** we recommend that ONS and the health departments should work together to incorporate the widening scope of Reference Costs and equivalent sources into the Health output measure as this becomes possible, with further improvements in timeliness; should keep under review the NHS services for which there are no direct output measures, taking expert advice on the potential impact on overall NHS output and productivity estimates; and should distinguish appropriately between individual services, collective services and overheads.



### Improving UK coverage

- 8.37** ONS, with DH assistance, is working with the health departments in Wales, Scotland and Northern Ireland to see how far relevant data from their health systems can be incorporated into the National Accounts, using the techniques adopted for England in 2004 or adapting them as appropriate. This would meet Principle E (see paragraph 4.49) on UK coverage. Good progress is being made.
- 8.38 Recommendation 8.3:** we recommend that ONS and the health departments in Scotland, Wales and Northern Ireland should introduce measures of Health output in those countries into the National Accounts once sources and methods have been verified.

### Whole courses of treatment, technical change and substitution

- 8.39** Ideally, we should look at the whole course of treatment for an illness rather than at its components. This might include several linked outpatient attendances, investigations, inpatient stays where the patient may be transferred between consultants, and follow-up care including GP consultations and prescriptions. At present, each of these counts as an independent unit of activity in different parts of the current Health output index. A change in medical practice could change the total count of activities without a corresponding change in outcome. For example, new ‘one stop shop’ hospital procedures for the timing of diagnostic tests and medical consultations can lead to a judgement on the diagnosis and treatment plan during a single outpatient appointment rather than a number of separate appointments. The health outcome for patients may be the same or better, but the count of activities is lower, and the cost weighted index may also be lower. If it were achievable, a unit of output based on a course of treatment would be less prone to artificial distortion as a result of changes in procedure.
- 8.40** Such an output measure could take better account of the quality of care given. Readmission soon after treatment may be a sign that the treatment has been unsuccessful and this should ideally be flagged in the way the data are collected (and perhaps treatment for problems created by clinical failure should not be counted as a new output). NHS data systems have not in the past attempted to record complete courses of treatment, though more may be possible when current major IT developments are complete. NHS policies for chronic disease management also suggest a need for supporting information which links the activities of hospitals, community staff and general practitioners together, to measure the costs and effectiveness of an overall package of care.
- 8.41** Early progress in measures based on aggregating NHS episodes into whole courses of treatment is unlikely, but we would encourage further exploration of the concepts, to consider what might be done to give the clearest picture of value added by the NHS. We also consider it very important that developments in NHS information systems, while intended primarily to support patient care, should also support better analysis of health care outputs.

**8.42** Nicola Mai, an ONS economist working on the review, explored a method for measuring health output using a diagnosis-based approach, presented in a paper published in *Economic Trends* (Mai, 2004). This work is based on similar work carried out in the USA by David Cutler et al (Cutler, 2001). The method has three key characteristics:

- the unit of measurement is the whole course of treatment of a patient rather than activities performed;
- units of measurement are grouped by diagnosis; and
- treatments are adjusted for quality factors.

**8.43** Mai illustrates this approach with a case study on a single diagnosis – coronary heart disease. He uses a common cost weight for two substitutable treatments (coronary artery bypass graft (CABG) and percutaneous transluminal coronary angioplasty (PTCA)). The clinical pattern has been a fall in the more expensive treatment, CABG, and a rise in the cheaper one, PTCA. His proposed methodology suggests higher output growth compared with the results of the 2004 ONS method. If clinical opinion and research evidence is that patients have done as well or better with PTCAs as with CABG, then it is misleading to say that health output is lower simply because the cheaper treatment has been used. Where treatments are substitutes, and especially where the cheaper one gives better results for the patient, Mai's technique has a distinct advantage. However, unless clinical information about the outcome of treatment can be used consistently, the current cost weights are a better way of reflecting the overall pattern of change in output.

**8.44** Mai suggests further work (as discussed in paragraphs 8.39-8.41) to combine outpatient, hospital, drug, GP consultation and GP prescribing data with hospital inpatient data to give a clearer analysis of the cost of care pathways. His methodology could be used to measure quality gain where one form of substitutable treatment has a clear advantage over another. An approach which identifies benefits from technical innovation and substitution, especially if it could be based on the costs and benefits of whole courses of treatment, might be used to analyse changes in health outputs in certain areas. If a wider range of examples become available, results could be explored as part of the triangulation approach recommended in Principle H (see paragraph 4.64).

**8.45 Recommendation 8.4:** we recommend that ONS should explore, with DH and the wider health information and research community, ways of taking forward work on whole courses of treatment, technical change and substitution, and should make use of the results in Health productivity articles.

### Measuring quality change

**8.46** The summary in paragraphs 8.7-8.11 of the priorities for health set by governments across the United Kingdom suggested that the main dimensions for understanding quality of health care are:

- a) saving lives and extending life span;
- b) preventing illness and mitigating its impact on the quality of life;
- c) speed of access to treatment; and
- d) quality of patient experience.

**8.47** All these dimensions of quality are relevant for the National Accounts, and work is needed to find ways of measuring them, in addition to the disaggregated count of activities which (as explained in paragraph 6.28) already incorporates some aspects of quality change. The National Accounts would need to measure the year on year change in quality of health care received by individual patients, attributable to the NHS. Change may be easier to measure than the absolute level of quality. Quality has several dimensions, and so vectors for change in each of these, if measurable, would need to be combined. That requires some common basis for valuing (say) a 10 per cent improvement in one aspect of quality against (say) a 5 per cent decrease in a different aspect. This ideally requires the marginal social valuation of different aspects of quality so that changes in different dimensions are commensurate, eg by expressing them in money terms. Further work would be needed to find a basis for these relative values which would be accepted as robust.

**8.48** Quality measurement is important in health care and medical research more widely, and expertise from public health medicine, epidemiology, health service management, health informatics and health economics could all be valuable. There are various sources of quality indicators, such as Healthcare Commission performance indicators and National Centre for Health Outcomes Data (NCHOD) clinical outcome indicators, but these are often more suited for use in cross sectional analysis rather than as time series. Consistency of definitions is important for measurement of quality change over time, and Healthcare Commission (or their predecessor) performance indicator definitions change fairly frequently, since their prime purpose is to measure and incentivise improvements on matters of current concern. Nevertheless, these bodies and others in the health area have expertise in understanding and defining quality measures and it would be helpful to engage them in development work

**8.49** DH is funding the Centre for Health Economics at University of York and the National Institute of Economic and Social Research to develop new approaches to measuring and understanding NHS outputs and productivity. Their work began in March 2004. A first interim report (Dawson et al. 2004), focusing on data sources in secondary care and setting out ideas for possible methods, was published in July 2004. A second interim report is planned for publication early in 2005 and a final report is due in August 2005. This initiative is very welcome and the final results will be helpful in taking forward practical steps to measure Health output, within the framework proposed here.

### Saving lives and extending life spans; mitigating effects of disease

- 8.50** The first York/NIESR report discusses the concept of Quality Adjusted Life Years (QALYs) as part of a potential currency for health outcome improvement. Gaining a better understanding of how the NHS is improving the health status of patients is a goal in itself, apart from potential use in the National Accounts. Attribution is an important issue. QALYs are a useful measure where the activity of the NHS is the exclusive factor in the change in health status. This would be the case in much curative care, for example treatment of a broken arm, where all (or almost all) the health outcome is attributable to the NHS. In other situations, including long-term care, the health status of NHS patients may be explained in part by other factors. Joint production between health and social care for elderly people with disabilities and other complex medical needs is an issue (see paragraphs 6.22-6.25). Other social factors are also relevant. For example, it is not clear how far improved survival rates from cancer may be due to earlier diagnosis and treatment, more effective treatment, healthier life styles or beneficial effects of affluence. The first two factors involve health care expenditure, and to a degree health promotion activities (eg smoking cessation clinics) influence life styles. But health care activity is clearly not the only factor. The York/NIESR research team are considering further the issues on attributing changes in health outcome to the NHS, as required in Principle B (see paragraph 4.25).
- 8.51** BUPA reported on its collection of information on health outcomes (BUPA, 2004). BUPA collected such information from its patients for the last six years, covering more than 100,000 cases of elective surgery. They have used two instruments, SF36 (a generic health status measurement instrument; see <http://www.sf-36.org/>) and VF-14 (an instrument for assessing visual impairment, AO 1994). The main purpose is cross-sectional analyses to support identification of poor performance and good practice. The first three years of collection saw relatively low response rates, but they have been improved by for example issuing postal reminders to patients. This is an interesting precedent but evidence of outcomes for patients receiving private health care would not in itself be relevant to measurement of government final consumption. Further work is needed to explore whether similar information for NHS patients, if available, would be useful in measuring quality change over time, eg whether any changes in the mean of the distribution might be due to factors such as changing response rate or case mix (eg more patients who have co-morbidity which affects their responses to the survey) rather than a genuine difference in attributable benefits to individuals from health care.
- 8.52** DH is commissioning research into the collection of information on health outcomes for patients visiting independent treatment centres, focusing particularly on a limited number of treatments (cataract surgery, hip replacement, knee replacement, varicose vein procedures and hernia repair). In a first stage, which began in December 2004 and is due to report in June 2005, the London School of Hygiene and Tropical Medicine is reviewing the international evidence on routine use of patient reported health status measures from which can be derived assessments of the outcomes of treatment, including both measures specific to the procedures undertaken, and generic measures. In a second stage, to begin in April 2005, piloting of routine use of the data will begin.

**8.53** Collection of information on health outcomes needs to reflect the typical natural history and care pathway for different diagnoses. The choice of timing of the collection of information on health status depends on the length of time it takes for health gains from NHS activity to be achieved. This might be days, months or (for cancer survival rates) years. It is also important to understand the counterfactual: a patient may be worse after treatment than before, but nevertheless be better than they would have been if no treatment had been given at all.

**8.54** Further consideration of data to assess changes in health outcome as a result of NHS treatment should consider carefully how health status information can be used to track changes over time. Particular attention will need to be paid to:

- the choice between sample surveys (with consideration of appropriate sample size and the issues in comparing results of successive unlinked surveys – see paragraph 8.21) and a complete census;
- issues involved in using information designed for cross-sectional use to answer questions about change over time, and possibility of linked longitudinal information in some areas; and
- how to separate out the particular contribution of the NHS to the outcome.

**8.55** It would be very helpful to be able to base quality adjustments for NHS output on a data set which measures the health outcome achieved as a result of treatment, collected annually by all or part of the NHS for most aspects of health care. This is a major undertaking. An alternative approach – we are grateful to Professor David Cutler of Harvard University for suggesting this to us – would be to focus initially on one or two major disease groups (eg coronary heart disease and cancer) for which there is agreement, based on research, on the clinical practices which are most likely to lead to effective outcomes. The National Service Frameworks published by DH would be a starting point. Evidence is then needed on the extent to which the desired practices are being followed – this could be monitored by the rate of prescribing of recommended drugs, for example. The overall effectiveness of treatment patterns for the disease group could be compared with previous years, taking account of known demographic factors which affect the cases presenting for treatment. Research evidence could be used to estimate the health gains (eg future years of healthy life) which will result from the use of best practice treatment patterns, rather than previous ones.

**8.56** This approach might require less new data collection, and rely more on analysis of existing research evidence and expert clinical opinion. Work on these lines would be very interesting in assessing the extent to which health care spending is producing worthwhile results, beyond the count of volume activity which is already available. It may not be possible to develop a precise numeric quality adjustment which would be acceptable for the National Accounts, but publication in the context of productivity analysis could be very helpful.

- 8.57** The new GP contract introduced in April 2004 includes financial payments based on evidence of quality of patient care, in a number of specified areas. This will mean that computerised data sets will become available on the numbers of general practitioners meeting standards which have been set, on the basis of research evidence, as likely to improve patients' health – eg to prevent a first or subsequent heart attack or stroke. Numbers will be available, through financial systems, of the number of points scored by practices against these criteria, and it may be considered that evidence that general practices, taken together, receive more quality points in one year than another is itself evidence of quality change in health care.
- 8.58** The new GP contract is a promising source of information on what is done in general practice, rather than just counting consultations (see paragraphs 8.27-8.30). However, many of the indicators will only distinguish between two levels of performance. For example, indicator CHD4 distinguishes between practices with 90 per cent of patients with coronary heart disease and who smoke, whose notes contain a record that smoking cessation advice has been offered within the last 15 months, and those below this threshold. This does not directly yield information on the numbers of patients who are advised to give up smoking, or on the numbers who actually do so. At least initially, practices may gain points by improving the way they record their current clinical practice rather than by changing practice. There is also a possibility that thresholds will be redefined after a few years' experience, with variation at PCT level possible. It may not be easy to find consistent and stable data for national measures of quality gain, but the rich data sources should be explored further.
- 8.59** Work on measurement of changes in health outcome attributable to health care, if the various approaches discussed above lead to results which cover a reasonable range of health care activities, could be used in two different ways. One approach would be to seek to use weights based on the value of health gain from each treatment rather than on its cost. As discussed in paragraphs 6.17-6.19, it would be better to combine different aspects of health care by using weights based on marginal valuation rather than on average costs. This would need a substantial evidence base, and judgement about how to combine marginal valuation and cost weights within the same index if it were not possible to find marginal valuations for all aspects of health care. There are also reasons (eg joint producers – see paragraph 6.24) why cost weights may, overall, be more satisfactory. While a framework for marginal valuations should continue to be explored, it would be unwise to rely on this as the only way to use information about health outcomes.

- 8.60** On an experimental basis (for use in separate publications, rather than the National Accounts, at this stage), it might be helpful to identify some types of health care activity where there is research evidence that marginal valuation and cost weight may be very different. For example, prescription of statins has benefits in reducing the chance of future heart attacks which can be regarded as higher than the financial cost of the drug. There may be other examples where research has shown that expensive treatments have low clinical benefits, and yet they continue to be used. The National Institute of Clinical Effectiveness (NICE) has responsibility for advice in this area, and ONS and DH might like to consider whether some further work with NICE could identify treatments where marginal valuation and cost weight are very different. If so, analysis of the difference in measured output growth, using estimated marginal valuation rather than cost weights, would be of interest.
- 8.61** The alternative to using information on health outcomes to form a set of weights is to use them to define the volume measures for health care in terms of the degree of success of the treatment (the second method in paragraph 6.26), or to use them to apply a separate quality adjustment (the third method). In both cases, the aim is to measure 'change from previous period' in commensurate terms – the absolute level need not be included in the measure. The same approaches apply to the other two dimensions of quality discussed below, speed of access to treatment and patient experience.

#### Speed of access to treatment

- 8.62** Another aspect of quality identified in paragraph 8.46 is speed of access to treatment. Ideally, this should be measured as the time from first concern about symptoms through to completion of treatment. So far, the main Hospital Episode Statistics (HES) dataset records only the time from a consultant decision to put a patient on a waiting list for treatment, to treatment. Collection of data and analysis of an extended definition of waiting time would be desirable, as a minimum including time spent waiting for an outpatient appointment which is then followed by elective hospital treatment.
- 8.63** The focus in NHS performance measures (see paragraphs 8.7-8.10) is on maximum waiting times. For the National Accounts, it would be more appropriate to reflect the experiences of all patients and to make use of data on mean waiting time, for those in comparable circumstances. It is possible, though, that the quality gain to patients from quicker access to treatment may be non-linear (we are grateful to Professor Barry McCormick, Chief Economic Adviser in DH, for his suggestions on this point). For a condition which is not painful or disabling, say, there may be a gain in utility from waiting two months rather than three, but less gain from waiting one month rather than two, and perhaps disutility if the patient is given less than one week's notice of hospital admission. It might therefore be sensible to set a minimum floor of tolerable waiting time, which would be different for different diagnoses – there is strong management and clinical concern to treat cancer quickly. The data on actual waiting times would be adjusted by subtracting the floor. Other approaches to take account of non-linearity would also be possible. On this basis it may be possible to make early progress in using information on changes in waiting time for elective treatment as one measure of quality gain for NHS patients.

**8.64** Other information on speed of access to diagnosis or treatment could also be studied for potential use as measures of quality change over time. There is management information about the distribution of waiting times for admission to hospital from accident and emergency departments, the proportion of patients seeing a GP within 48 hours, and emergency ambulance response times. In each case data collection is designed to identify the numbers of patients who exceed a maximum time period and may not be suitable to identify the full distribution. Issues of non-linearity also suggest that the unmodified mean may not be the most useful measure. But it would be helpful if ONS and the health departments would consider further whether measures of quality change could be developed in these areas.

#### Patient experience

**8.65** The final dimension of quality identified in paragraph 8.46 is patient experience. This is measured by individual Trusts through a national patient survey programme, using questions on five dimensions of care: access and waiting; quality and co-ordination of care; information and choice; relationships with staff; and environment. Results for England are available at national aggregate level from the Healthcare Commission. All these areas are relevant to the measurement of quality, and we understand are being considered by the York/NIESR project. Care will need to be taken to be sure data analysis is meaningful as a measure of quality change over time.

**8.66 Recommendation 8.5:** we regard the measurement of quality change in health care as a difficult area, but have a number of suggestions for work which should be taken forward. The results of research commissioned by DH from the University of York and National Institute for Economic and Social Research will also be important. We recommend that:

- a) a number of dimensions of quality should be measured, with results weighted together by marginal social valuation: more work would be required to underpin these weights;
- b) a range of expertise should be used to develop quality measures, including public health medicine, epidemiology, health service management, health informatics and health economics;
- c) ONS and the health departments should assess options for collecting new information on health outcomes resulting from NHS treatment, with particular consideration to the needs ONS has for measurement of change over time, rather than cross-sectional data sets which are useful to health departments for other purposes;
- d) ONS and the health departments should consider studies of changing treatment patterns for particular major disease groups to assess whether these could provide useful estimates of improved health outcomes resulting from changes in clinical practice;



- e) ONS and the health departments should explore the data set on quality standards in general practice, resulting from the new GP contract, to see whether this could be the basis for a measure of quality change;
- f) ONS and the health departments should consider whether, with advice from the National Institute for Clinical Effectiveness, it might be possible to identify treatments where marginal valuation and cost weights are very different, and explore the difference in output growth resulting from use of estimated marginal valuation instead of cost weights;
- g) ONS and the health departments should develop a measure of quality change based on speed of access to elective treatment, using the Hospital Episode Statistics data set and taking account of non-linearity, with further developments if new measures of total waiting time are introduced;
- h) ONS and the health departments should explore whether measures of quality change could be developed from information sources for time taken for admission to hospital from accident and emergency departments, time before seeing a general practitioner and ambulance emergency response times; and
- i) ONS and the health departments should explore whether measures of quality change over time could be based on the national patient survey programme which measures aspects of patient experience.

## Inputs and Deflators

**8.67** As discussed in paragraphs 5.11-5.17, the flow of data for the compilation of estimates of government spending on Health is complex. Working with the review team, ONS has made significant progress over the last year in improving the methods used for calculating current price Health expenditure, including reclassifying some areas of spending (like health care in prisons) between areas of COFOG. Further work to document the data flow and check all relevant classification issues, as set out in chapter 5, would be helpful.

**8.68** Improvements in the methods used to deflate current spending, for use in productivity calculations, were reported by ONS in *Public Service Productivity: Health* (ONS 2004c). Table 8 of that article shows the impact that different deflators have on estimated productivity change. Further detail on the improved deflation sources and methods can be found in ONS's technical paper *Sources and methods for Public Service Productivity: Health*.

- 8.69** There is more work to be done to ensure the health deflators meet in full the quality criteria proposed in recommendation 5.9 (see Table 5.1). The ONS article points to uncertainties on the best approach to deflating expenditure on prescription drugs, and more work is needed in this area, and on capital services. There would also be benefit in a more disaggregated approach to measuring changes in skill mix as part of the labour deflator, whether the direct or indirect method is used (see paragraphs 5.62-5.65). Current data on pay and price changes relate primarily to England, and should be developed to take into account any differential in price movement in other parts of the United Kingdom. The deflators for some items of expenditure are not appropriate, for example indicators of price movements in the hospital sector are used to deflate expenditure on administration of the Department of Health. Expenditure on health care in prisons, provided by the armed forces and in nursing homes within Health also requires further review of relevant pay and price indicators for this spending.
- 8.70** **Recommendation 8.6:** we recommend that ONS should work with the four health departments to improve the deflators for current price expenditure on Health, and the matching expenditure weights.

### Triangulation and Productivity Measurement

- 8.71** We welcome the ONS article *Public Service Productivity: Health*, published on 18 October 2004. It is helpful to put on public record a range of estimates to illustrate the different ways in which aspects of productivity can be estimated, and to be explicit about known problems of measurement, as a guide to those who interpret the figures.
- 8.72** It is possible to measure the productivity of health care by dividing national accounts inputs at constant prices by outputs at constant prices, as in the October article. This measure cannot be regarded as a total picture of productivity. We therefore also welcome the section on triangulation. Future such articles might also publish new sources and methods which would eventually be considered for incorporation in the National Accounts output measure, as well as providing corroborative evidence on Health productivity.
- 8.73** Fruitful areas of investigation for further triangulation material include the following:
- a) Account should be taken of the changing skill mix of health care staff: a change in the overall level of skills gives a legitimate expectation of a change in the quality of output, for which evidence can be sought; other shifts in skill mix may indicate more, or less, effective use of support staff to bring about change in the productive time of those with more specialist skills. Good examples of this include the changing balance between numbers of different grades of hospital doctor and reductions in junior doctors' hours as a result of the working time directive.
  - b) The migration of treatments from expensive settings (eg an acute hospital) to cheaper ones (eg GP's surgery) should be examined.
  - c) Changes in the technology of treating particular diagnoses should be examined, particularly in areas where such developments move the output from one category to another, eg the substitution of drugs for invasive surgery.

- d) The levels of use of scarce resources should be investigated, such as intensive care beds, ambulances or operating theatres; more intensive use would generally increase productivity, though a very high rate of use may be as inefficient as a very low rate, as time is wasted in hunting for an alternative, and/or patients have adverse outcomes.

**8.74** Some Health expenditure is expected to lead to outputs in a different time period. This is the case for prevention and public health services, education and training of health personnel, and research and development in medicine and health care. None of these should be expected to produce immediate value in terms of health care activity. Prevention aims to reduce the requirement for health care, with benefits accruing over many years. Staff training (much relevant expenditure remains within Health, despite the recent reclassification) may increase the productive capacity of the health service with a lag, as new staff take up posts. Or it may increase the quality of health care in different ways if current staff are trained in new ways of delivering care or improving outcomes. Research should improve the effectiveness of health care spending, but the link may be indirect and with a considerable time lag before there is sufficient body of evidence to change health care practice.

**8.75** Analyses of productivity should investigate how far current expenditure may lead to future output, and whether current output is reflecting lagged past investment. This will require more work to build a model of past expenditure and its results. It may also be fruitful to explore the relationship between input and output for spending on:

- arms' length bodies such as NICE, the NHS University, the Healthcare Commission and the Health Protection Agency; and
- modernisation programmes, which incur expenditure which is designed to improve service provision over many years (see for example DH's Technical Note describing how efficiency savings set out in Spending Review 2004 will be made <http://www.dh.gov.uk/assetRoot/04/09/29/44/04092944.pdf>).

**8.76 Recommendation 8.7:** we recommend that ONS should continue to publish health productivity articles and extend the range of sources and issues explored in them.

#### Satellite accounts

**8.77** ONS has been developing health accounts for the United Kingdom. Currently, this work publishes estimates of total UK health expenditure on a fairly regular annual basis. It has also developed an experimental set of UK health accounts, based on the international framework promulgated by the OECD. These present an analysis of the source of financing for health activities, of the producer or provider of those activities, and of the purpose for carrying out the activities (eg to cure an existing illness, to prevent illness in the first place).

- 8.78** A true health satellite account would examine the production of health goods and services and would have a framework-based analysis of inputs used in the production of such goods and services. The framework for a satellite account is permitted to differ from that of the National Accounts in order to add to analytic power. This gives the possibility of developing a satellite account framework for health which encompasses alternative ways of measuring inputs and outputs, as well as concepts which are not wholly part of the National Accounts, for example the material on triangulation discussed in the preceding section. However, whilst there is an international framework for health accounts, this does not extend to a satellite account as described in this section.
- 8.79** The development of a health satellite account would be greatly assisted by the creation of input-output tables for the health function, which would make use of the planned improvements of service sector data as recommended in the Allsopp Review.
- 8.80 Recommendation 8.8:** we recommend that ONS should consider developing the framework for health accounts further, developing full satellite accounts including health production accounts.

# 9 Education

## Introduction

**9.1** This chapter explains the current UK Education output measure, and recommendations for the future, in five sections.

- Introduction – including scope and objectives for public spending on education
- Current methods of output measurement, and a critique against the criteria in Recommendation 6.1 (see paragraph 6.5)
- Future methods of output measurement
- Inputs and deflators
- Triangulation and productivity measurement

**9.2** Education is the second largest area of government expenditure, after Health: 17 per cent of government final consumption in 2003. Most spending is through local authorities, on maintained schools, but there is also central government expenditure including procurement of courses for health professionals and initial teacher training. General government expenditure does not include education funded through grants and transfers. For this reason, further education (FE) and higher education (HE) institutions are excluded. Government funding for nursery school places outside maintained nursery and primary schools is currently defined as a transfer; however after discussion between the review team and ONS, it has been agreed that this should be reclassified as expenditure. Education is the responsibility of the Department for Education and Skills (DfES) in England and of the Devolved Administrations in Scotland, Wales and Northern Ireland, and there are some important differences in the education systems across the United Kingdom.

**9.3** The DfES Annual Report (2004) states that its aim is ‘to help build a competitive economy and inclusive society by creating opportunities for everyone to develop their learning; releasing potential in people to make the most of themselves; and achieving excellence in standards of education and levels of skills.’ The DfES Public Service Agreement (PSA) 2004 includes targets for schools ‘to raise standards and tackle the attainment gap in schools:

Raise standards in English and maths so that:

- by 2006, 85 per cent of 11 year olds achieve level 4 or above, with this level of performance sustained to 2008; and

- by 2008, the proportion of schools in which fewer than 65 per cent of pupils achieve level 4 or above is reduced by 40 per cent.

Raise standards in English, maths, ICT and science in secondary education so that:

- by 2007, 85 per cent of 14 year olds achieve level 5 or above in English, maths and ICT (80 per cent in science) nationally, with this level of performance sustained to 2008; and
- by 2008, in all schools at least 50 per cent of pupils achieve level 5 or above in each of English, maths and science.

Improve levels of school attendance so that by 2008, school absence is reduced by 8 per cent compared to 2003.

By 2008, ... in all schools at least 20 per cent of pupils to achieve the equivalent of 5 GCSEs at grades A\* to C by 2004, rising to 25 per cent by 2006 and 30 per cent by 2008.

Enhance the take-up of sporting opportunities by five to sixteen year olds so that the percentage of school children in England who spend a minimum of two hours each week on high quality PE and school sport within and beyond the curriculum increases from 25 per cent in 2002 to 75 per cent by 2006 and to 85 per cent by 2008.<sup>7</sup>

**9.4** In Scotland, since devolution in 1999, the Scottish Executive is responsible for education policy. The Standards in Scotland's Schools etc Act 2000 defines the purpose of school education: 'to encourage the development of the personality, talents and mental and physical abilities of the young person to their fullest potential'. The Act set five National Priorities in Education, which set out the long term strategic direction for Scottish education and ensure that improvement encompasses the whole needs of the young person and the whole life of the school. The recent publication *Ambitious Excellent Schools* outlines the Scottish Executive's agenda for action in the coming years.

**9.5** The Scottish Executive's commitments for education include:

- increasing the number of teachers to 53,000 by 2007 and target these additional teachers on reducing class sizes for S1/S2 Maths and English and for P1;
- providing a modern, high quality learning environment through the completion of 300 either new or substantially refurbished schools by 2009; and
- increase the average tariff score of the lowest attaining 20 per cent of S4 pupils by 5 per cent by 2008.

**9.6** The Welsh Assembly Government has responsibility for education policy in Wales. The aim outlined in *Wales: A Better Country* is to ensure that education and training contributes to personal fulfilment, wealth creation, social cohesion and cultural enrichment. The approach taken ‘will overhaul all aspects of learning ... establishing new structures and frameworks for 3-7 year olds; better transition from primary to secondary schools; a new approach to 14-19 years which will allow for greater variation in what is taught (including the related Welsh Bacalaureate qualification)’. The Assembly’s commitments include:

- getting the worst performing schools to catch up with the ever improving performance of the best;
- reform of the 14-19 age range curriculum, extending education at school into life-long learning as an adult;
- development of a new 3-7 curriculum;
- ensuring that by the end of the decade, no pupil in Wales leaves school without qualifications; and
- cutting junior school class sizes.

**9.7** In Northern Ireland, the Department of Education’s vision is ‘to educate and develop the young people of Northern Ireland to the highest possible standards, providing equality of access to all’. The PSA targets include:

‘To promote improvement in educational attainment so that:

- By 2008, 80 per cent of primary pupils to achieve level 4 or above in Key Stage 2 in English and 83 per cent in Maths (compared to 76% and 78% Maths in 2002–03);
- By 2008, 63 per cent of year 12 pupils to obtain 5 or more GCSEs (or equivalent) at grades A\* to C (compared to 59% in 2002–03); and
- By 2008, 60 per cent of year 14 pupils achieving 3+ A levels at grades A to C (or equivalent) (compared to 56% in 2002–03).

To reduce differentials in educational attainment so that:

- By 2008, 70 per cent of pupils in the most disadvantaged primary schools, to achieve level 4 or above in Key Stage 2 in English and in Maths compared to 63% in English and 67% in Maths in 2002/03.
- By 2008, 83 per cent of year 12 pupils in secondary schools to obtain 5 or more GCSEs at grades A\* to G (or equivalent) compared to 80% in 2002–03.
- By 2008, 94 per cent of year 12 pupils gaining GCSEs at A\* to G (or equivalent) in the most disadvantaged post-primary schools compared to 89% in 2002–03.’

- 9.8** These education aims and targets are broader than the outputs measured in the National Accounts. Pupil attainment is relevant to Education output, and we propose, in paragraphs 9.20-9.34, ways of using information about examination results to measure the quality of Education output. The targets also include equity: this is a legitimate area for policy objectives and targets, but not relevant to national accounts measures. Some targets relate to physical fitness and health, a reminder of the issue of joint production covered in paragraphs 6.22-6.25.

### Current Methods of Output Measurement, and Critique

- 9.9** Direct measurement of Education output was introduced into the National Accounts in 1998, backdated to 1986. The output measure relates to government maintained schools in the United Kingdom. In 2004, ONS also introduced an output measure for higher education courses for health professionals, purchased by the National Health Service (NHS). This section describes the current methods and comments on them against the criteria in Recommendation 6.1 (see paragraph 6.5).

#### Schools

- 9.10** The full time equivalent (fte) number of school pupils in the United Kingdom is used as the basis of the Education output measure. The fte pupils in the four types of maintained school (nursery, primary, secondary and special schools) are added together using cost-weighting by type of school, based on total UK expenditure for that type of school. The cost weights have not been updated since 2000. International guidance suggests that pupil hours or pupil numbers should be used to measure education output (together with a quality adjustment). In the National Accounts, fte pupil numbers are used rather than pupil hours. Information is not available in England to measure pupil hours, but DfES advise that they are not expected to have changed over recent years and are not necessarily a better measure than pupil numbers, or attendance (discussed in paragraph 9.18).
- 9.11** A quality adjustment of +0.25 per cent is applied to total cost weighted pupil numbers, omitting those in nursery and special schools. Its basis is that the quality of educational services delivered can be proxied by exam success. The quality adjustment was introduced in 1998 and backdated to 1986. It was based on the trend in the average points score (APS) from General Certificate of Secondary Education (GCSE) results over a period of four years in the mid 1990s, in England only, for pupils who were 15 or younger at the start of the year they took the exam. It has not been updated to verify whether subsequent cohorts of pupils achieved the same improvement. The quality adjustment is applied to school pupils aged 16-18 but there is no separate quality measure of their examination attainments.
- 9.12** Overall pupil numbers are fairly stable but there are underlying trends, with a rising trend to 2001 and then a gradual fall, which is due to a decline in primary school numbers; secondary school numbers are still rising. Figure 4.2 in Chapter 4 shows the trend in a measure based on pupil numbers over a long run of years. The chart shows the Education output trend with the 0.25 per cent quality adjustment and the output trend with no quality adjustment.



**9.13** The current measure for output from schools meets many of the criteria in recommendation 6.1, but could be improved by measuring actual school attendance rather than registered pupil numbers, since those who are not at school are not benefiting. The quality adjustment should be revised or updated, and based on a wider range of information including attainment results from Scotland, Wales and Northern Ireland, and should take account of the success of education given to pupils aged 16 and over.

### Health professionals' courses

**9.14** Government expenditure in the National Accounts is classified by purpose, rather than by the responsible government department. In June 2004, a change was made to the National Accounts to reclassify the Department of Health's (DH's) spending on non-medical health professional education from Health into the Education category of government expenditure. The expenditure goes from NHS bodies to universities to purchase places on diploma or degree courses in nursing and allied health professional training. Many of these are three-year courses taken by students who are not employed by the NHS but intend to make a career in health care. Some students may be current NHS employees taking further qualifications. (University education in medicine and dentistry is funded differently and is outside general government expenditure, as is generally the position for higher education.)

**9.15** There was no specific output measure for this expenditure when it was included in the Health category of the accounts. After reclassification, an output measure was introduced, using the number of new students each year on courses in England, with no cost weighting for different types of course. No quality measure is used. The number of new students in England is used as a proxy for UK output, matched to NHS expenditure on non-medical health professional education in England. This is grossed up by the ratio of England to UK population to give estimated UK output.

**9.16** This measure could be improved by making use of more detailed information about cost weights of different courses, by including actual student numbers and spending figures from Scotland, Wales and Northern Ireland, and by finding a quality measure.

### Future Methods of Output Measurement

**9.17** This section sets out our recommendations for change in the measure of Education output in the National Accounts. These follow the criteria for new measures and replacement measures in Chapter 6 of this report, with improvements in extending coverage, increasing the level of detail at which output indicators are measured, revisions of the weightings used to combine measures, plans to introduce quality adjustment in some areas and revision of the current quality adjustment for school education output.

### Schools output

- 9.18** We propose that pupil attendance is used, rather than the number of pupils, on the basis that it provides a better measure of pupils who are actually being taught in schools. Pupil attendance can be calculated from information collected on pupil numbers and pupil absence, by type of school, though Northern Ireland do not have information on absence for primary or special schools. Absence levels in England have changed over recent years: it is a key DfES objective to reduce absence levels and pupil absence is currently at its lowest level for ten years. This, in part, reflects additional expenditure and effort in improving management of attendance. In addition, the cost weights for different types of schools should be updated annually, under the chain linking method used elsewhere in the National Accounts.
- 9.19 Recommendation 9.1:** we recommend that pupil attendance, rather than the number of pupils, should be used as the volume measure of output, and that school cost weights should be updated annually.
- 9.20** The review team has worked with DfES to develop an improved quality measure of output for schools in England. DfES have developed a number of approaches and plan to describe their work in a published discussion paper later in 2005. The work includes options for measuring pupil attainment and pupil progress through the key stages, or by GCSE results, and estimating the value of education in terms of future earnings (see paragraphs 9.33-9.34). We hope this work will be the basis of a measure which ONS could use in the longer term, taking account of any wider comments on the interesting DfES proposals.
- 9.21** The quality adjustment was based on England results, used as a proxy for the United Kingdom. Quality adjustment measures are currently being considered for school output for England, Scotland, Wales and Northern Ireland. The methodology ought to be consistent across the United Kingdom; however, there are differences between educational systems, including the timing and nature of examinations or key stage assessments, and these may affect the approach to be taken. We have discussed the issues with the Devolved Administrations during the review, to see how ONS can improve on an assumption that quality change in the English educational system is an accurate proxy for change in the other countries of the United Kingdom. All countries have shown interest and commitment to contributing to the review. ONS and the Devolved Administrations need to continue this work so that information for Scotland, Wales and Northern Ireland is included where this is possible.
- 9.22** There are a number of issues for further work and public comment, and we have had to consider whether to advise that the current 0.25 per cent quality adjustment should continue meanwhile, or whether to advise an interim revision. We think an interim update should be considered seriously, not least because it will allow for fuller exploration of the options for a comprehensive, UK wide quality adjustment to be adopted in the future.

**9.23** We consider that, rather than continuing to rely on an out of date calculation, the current quality adjustment should be updated by using similar information to the previous measure (i.e. APS for GCSE results achieved by age 16), but using more information and more recent years. As an interim measure, this might still be based on results in England only, but it would be preferable for ONS to work with the Devolved Administrations to make use of results from all four countries in the United Kingdom, taking account of the different exam systems. In Scotland, the average tariff score of S4 pupils could be used.

**9.24** The GCSE results are the outcome of 11 years of compulsory schooling. The main drawback with this measure is that a time lag of 11 years is therefore required to measure the attainment of all 11 cohorts of pupils in any year. This could be handled by making projections for future years based on current trends and expectations, but the most appropriate method would have to be considered. Each year, retrospective adjustments would be made using actual GCSE results to replace predicted results. As discussed in paragraph 6.37, education results in one year may be attributable to an investment in increased resources, or new teaching methods, many years earlier. This should be recognised in the analysis and interpretation of results, and possibly in any intermediate estimates.

**9.25** An interim updated GCSE measure has a number of advantages.

- It continues to use GCSE APS results for the quality adjustment, like the current quality measure.
- It can make use of the long time trend available for GCSE results.
- It is relatively simple to use and the method and data will be transparent, and easier for Devolved Administrations to implement.
- It provides a measure of the final outcome of compulsory schooling (ages 5 to 16) in England.
- It would be more defensible than continuing a calculation, with no mechanism for annual review, based on changes in the education system in the mid 1990s.

**9.26 Recommendation 9.2:** we recommend that ONS should update and revise the quality adjustment factor for schools, using later information about GCSE results, and if possible also information from all parts of the United Kingdom.

**9.27** For the future, the review team and DfES have explored the potential for using alternative approaches for measuring quality based on:

- pupil attainment;
- quality of teaching; and
- class size.

Our work has included consideration of the value of education in terms of future earnings.

### Pupil attainment

**9.28** DfES have worked on a number of approaches and plan to describe their work in the forthcoming discussion paper. In addition to methods based on GCSE results, the paper will examine alternative approaches to measuring pupil attainment. In England, pupils are assessed at the end of the key stages of school education by key stage tests (see box). DfES have produced methods for measuring progress between the key stages. Briefly, the quality of education output would increase if pupils make more progress between key stages than would be expected, based on past experience. More detail of possible methods was given in our Interim Report.

In the current compulsory education system in England, pupils are required to sit statutory tests at ages 7, 11 and 14 and GCSE exams at age 16. The tests aim to assess the knowledge and skills gained by pupils over the period of the four key stages of education. The tests are called Key Stage 1, Key Stage 2, Key Stage 3 and Key Stage 4 (or GCSE) respectively.

**9.29** In Scotland, the Scottish Survey of Attainment will be introduced in 2005 and will report annually on the results of a sample-based survey of pupils in the school years P3, P5, P7 and S2 for English, mathematics, science and social subjects. This will provide national level information on primary and early secondary school attainment.

In the current education system in Scotland the 'key stages' in terms of the Scottish Survey of Attainment will be P3 (age seven), P5 (age nine), P7 (age 11) and S2 (age 13). Final exams take place in S4 (age 15), for Standard Grades (broadly similar to GCSEs); in S5 (age 16) and S6 (age 17) pupils are likely to sit Highers and Advanced Highers.

**9.30** DfES have started to consider ways in which a quality adjustment for education of school pupils aged 16 and over can be measured. The GCSE based quality measure will need to be reviewed when the way in which pupils take exams becomes more flexible, as a result of 14 to 19 education policies in England. Following a review of the curriculum in Scotland, the Scottish Ministers' response to the recommendations of the Curriculum Review Group include the abolition of Age and Stage regulations (which state when young people can sit exams) by the end of 2005, and the introduction of guidelines. It is important for ONS and DfES to work with the Devolved Administrations so that future quality adjustments take account of educational systems and results in all parts of the United Kingdom.

- 9.31** One area of concern when using test and exam results is whether standards have been maintained over time. In England, the Qualification and Curriculum Authority (QCA) is responsible for regulating the public examination system. The Scottish Qualifications Authority are responsible for regulating the examination system in Scotland, to ensure that standards are maintained at a consistent level for each year. We discussed with the QCA their work on setting, maintaining and monitoring examination standards. The examination bodies have rigorous procedures in place to ensure that standards remain constant year on year and the role of QCA is to ensure the consistency of those standards over a longer period. QCA has in place a rolling programme of standards reviews which looks at the syllabuses, question papers and candidates' work over time.
- 9.32** QCA's view is that, over the last five years, standards in England have remained constant. However, in the longer term it is more difficult to guarantee maintenance of standards, because of major changes in syllabuses. Where QCA's monitoring of examination evidence suggests any changes in standards, action is taken to set appropriate standards in the following year. Given this form of correction, it may be preferable to measure average exam results over several years, rather than a single year.
- 9.33** The DfES paper will set out their work on measurement of the value of education output in terms of future earnings, which has been based on discussions with the review team. In Chapter 4, we drew on the parallel with the private sector, and this was embodied in Principle A (see paragraph 4.7). In order to apply this principle, we have, in the absence of market transactions, to infer the value that would be attached, and the account that would be taken of quality change. The example was given of driving schools, and the contribution of driving lessons to passing the driving test. Passing the test has a value to the individual concerned. Taking the specific example of Heavy Goods Vehicle (HGV) driving licences, we can see that the acquisition of the licence adds to the person's earnings prospects. Other things being equal, the wage premium associated with the possession of an HGV licence rises over time in real terms with the level of real earnings. Historically, in the United Kingdom, the annual increase in real earnings has averaged around 1½ per cent.
- 9.34** In principle, the argument of the previous paragraph applies to educational qualifications in general. An adjustment of 1-1.5 per cent per annum would close the gap identified in Chapter 4 (see paragraph 4.32) between a demographic-based output measure and growing GDP. It would recognise the complementarity between public and private output. At the same time, the magnitude of the adjustment is much larger than that associated with the improvement in qualifications (with which it is additive). Moreover, as far as we know, no other country yet makes such an adjustment. These are grounds for proceeding cautiously, and ensuring that the adjustment commands wide support in principle before it is implemented. But we recommend that ONS give serious consideration to the earnings adjustment. Not to make such an addition would miss an important part of the contribution of public output.

### Quality of teaching

**9.35** Quality of education could be measured through school inspections. In England, this would mean using the quality judgements made about schools in inspections undertaken by the Office for Standards in Education (Ofsted). In Scotland, HM Inspectorate of Education is responsible for inspecting schools.

**9.36** Ofsted quality judgements about individual schools in England could be summarised to measure changes in the quality of education. For example, the percentage of schools judged as good and above for teacher quality could be used as an annual measure of quality. There are a number of advantages, which could justify the use of Ofsted assessments.

- Ofsted advised us that, although frameworks for inspection have evolved, the method of judging teaching quality had been one of the more stable elements. There are checks and balances to ensure consistency in inspection standards, with inspectors working to a common framework and themselves subject to monitoring and scrutiny.
- Inspections cover all aspects of education, not just examination scores.
- Ofsted have an unrivalled depth and breadth of knowledge about the quality of schools.
- Judgements are recorded on a seven-point scale, from excellent to very poor.
- Ofsted ensure that its annual summary of inspection results is nationally representative by using appropriate weights for the numbers of different types of schools inspected.

**9.37** But there would also be a number of difficulties.

- Ofsted continually reviews and changes its inspection procedures. This makes long term comparisons difficult. The Ofsted results are not designed for monitoring long-term trends.
- Schools prepare for Ofsted inspection and there may be an artificial climate, and no certainty that the criteria for teaching and school quality would be consistent across schools and time.
- There are discontinuities, such as a major change in how judgements were made and recorded in April 1996 (each point of the seven-point scale was given a description, this had a significant effect on the way judgements were made).
- The next changes, planned for September 2005, will be an even bigger step change as they will (subject to consultation) introduce a four-point scale. For comparative purposes, it is unlikely that there will be an easy read across from one scale to the other.
- From September 2005, the inspection cycle will change from 6 years to 3 years and the inspection process will change to no or very little notice, with a substantially reduced amount of inspection coverage.

**9.38** This is an interesting area. We do not recommend using Ofsted results directly in output measures at this time, but they should be kept under review, and used in the triangulation work discussed in Chapter 4 and later in this chapter.

#### Quality of resources based on class size

**9.39** An alternative approach for measuring quality would be to use class size, or an adult/pupil ratio, on the assumption that the smaller the teacher/pupil or adult/pupil ratio the better the quality of learning. But clear evidence of these relationships would have to be established.

**9.40** Class sizes in infant schools (for five, six and seven year olds) were reduced to a statutory maximum of 30 from September 2001 as part of the drive to raise standards in schools in England. There are no plans to require further reduction in class sizes, which have reduced slightly over recent years. In Scotland, there is a commitment to reduce the size of S1/S2 for Maths and English, and to reduce the size of P1. Although there may be advantages in having smaller classes in some circumstances, the case is not proven that reducing class size alone would improve quality.

**9.41** Schools in recent years have taken on a greater number of classroom support staff, increasing the adult/pupil ratio. Support staff can directly help pupil learning. Support staff can also take some of the administration work from teachers to increase teachers' time with pupils. This change in the mix of skills can be considered in the wider examination of education productivity, but it would be wrong to presume that outputs have changed just by measuring the change in quality-adjusted inputs.

**9.42** **Recommendation 9.3:** we recommend that ONS and the four education departments should continue to work on a longer term revision of the quality adjustment for the schools output measure. This should take full account of results from throughout the United Kingdom, measure if possible the quality of education delivered at younger ages rather than relying on examinations at age 16 to proxy the whole education output, include information about attainment of school pupils who are 16 and over, and consider an adjustment to reflect the value of education for future earnings. We regard the sources of information on quality of teaching and class size as useful for assessment in productivity articles rather than the National Accounts measure.

#### Initial Teacher Training courses

**9.43** Central government expenditure includes the procurement of Initial Teacher Training (ITT) courses. This gives scope for a new output measure, mirroring that which ONS introduced in 2004 for health professionals' courses. The number of students taking ITT courses can be used as the output measure, classified and cost weighted by type of course, updating the weights each year. Data are available to construct a time series back to 1995. Initially, England would be used as a proxy for the United Kingdom and no quality adjustment would be made. However, it is desirable to add Devolved Administration data as soon as possible, and quality issues should be examined further.

- 9.44 Recommendation 9.4:** we recommend that ONS should introduce a new output measure for Initial Teacher Training courses, using a cost weighted index of student numbers. This should, as soon as possible, include information from the Devolved Administrations, and further work should be done to develop a quality measure.

#### Health professionals' courses

- 9.45** The current measure is the number of new students per year in England, cost weighted by the total cost of the courses in the base year, currently 2000. We recommend that the current output measure is revised, by using total student numbers, adding detail by type of course and updating the cost weights each year. The new measure would be the number of students per year by course type, cost weighted by the cost of the type of course, with cost weights updated each year. England could still be used as a proxy for the United Kingdom but it is desirable to add Devolved Administration data as soon as possible.
- 9.46** The Quality Assurance Agency for Higher Education (QAA) is starting to devise a quality assurance arrangement in health care education in England. This could provide a future source of quality measurement. Alternatively, there may be scope to use student attrition data from the Higher Education Statistics Agency (HESA), as an indicator of quality.
- 9.47 Recommendation 9.5:** we recommend that the health professional education output measure is updated by using total student numbers, cost weighted by type of course, with UK data added as soon as possible, and working towards a quality adjustment based on Quality Assurance Agency for Higher Education or Higher Education Statistics Agency information.

#### Nursery places

- 9.48** Public funding for private nursery places for three and four year olds is currently treated as a transfer in National Accounts. After discussion between the review team and ONS, it has been agreed that this should be considered to be direct purchase and included in general government expenditure on Education. The new output measure proposed is the total number of filled nursery places per year; with annually updated cost weighting. Initially, England would be used as a proxy for the United Kingdom and no quality adjustment would be made. However, full UK coverage should be achieved as soon as possible, and the possibility of a quality measure should be examined further, perhaps taking account of Ofsted inspections of provision for under 5s.
- 9.49 Recommendation 9.6:** we recommend that a new output measure should be introduced for publicly funded private nursery places, including inclusion of information for all parts of the United Kingdom and consideration of how to develop a quality measure.



## Inputs and Deflators

### Inputs

**9.50** General government Education expenditure on schools occurs at four levels: schools (nursery, primary, secondary and special), local authority, central government spend and non-departmental public bodies. There are three components of input expenditure: labour, intermediate consumption and capital consumption. In 2003, at current prices, labour accounted for around 75 per cent of Education inputs, goods and services for 22 per cent and capital consumption for three per cent. Table 9.1 presents figures of the various Education components at current prices; these figures are consistent with *Blue Book 2004*.

Table 9.1 Expenditure on general government Education inputs: labour, intermediate consumption and capital consumption, current prices, UK

| £m                       | 1995   | 1996   | 1997   | 1998   | 1999   | 2000   | 2001   | 2002   | 2003   |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Labour                   | 17,960 | 18,246 | 18,788 | 19,560 | 20,928 | 22,663 | 25,008 | 27,208 | 29,557 |
| Intermediate consumption | 6,495  | 6,612  | 6,712  | 7,050  | 6,965  | 7,086  | 7,261  | 8,236  | 8,776  |
| Capital consumption      | 1,055  | 1,073  | 1,073  | 1,098  | 1,128  | 1,171  | 1,211  | 1,247  | 1,273  |
| Total                    | 25,510 | 25,931 | 26,573 | 27,708 | 29,021 | 30,920 | 33,480 | 36,691 | 39,606 |

Source: Office for National Statistics

**9.51** Expenditure figures for the National Accounts are obtained from several different accounting sources. The sources for local authority data are the Office for the Deputy Prime Minister (ODPM) and DfES for England, the Scottish Executive for Scotland, the Welsh Assembly for Wales, and the Treasury for Northern Ireland. Chapter 5 explains the data flows and issues which arise.

**9.52** For England, local authority expenditure data on labour and goods and services are obtained from the Revenue Outturn 1 (RO1) form supplied by the ODPM. The RO suite of forms divides local authority services into key areas: employees, running expenses and total expenditure. However, for the National Accounts, the figures need to be adjusted to remove transfers, subsidies and grants. This detail is not given on the RO1 forms, so ONS obtains it from the section 52 form, which local authorities send to DfES, and assumes both forms are consistent. However, inconsistencies in the data have been discovered by ONS and the Treasury and the review team have consulted DfES, ODPM, the Treasury and CIPFA on why the differences are occurring and to investigate how this can be resolved. ONS and the other departments should continue to work on this.

**9.53** The Teaching Training Agency purchases teaching training courses from higher education institutions and provide financial information via DfES. Spending by NHS bodies on health professional education is reported via DH. Both are classified as intermediate consumption.

## Deflators

- 9.54** The review is also considering price indices used to ensure that the most appropriate adjustment is made to convert expenditure to constant prices. Using the criteria proposed in Recommendation 5.9 and Table 5.1, we have been working with DfES to produce new deflators that cover England. We have discussed this with the Devolved Administrations and it is hoped that country specific education deflators can be developed.
- 9.55** Expenditure on labour is by far the biggest area of Education spend. Previously, deflation of labour was calculated using a local authority education pay index supplied by ODPM to deflate all local authority labour expenditure. The ODPM pay index included national insurance contributions and pension contributions. However, the pay index used headline pay settlements, though it would be preferable to deflate by changes in average earnings for different staff groups. The figures covered England and Wales but did not include teachers' pay in Scotland and Northern Ireland. Costs of all groups of staff, i.e. teachers, support and administration staff, were deflated using the same ODPM pay index.
- 9.56** Work has been carried out to address these weaknesses, but more remains to be done. ONS and DfES have developed a more robust and responsive method that measures changes in earnings of the different groups employed. This needs to be developed further to take account of national insurance and superannuation contributions. The DfES database of teachers' records holds information (for pension purposes) on the average earnings of all teachers. The movement in earnings is used to obtain measures of changes in the average earnings of teachers. For support, administration and other staff, the public sector average earnings index (AEI) would be an improvement on the existing methodology while a more appropriate index is developed. Given that the number and expenditure on school support staff has increased significantly over the last few years, it is important to deflate this expenditure accurately.
- 9.57** Intermediate consumption represents 22 per cent of total education current expenditure in 2003. Education goods and services include the purchase of teaching aids, books and stationery, electricity and other utilities. The ideal method for deflating goods and services would be to apply specific price indices on a product-by-product basis. Previously, a combination of Producer Prices Indices and the Retail Prices Index excluding mortgage interest payments (RPIX) was used as a deflator. ONS and DfES have carried out further work and are progressing towards improved deflators for use in this area.
- 9.58** The inclusion in output of health professional higher education courses, and the proposal to include initial teacher training courses, means these costs should be separately deflated. Currently, RPIX is used as the deflator. However it would be better to use price indices that measure specific movements in the cost of these higher education courses. ONS and DfES should continue researching more appropriate higher education deflators.

- 9.59** Government purchase of private nursery places should be separately deflated. Initially, RPIX could be used as the deflator. However, ONS and DfES should investigate a better price deflator.
- 9.60** **Recommendation 9.7:** we recommend that ONS and the four Education departments should continue to work together to improve accuracy, timeliness and classification of figures for Education spending, and suitable deflators to measure volume of spending in a way which takes account of changes in the quality of inputs.

## Productivity and Triangulation

- 9.61** ONS plans to produce an education productivity article later in 2005, to analyse figures based on the National Accounts, for inputs and outputs, and estimate productivity change, using the best available deflators. The intention is to make use also of alternative estimates of outputs to be published separately by DfES, which do not yet form part of the National Accounts. It would be helpful to set these various figures for estimated change in outputs in the context of changes in staffing and resources. Expenditure in schools could be linked more accurately to achievements where there is a lagged delivery. Pupil key stage results could be linked to inputs over relevant preceding years.
- 9.62** Such a publication would be very helpful. It could also include triangulation information – evidence on quality change and productivity from other sources. This would enable measures based on pupil attainment to be placed in context and compared for example with results of Ofsted inspection reports on teaching quality (see paragraphs 9.35-9.38). Other sources of evidence include international comparisons of pupil attainment, and public satisfaction surveys. The Efficiency Technical Note, published by DfES and the Treasury as part of the 2004 Spending Review, sets out a range of detailed ways of measuring improvements in efficiency in school, such as reductions in teachers' time spent on particular administrative tasks as a result of delegation to classroom assistants, and savings in costs of supply teachers by extending the roles of school support staff. The results of these measurements could usefully be considered in future productivity articles. Over time, the triangulation section could be extended by reviewing relevant government, academic and international reports and research on education output and productivity.
- 9.63** It would be desirable for ONS to publish a series of education productivity articles, updating and expanding the range of analysis and research in each new article. For example, articles could look at education in the Devolved Administrations, examining the output, outcomes and productivity and the wider triangulation evidence for Scotland, Wales and Northern Ireland. Other areas that could be examined in more detail would be the health professional and initial teacher training courses and nursery provision procured by government.

- 9.64** In the longer term, analysis of outputs from education could be extended more widely. There is a logical progression into exploring quality adjusted output measures for all higher and further education: these are currently classified outside general government in the United Kingdom, though most other European countries include this area of education in their non-market education area. In a wider sense, education funded privately by households, and training funded by employers, also contribute to future earnings growth and other benefits of education and it would be interesting to identify figures on inputs and outputs equivalent to those used for general government expenditure. These could be explored in a satellite account on human capital resource formation, as proposed in Recommendation 7.5 (see paragraph 7.20).
- 9.65** **Recommendation 9.8:** we recommend that ONS and the four Education departments should continue to work together on analysis of education output and productivity change, using the National Accounts and other sources, to be published in productivity articles and through development of a satellite account for human capital resource formation.

# 10 Public Order and Safety

---

## Introduction

**10.1** This chapter explains the current UK Public Order and Safety measure, and recommendations for the future, in five sections:

- Introduction – including scope and objectives of Public Order and Safety
- Current methods of output measurement, and a critique against the criteria in Recommendation 6.1 (see paragraph 6.5)
- Future methods of output measurement
- Inputs and deflators
- Triangulation and productivity measurement

**10.2** Under the international Classification of the Functions of Government (COFOG) used in the National Accounts, Public Order and Safety has six subsections. These are:

- Police
- Fire
- Law Courts
- Prisons
- Research and Development in Public Order and Safety
- Public Order and Safety not elsewhere classified

**10.3** Three government departments in England and Wales take principal responsibility for the Public Order and Safety function.

- Police, Probation, Prisons, and Research and Development are the responsibility of the Home Office.
- Fire is the responsibility of the Office of the Deputy Prime Minister.
- Courts are the responsibility of the Department for Constitutional Affairs (DCA).

Other bodies, such as the Crown Prosecution Service (CPS), also play an important role. There is thus greater breadth to the functions in this chapter than for either Health or Education – though also interconnections, as discussed below.

**10.4** In all these areas, there are distinct legal and structural arrangements for Scotland and Northern Ireland. Services for Wales follow the same systems as in England, although most of them are the responsibility of the Welsh Assembly Government. The exceptions are the police forces in Wales, which are the responsibility of the Home Office, and the criminal and civil courts in Wales, which are the responsibility of the DCA. In Scotland, responsibility for criminal justice rests with the Scottish Executive and the Crown Office and Procurator Fiscal Service.

**10.5** Attributing final output to the particular activities on individual services is difficult across all areas of government, but the problem is particularly acute in the Criminal Justice System (CJS). It is hard to separate out the various functions of Police, Law Courts and Prisons and tidily quantify their contribution to output. The effectiveness of each agent of the CJS depends, to varying degrees, on the effectiveness of the others. This is reflected in the fact that there is a Public Service Agreement (PSA) for the CJS as a whole, which the Home Secretary shares with the Lord Chancellor and the Attorney General. Each department has its own exclusive targets, but joint ones from 2004 include the following three.

- Reduce crime by 15 per cent, and further in high crime areas, by 2007-2008.
- Reassure the public, reducing the fear of crime and anti-social behaviour, and building confidence in the Criminal Justice System without compromising fairness.
- Improve the delivery of justice by increasing the number of crimes for which an offender is brought to justice to 1.25m by 2007-2008.

Separate, but largely similar targets exist for Scotland. In Northern Ireland responsibility for criminal justice is shared between the Lord Chancellor, the Northern Ireland Office (NIO) and the Attorney General for Northern Ireland. NIO has a number of specific PSA targets dealing with cross-community matters.

### **Current Methods of Output Measurement, and Critique**

**10.6** The paragraphs that follow describe briefly the methods employed for the different functions and identify some of the principal concerns about the current methods. In the UK national accounts, all Public Order and Safety, except for Police, is estimated using activity indicators, without quality adjustment. Police output is measured using deflated inputs.

#### **Courts and Administration of Justice**

**10.7** These are currently estimated using direct output methods. The output of county (civil) courts, crown courts and magistrates' courts are measured separately, with the workload broken down by type of case. For county courts, there is also a measure of the administrative workload, measured by number of hours. The weights used to produce the overall index for magistrates' courts and crown courts are calculated by expenditure on types of cases. County courts activities are weighted together using an average time on case, because of limited data sources.

**10.8** Output for the CPS and the Legal Services Commission (legal aid) and their corresponding weights are calculated in similar fashion, with a workload measure of output and an average time/cost weighting system.

**10.9** The current methods for measuring the output of the courts have a number of defects. For instance, in county courts administrative hours are used as a volume indicator of output, although they are clearly inputs. In recent years, administrative work has become much more efficient, which ought to result in a measured productivity increase. Instead, the output is deemed to have declined. Some important areas, such as divorce work, are not measured at all, and there is no quality adjustment.

#### Probation

**10.10** Probation output is currently estimated using direct output methods. The current indicators used for Probation are probation starts; community service; combination orders and licences; numbers of pre-sentence reports (PSRs) completed; and a measure of probation work done in the family court. An experimental cost-weighted activity index, constructed by the Home Office, is used to weight these various services. However, there are no up-to-date data and the index is extrapolated from a short time series, which is now a few years old.

#### Prisons

**10.11** Prison service output is currently measured by numbers of nights spent in prison by: any prisoners on remand; prisoners under sentence; non-criminal prisoners; and prisoners in police cells. The current method has evident defects.

- It fails to quality adjust for overcrowding, reoffending, and achievements during incarceration such as educational attainment or drug rehabilitation.
- It fails to weight according to cost – eg high risk/ low risk prisoners.

#### Fire

**10.12** Fire output is currently measured directly. There are three broad output categories:

- fighting fires;
- preventing fires; and
- special services.

**10.13** The categories are further divided into sub-categories, or incident types, and output weights for these are assumed to be proportional to average staff hours spent on each one. The total weight of each incident type is calculated as the product of the weight for one incident and the number of such incidents in the base year. For prevention, the output measure is staff hours, based on survey data. These measures reflect the volume of activity rather than the effectiveness, quality or impact on final outcomes.

## Police

**10.14** Although Police output is currently measured using deflated expenditure, some experimental output indicators had been constructed for Police by ONS prior to the initiation of this review. They divided work into:

- crime related incidents;
- non-crime road incidents; and
- other non-incident related activities, such as patrols, crime prevention and special operations and events.

**10.15** The output indicators for crime related incidents and non-crime road incidents were fairly comprehensive in their coverage but, for lack of data, indicators for the third area are inadequate, with data only covering the licensing of fire arms (see paragraph 10.32 for possible future improvements in this area). There was also no proposed method for quality adjustment in any of the three areas.

**10.16** The proposed weights to be used for each indicator reflected the relative cost of clearing up a crime, taken from a survey conducted of the Humberside Police force, although with an adjustment for the Metropolitan Police. This was necessitated by data limitations at the time, but the assumption that one police force was representative enough to use for the construction of output weights is probably not a safe one.

**10.17** Some general data issues need to be addressed, as well as the individual problems set out above. Four areas where ONS's current output methods could be improved are summarised in Table 10.1. Coverage is generally only for England and Wales, making use only of Home Office statistics. There is no quality adjustment in the current methods. Development of more detailed indices of activity and better weighting systems should capture some quality changes in the services provided, by better disaggregation (see paragraphs 4.11-4.12).



Table 10.1 Current methods and summary of their limitations

|                 | ASSESSMENT OF CURRENT METHODS |  |  |                       |   |
|-----------------|-------------------------------|--|--|-----------------------|---|
|                 | Output coverage               | Detail of coverage and weights   | Quality adjustment   | UK coverage           |   |
| DELIVERY AGENCY | Police (experimental)         | Incomplete coverage of non-incident activity   | Detail is often patchy. Weighting done by survey of one unrepresentative force | No quality adjustment | Wales already included in data. England and Wales data grossed up for Scottish and N. Irish measure |
|                 | CPS                           | Complete coverage  | No disaggregation between guilty pleas, not-guilty pleas and acquittals.       | No quality adjustment | Wales already included in data. England and Wales data grossed up for Scottish and N. Irish measure |
|                 | Crown Courts                  | Full coverage but some measures of inputs still used   | Coverage not full enough to differentiate between work of differing values     | No quality adjustment | Wales already included in data. England and Wales data grossed up for Scottish and N. Irish measure |
|                 | Magistrates Courts            | Complete coverage  | Weights taken from 1995 data   | No quality adjustment | Wales already included in data. England and Wales data grossed up for Scottish and N. Irish measure |
|                 | Fire                          | Full coverage  | Based on activities count with poor weighting data                             | No quality adjustment | Great Britain coverage (i.e. ex Northern Ireland)   |
|                 | Probation                     | Coverage fairly complete   | Activities index   | No quality adjustment | Wales already included in data. England and Wales data grossed up for Scottish and N. Irish measure |
|                 | Prisons                       | Complete coverage of custodial function, but no measure of other outputs – eg educational, rehabilitative function | No weighting, or division by category of prisoner                              | No quality adjustment | Wales already included in data. England and Wales data grossed up for Scottish and N. Irish measure |

## Future Methods of Output Measurement

- 10.18** Ideally, we want to capture the attributable incremental contribution of government spending on public order to outcomes, but practical measures are constrained by the available data. As a result, three approaches were explored in parallel, recognising that there was likely to be trade off between what was immediately achievable and what was desirable. One approach essentially improves the current ONS methodology. This is a straightforward activities index. Another, the ‘administration of justice’ approach, is closer to a direct output measure. A third approach was to capture the CJS’s contribution to crime reduction using econometric modelling (see box on page 153). Work has been carried out on data mainly from England and Wales, but the aim is to extend the work to the whole of the United Kingdom and incorporate data from Scotland and Northern Ireland into the modelling framework.
- 10.19** We have made a distinction between those Public Order and Safety services categorised as ‘collective’ and those categorised as ‘individual’ for the reasons given in paragraphs 6.12-6.15. The *System of National Accounts* (SNA) summarises collective services as those that can be delivered simultaneously, do not require the explicit agreement or active participation of all the individuals concerned and for which there is no rivalry in acquisition (see Appendix B). An activities or disaggregated inputs method would count as a B method for collective services, under the Eurostat classification, and therefore be acceptable.
- 10.20** The SNA defines Public Order and Safety as a collective service. The distinction between collective and individual is not always straightforward, and that is particularly the case in this area. Clearly, some of the services under discussion combine elements of both collective and individual services. Arguably, there may be rivalry in acquisition for the fire service, the police service, or the use of the courts. A fire engine, when on active service, is devoted to servicing individuals or individual buildings. There may be times when the demand for fire engines in a locality exceeds their supply. But the fire service is a collective service in so far as the intention of the authorities is to provide sufficient capacity to meet all demand. The purpose is that it should be universally available, within a reasonable response time, wherever and whenever the demand arises, in the same way as street lighting.
- 10.21** A similar point could be made about the police service. The aim of the service is to provide the public with universal and continuous protection. But, in the event of a failure of this protection, the police also provide a service in clearing up crime, and this is delivered to the individual victims. Here, there will often be rivalry in acquisition and so, for instance, the police may not always have the resources available to follow up instances of vandalism or domestic burglary.

- 10.22** The CJS as a whole can be seen as a collective service. The police, prisons and other areas of the system involve the arrest, prosecution and incarceration of individual offenders, but the service being provided is a collective one to society as a whole, rather than an uninvited one provided to those prosecuted, arrested or incarcerated. Nevertheless, the fact that the service provided by the CJS involves bringing offenders to justice, gives it the flavour of an individual service and enables it to be treated as an individual service, for the purposes of statistical measurement.
- 10.23** Our work has tried to separate out those services that are more obviously collective, such as non-incident related police work, and treat them separately from those areas that have more of an individual aspect – mainly, but not exclusively, activities relating to the CJS. The non-incident related work of the Fire and Rescue services is arguably collective, although less obviously so than the non-incident police work. We have treated these two areas separately from the incident-related work of the CJS and the Fire service to allow for the different international guidance on the measurement of collective services.
- 10.24** By contrast, the civil responsibilities of the courts are more obviously individual, since the services they provide are provided to the individuals or companies involved. A divorce settlement, or a compensation claim, or a libel case do not meet the SNA criteria for collective services outlined in Appendix B. A measure of civil courts output is being developed separately from the CJS-related work of the courts.

### **Incremental Improvements to the Current ONS Methodology**

- 10.25** This section describes the first of three parallel approaches: to maintain the broad method now in the National Accounts, but to improve its coverage and detail. The outputs of individual delivery agencies – Police, Courts, Prisons and the CPS – are measured separately. But, with the close cooperation of the Home Office, ODPM and DCA, much more detailed data have been used, both to improve coverage of activities and to improve weighting. For instance, the weights used for Courts and the CPS have been weighted using the Home Office Flows and Costs model, which provides detailed information on the costs incurred by different delivery agencies in processing individuals through the various stages of the CJS. The police Activity Based Costing data have been used to weight police activities. Together with a greater disaggregation of output indices, this weighting of data helps to pick up movements in the mix of outputs better than do current approaches.
- 10.26** A comprehensive list of activities and outputs was compiled. Once outputs were identified, input costs were attributed to activities, which were in turn linked to the outputs from each CJS delivery agency. These outputs derived from each CJS delivery agency were then weighted according to their associated input costs to produce a final agency output measure.

**10.27** Police output is captured using investigations data, Courts and CPS output by using the number of cases processed, and Prisons output by the number of places filled (prisoner years detained). Output is split into offences (for Police and Courts) and category of prisoner (Prisons). The CPS data are not currently split by offence, but this would be desirable and will be a future area of work, subject to the appropriate weighting data being available. No new measure has been developed for probation services, because the current methodology is fairly full in its coverage, although there are data collection problems. The organisation of correctional services as a whole (Prisons and Probation) will be brought under the auspices of the National Offender Management System (NOMS) in the near future and further work will be needed after these machinery of government changes.

**10.28** The output of Crown Courts is currently measured by:

- actual trials;
- referrals from magistrates' courts, where the defendant has been found guilty, but is referred for sentencing; and
- appeals from magistrates' courts.

The expenditure for each category has been weighted by the average expenditure for each category of work in the base period.

**10.29** The new method still divides the activities of the crown courts into the three categories, but each of these categories is subdivided further by type of crime, which are the standard categories for which the Home Office collates data. These are:

- Violence against the person;
- Sexual offences;
- Burglary;
- Robbery;
- Theft and handling stolen goods;
- Fraud and forgery;
- Criminal damage;
- Drug offences;
- Other indictable offences;
- Indictable motoring offences;
- Summary offences (excluding motoring); and
- Summary motoring offences.

- 10.30** For each category of offence, at each stage of the process (i.e. trial, guilty pleas and sentencing), average time weights have been constructed. These are used to produce an index for each category of offence across the entire process. The next step is to weight these offence categories together by expenditure. Expenditure weights have been calculated by taking expenditure data for each category of offence and dividing by the aggregate output (eg the volume of trials or sentences). This gives a base-year unit cost for each offence category that can then be aggregated together.
- 10.31** An almost identical methodology is used to measure the output of magistrates' courts (criminal only). The three relevant processes in this case are proceedings, trials and sentences, although for the time being data limitations mean that cases can only be split between proceedings and sentences. For both crown courts and magistrates' courts the data used to construct the output weights are taken from the Flows and Costs model. The police Activity Based Costing data are used to calculate the weights for police activities within the CJS, since this is a better source than the Flows and Costs model. The Police measure only covers the output of the police relating to the CJS – i.e. detections and arrests.
- 10.32** Other areas of police activity, such as patrols and public order work, are not covered. In current experimental methods, these are measured by a count of non-crime road incidents and other non-incident related activities, such as patrols, crime prevention work and special operations and events. More work is required on what should be measured to capture the output of this side of police work, before anything is included in the National Accounts. A new scheme, the National Standards for Incident Reporting (NSIR), has just been piloted. If fully implemented, it could provide greater coverage of police activity for non-crime incidents and could serve as the basis for a detailed cost-weighted activity index for this area. This could be supplemented by using data on how secure individuals feel and other measures of the effectiveness of these areas of police work covered in the British Crime Survey.
- 10.33** Prison output measures (as with probation) will need to be reviewed further after the introduction of NOMS, but a possible quality adjustment has been developed. Intuitively, it is plausible that overcrowded cells should be given a lower weight in output. No robust evidence has yet been found to justify a precise weight, but the Home Office has suggested giving an overcrowded cell a weight of 0.8 rather than 1. We note this suggestion, and regard it as a good example of a proposal that should be validated by external experts, as recommended in Recommendation 6.2 (see paragraph 6.8).

Table 10.2 Summary of CJS measures after improvements outlined above

|                 | Output coverage    | IMPROVEMENT TO CJS METHODS  |  | UK coverage   |  |
|-----------------|--------------------|---|--|---|--|
|                 |                    | Detail of coverage and weights  | Quality adjustment   |   |  |
| DELIVERY AGENCY | Police             | Restricted to outputs of contribution to CJS. (Would be extended if NSIR adopted)                 | Greatly improved detail of outputs and activities and of weights                     | No separate QA factor yet, but introduced through improved coverage | Wales already included in data. Scottish and N. Irish work being undertaken through 2005 |
|                 | CPS                | Full coverage of court work, but omits measurement of some areas (eg work with victims, charging) | Weighted index of activity, split by court and outcome of case                       | No separate QA factor yet, but introduced through improved coverage | Wales already included in data. Scottish and N. Irish work being undertaken through 2005 |
|                 | Crown Courts       | Full coverage   | Much fuller coverage with type of work broken down by crime type and procedural type | No separate QA factor yet, but introduced through improved coverage | Wales already included in data. Scottish and N. Irish work being undertaken through 2005 |
|                 | Magistrates Courts | Full coverage   | Much fuller coverage with type of work broken down by crime type and procedural type | No separate QA factor yet, but introduced through improved coverage | Wales already included in data. Scottish and N. Irish work being undertaken through 2005 |
|                 | Prisons            | Full coverage   |  | Quality adjustment for crowded cells                                | Wales already included in data. Scottish and N. Irish work being undertaken through 2005 |

**10.34 Recommendation 10.1:** we recommend that current methods for measuring Police, Courts and other Criminal Justice System delivery agencies are improved by extending detail of coverage and improving weights. This work should be extended to include information from Scotland and Northern Ireland as soon as possible. The measure for correctional services output should be reviewed when the National Offender Management System is in place. In the interim, we consider it would be reasonable to adopt a quality adjustment to reduce the output value of crowded prison cells.

### Administration of Justice output approach

- 10.35** This section sets out the second approach, described as ‘administration of justice’. The first approach is an improvement on current methods, but suffers from the shortcoming that each delivery agent is treated as a separate entity, with separate outputs. This is clearly not the case, since, as noted earlier, many of the outputs of one agency are effectively the inputs of another – eg an arrest by the police is an input of the CPS. The Home Office’s chief objective is not to increase the activities, or output, of the police, but to reduce crime. The CJS plays a central role in reducing crime, by the successful detection, prosecution and sentencing of offenders. It acts as a deterrent to future crime by imposing an expected cost on criminal activity.
- 10.36** The output of the CJS is ‘justice’. An effective system will convict the guilty and acquit the innocent. Because prosecutions are undertaken on the balance of probability, but convictions made only when the case is ‘beyond reasonable doubt’ acquittals should be included in the output measures. They do not represent a failure of the system. The administration of justice method defines outputs as CJS disposals which are delivered by the system as a whole, looking at the joint output of the police, CPS and the courts; and then separately for the combined outputs of the correctional services, i.e. offender management and offender interventions.
- 10.37** If, for illustration, the police had made a successful arrest, but the CPS failed to formulate an adequate case, and the prosecution was thrown out of court on technical grounds, any initial value added by the police would be lost. (Our concern is with a case where the individual was actually guilty, not with those where a court properly acquits because the evidence was insufficient.) This aspect of the joint output of the CJS is not picked up in the first approach, but it is in this one.
- 10.38** The methodology traces the progress of individuals through the system to the point of sanction or acquittal. For any given crime type, there might be a range of disposals: an acquittal, caution, fine, community penalty or custodial sentence. These have different resource costs for the CJS. A caution is issued by the police and does not involve the CPS, or the courts. To see how various offences flow through the system, we need to relate each type of crime to its observed frequency of receiving the corresponding sanction.
- 10.39** A matrix can be constructed with the different types of crimes in the rows and the different types of disposal in the columns. These categorised pairs of offences and disposals capture something of the homogeneity of individual cases, for which weights can be calculated. Weights are the average expenditure shares for each pair of offence and disposal.

Table 10.3 Crime-sanction matrix

| GRID             | Disposal |           |     |                   |         |
|------------------|----------|-----------|-----|-------------------|---------|
| Crime type       | Caution  | Discharge | ... | Community penalty | Custody |
| Violence         | (1,1)    | (2,1)     | ... |                   | (X,1)   |
| Sexual           | (1,2)    | ...       |     |                   |         |
| Burglary         | ...      |           |     |                   |         |
| ...              |          |           |     |                   |         |
| Other indictable |          |           |     |                   |         |
| Summary          | (1,Y)    |           |     |                   | (X,Y)   |

**10.40** These are not the only weights that could be used to measure criminal justice output.

The relative cost of clearing up a crime is not necessarily proportional to the social value of that work. However, in so far as the object is to capture the CJS's contribution to clearing up the crimes, expenditure weights should be used in the National Accounts, since that gives us the closest approximation to the government's contribution. Alternative methods are discussed further in the triangulation and productivity section below.

**10.41** The administration of justice method is undoubtedly an improvement on the current ONS methods from a theoretical point of view. It measures a direct final output of the CJS and eliminates the element of double counting present in the improved version of the current methodology. However, questions still remain about the extent to which a measure captures the attributable incremental contribution of the CJS to reducing crime. Clearly, many factors influence the level of crime, of which the CJS is just one.

**10.42** A full measure of the output of the CJS in the United Kingdom should include information from the separate criminal justice systems of Scotland and Northern Ireland. Work is in hand on this with the appropriate authorities.

**10.43 Recommendation 10.2:** we recommend that the administration of justice approach be developed further for future use in the National Accounts, and that work is undertaken to replicate this approach for Scotland and Northern Ireland.



### Econometric approach

This box sets out the third, most ambitious approach. In an attempt to estimate the extent to which the CJS influences crime reduction, the Home Office has built an econometric model to assess trends in recorded crime, using economic, demographic and criminal justice variables. The model can be used to forecast trends in crime by varying assumptions about the change in the explanatory variables. It has been used to assess what would happen to forecast crime, if the CJS variables were reduced to insignificance. The difference between crime rates with and without the CJS variables could then be valued, using cost of crime weightings as an estimate of gross added value.

However, the initial results were not stable and the information was not sufficiently plausible to be of immediate use. The crime prevention outcome series generated by this method is volatile. But the model is still being developed and could be of further interest in the future.

### Civil courts

**10.44** Work to develop a measure of output for civil courts has proceeded along similar lines and the suggested improvements are comparable with those in the first method suggested for the CJS. A framework for a more detailed cost-weighted activity index has been developed. As with the CJS, the basis of the new index is a detailed matrix of types of case, to yield a reasonable degree of homogenisation and then construction of weights for the individual components, based on average unit costs of each type of case. The matrix combines 15 case types (eg personal injury, adoption, divorce), with three activities: applications, hearings and enforcements. This would give a desirable improvement, but more work is needed to identify the unit costs. Further work with Scotland and Northern Ireland is also required.

Table 10.4 Civil courts case types

| Court    | County  | Family   | Insolvency                                      | Probate                | High                         |
|----------|---|--|---|------------------------|------------------------------|
| Activity | Specified<br>money<br>Personal<br>injury<br>Land<br>repossession<br>Other | Divorce<br>Private law –<br>children<br>Adoption<br>Public law –<br>children | Debtors<br>Creditors<br>Companies<br>winding up | Solicitors<br>Personal | Chancery<br>Queen's<br>bench |

**10.45 Recommendation 10.3:** we recommend that ONS should measure civil courts output through a detailed cost weighted activity index, subject to the Department for Constitutional Affairs completing work to identify unit costs for each type of case, and to further work to replicate the approach for Scotland and Northern Ireland.

## Fire

- 10.46** Fire Service work is separable into three areas – fire response, fire prevention and other incidents (such as road traffic accidents). For response, the current methodology uses a cost-weighted index of incidents. It might seem odd, at first sight, to use the actual number of fires as an output measure, since the objective of the Fire Service is to prevent fires. However, the number of fires occurring is one way of estimating the probability of future fires. Interpreted in this way, the approach makes much more sense, although it would be more reasonable to take a smoothed average of past fires, as a basis for assessing the probability. Work has been undertaken on the long-run trend in fires, but no *ex ante* measure of the risk of fires has yet been constructed.
- 10.47** As was pointed out in paragraphs 4.34-4.35, an ‘incident’ count for fire response output is inadequate because it fails to take account of the value of the property protected. Fires have been divided into various categories such as dwellings, commercial buildings and grasslands. ODPM’s *Economic Cost of Fire* publication includes two average costs for each type of fire. There is a ‘consequential’ cost, which measures the damage to life and property, and a ‘response’ cost that measures the cost to the Fire Service in terms of labour and capital used. The ‘response’ cost corresponds to ‘c’ as discussed in paragraphs 6.17-6.19, and the ‘consequential’ cost to ‘v’. In other areas we have found it difficult to get an adequate measure of ‘v’ and so have used a measure of ‘c’. Here, the consequential costs are much closer to what we would ideally want, since they constitute a measure of average damage by type of property – as we pointed out in paragraph 4.34, the ‘benefit’ of saving a property from fire needs to be calculated by the replacement cost of the property, but not including the value of the site. Nevertheless, it would be important to continue to calculate a response-cost weighted index alongside this one to monitor the sensitivities of the indices to different weights. Adjustments may be made in the light of such work.
- 10.48** Formulating a measure of fire prevention work has not been easy. The Fire Service attaches importance to this work and it relates to its principal PSA target – ‘To reduce the number of accidental fire-related deaths in the home by 20 per cent by 2010.’ Since we are unable to measure the contribution of this work directly, an activities measure is needed. The current activities measure needs to be regularly assessed to ensure that all activities are captured. ODPM has developed an outcome-based measure and this is discussed in the productivity and triangulation section below (see paragraph 10.61).
- 10.49** The Fire Service also deals with non-fire activities, such as road traffic accidents, animal rescue and flooding. Data are available on the volume of incidents, but there are no data with which to construct values for them. The data only give the number of hours spent on road traffic accidents and all other incidents. Given these limitations, any index is likely to be crude, and it would be worth waiting for improved data on the value of this work before introducing any change to the existing output measure.

**10.50 Recommendation 10.4:** we recommend that ONS should measure fire response output using an index based on consequential costs, which measure damage to life and property, but should also continue to calculate an alternative index based on response costs which reflect the costs to the Fire Service, and monitor the sensitivity of the index to different weights. We also recommend continued work on the output of fire prevention and non-fire activities.

### Inputs and Deflators

**10.51** Departmental responsibilities do not dovetail neatly with internationally recognised classifications of government spending. Table 10.5 gives the contribution of various government departments to spending on Public Order and Safety in the United Kingdom. The Home Office (which covers Wales), together with the Scottish Executive and Northern Ireland Office, account for more than three-quarters of all expenditure. The Department of Constitutional Affairs (running the courts) and ODPM (Fire and Rescue Services in England) account for nearly all the rest. A review of the classification of government spending by COFOG category is being undertaken as part of the review and this may result in some minor reclassifications both into and out of the Public Order and Safety function.

Table 10.5 Public Order and Safety spending by department (2002-03)

|                   | Home Office | DCA   | Law Officer's Depts | ODPM | NI Office (inc. NI Executive) | Scotland | Other Depts | Total |
|-------------------|-------------|-------|---------------------|------|-------------------------------|----------|-------------|-------|
| Spend £bn         | 16.1        | 3.3   | 0.5                 | 2.0  | 1.1                           | 1.8      | 0.2         | 25    |
| per cent of total | 64.4 %      | 13.2% | 2%                  | 8%   | 4.4%                          | 7.2%     | 0.8%        | 100%  |

**10.52** Since we are looking for a volume measure of inputs, we require accurate deflators TO convert current price expenditure data into constant prices. The deflators for Public Order and Safety previously used by ONS are set out in Table 10.6.

Table 10.6 Public Order and Safety deflators

|                            | Pay                           | Procurement   | Capital  |
|----------------------------|-------------------------------|---|--|
| Police                     | LA: specific<br>CG: AEI       | LA: specific<br>CG: specific                            | Public admin, non-military administration<br>capital consumption (CG)        |
| Fire                       | LA: specific<br>CG:AEI        | LA:composite price index<br>CG: composite price index   | Public admin, non-military administration<br>capital consumption (LA)        |
| Prison                     | AEI                           | Specific prisons<br>procurement deflator                | Public admin, non-military administration<br>capital consumption (CG)        |
| Probation                  | AEI                           | LA:composite price index<br>CG: comp price index        | Public admin, non-military administration<br>capital consumption (LA and CG) |
| CPS                        | AEI                           | CG: comp price index                                    | Public admin, non-military administration<br>capital consumption (CG)        |
| Crown and County<br>Courts | AEI                           | Specific crown and county<br>court procurement deflator | Public admin, non-military administration<br>capital consumption (CG)        |
| Magistrates Courts         | Local government<br>pay index | LA: courts procurement<br>deflator                      | Public admin, non-military administration<br>capital consumption (LA)        |

**10.53** There are already specific pay deflators for Police and Fire. The local authority Police deflator covers the vast majority of police pay, since the central government component accounts for only a very small amount. The local government deflator used for Fire is already fire-specific, covering operational staff (fire officers) and other local government employees. However, it is undesirable to rely on the average earnings index in other areas where more specific pay deflators should be available, and it is important that all indicators are based on earnings rather than pay settlements, allow for changes in skill and grade mix, and incorporate costs of national insurance and pension contributions. Any differences in pay systems for Scotland and Northern Ireland should also be taken into account, rather than using the same deflators for all labour costs.

**10.54** Total procurement expenditure is available for each area, except for Police, where a sample of procurement spending from 14 police forces has been used. This has been broken down into categories of expenditure that can be matched to comparable elements in the various indices produced by ONS – RPI, CPI, PPI or CSPI – that can then be aggregated together to produce an overall deflator for each area of procurement. Some areas need to be further disaggregated, but initial findings have shown that a few spending categories are likely to dominate the final deflators. For instance ‘transport expenses’ and ‘police communications’ constitute around 20 per cent of all police procurement, and 50 per cent of all CPS procurement is spent on ‘legal services’.

**10.55** Price deflators are needed for Public Order and Safety capital consumption which are specific to the capital expenditure in these areas, which may be very specialised, rather than to rely on a general public sector capital deflator.

- 10.56 Recommendation 10.5:** we recommend that specific deflators for labour, intermediate consumption and capital consumption should be developed for expenditure on Public Order and Safety where they do not already exist.

### Productivity and Triangulation

- 10.57** The measures of output and input in the National Accounts give an implied or residual measure of productivity. It is important to assess this residual against any other information available to provide corroboration, or otherwise, of productivity estimates derived from the National Accounts. There are a variety of sources of corroborative evidence. One is performance data for the various delivery agencies. For instance, the Police Performance Assessment Framework that assesses all forces on their improvement in clearing up crimes, and increasing public safety and reassurance. Similarly the different departments have PSA targets and Key Performance Indicators. Performance against these should be taken into consideration.
- 10.58** National Accounts output measures are normally based on cost weights. However, the cost of clearing up a crime is not necessarily related to its social value. If all crime types were equally easy or hard to solve, then we would expect greater resources to be devoted to solving those crimes with a higher social cost. But some crimes from which the public most wishes to be protected are not necessarily the ones that require the greatest resources to solve. A measure that weights outputs by social value rather than resource cost gives a useful alternative perspective on the way resources have been used.
- 10.59** The proposed method for a new measure of output for the civil courts is an improvement on previous methods, but it is important to understand its limitations. Significant economic and social value lies in ensuring that disputes are resolved with the least possible involvement of the civil and family courts. So it is possible for there to be a fall in measured Courts output, even though the benefits to society may have risen as the number of court cases decreases through better legal advice or mediation. It would therefore be helpful to monitor fluctuations in output to assess the extent to which they are driven by changes in the number or proportion of disputes solved without recourse to the courts.
- 10.60** Similar triangulation work should be undertaken to test the robustness of the Fire measures. ODPM are developing analysis of workload of the metropolitan fire authorities to provide a measure of the utilisation of fire and rescue appliances. Optimal utilisation rates have been estimated as a benchmark with which to assess the performance of individual fire and rescue services. This information would be outside the scope of the output measures of the National Accounts, but would provide an important context in which to assess productivity. Each Fire and Rescue Service is also developing its own Integrated Risk Management Plan. This provides the management structure and improvement strategy for them to deliver their performance targets and efficiency savings as outlined in ODPM's Technical Efficiency Note.
- 10.61** We also see value in monitoring and maintaining an outcome-based measure of FRS preventative work. The proposed outcome measures for FRS fire safety and prevention work, together with their weights, are inverted indices of:

- number of fire fatalities, weighted by the statistical value of life;
- number of serious fire injuries, weighted by the statistical cost of a serious injury;
- number of building fires, weighted by the average value of property damage per building fire; and
- number of malicious false alarms, weighted by the average cost of the FRS responding to a false alarm.

These represent the principal areas in which FRS concentrate their fire-prevention resources and may provide useful evidence to corroborate (or not) the results obtained from the activities index.

**10.62 Recommendation 10.6:** we recommend that ONS should analyse changes in productivity in Public Order and Safety services in the context of a range of other triangulation information, and should continue to develop analysis in this area.

# 11 Social Protection

---

## Introduction

**11.1** This chapter explains the current UK Social Protection output measure, and recommendations for the future, in five sections.

- Introduction – including scope and objectives of social protection
- Current methods of output measurement, and a critique against the criteria in Recommendation 6.1 (see paragraph 6.5)
- Future methods of output measurement
- Inputs and deflators
- Triangulation and productivity measurement

**11.2** Social Protection is the term used in international statistical guidance for the functions of government relating to the provision of cash benefits and benefits in kind to categories of individuals defined by needs such as sickness, old age, disability, unemployment, social exclusion, and so on. In the United Kingdom, Social Protection comprises personal social services and social security.

## Personal Social Services

**11.3** Personal social services comprise mainly the provision of benefits in kind in order to improve, or prevent deterioration of, the lives of certain individuals and their carers. Examples of personal social services activities include:

- assessment of the needs, and on-going care management, of vulnerable individuals;
- residential care provided to vulnerable older people, younger adults and to children;
- day centres for older people and for younger adults with learning disabilities and other groups;
- home care and help services;
- meals on wheels;
- equipment and adaptations to homes to facilitate independent living;
- maintenance of child protection registers and reviews of cases;
- decisions to take children into the care of the state, termed ‘looked-after children’;

- placements into adoption or foster care of looked-after children;
- services provided to unaccompanied asylum seeking children.

**11.4** Local government is responsible for delivery of personal social services. Local authorities (councils) are responsible for assessing the needs of their populations and for arranging care in the light of local priorities and national guidance. They purchase care from public sector providers and from independent, that is, voluntary and market sector providers. The greater part of formal care services for adult groups is provided by the independent sector. These providers generally supply services both to publicly funded clients and to clients purchasing care privately.

**11.5** There are some 400,000 households in England who receive publicly funded home help or home care services, and around 280,000 adults who are supported in residential accommodation. Eligibility for publicly funded social services for adults depends on an assessment of the individual's care needs and, for most care services, a financial assessment. The latter takes account of the individual's income and assets and operates as a means test. Individuals with assets above a capital limit are not eligible for publicly funded care. They may purchase services privately and, in some cases, will move from privately funded to publicly funded care as their savings are depleted. In adult care, a distinction is made between nursing care, personal care and the costs of other services, such as accommodation. For local authority funded residents in England, nursing care has been provided free to the individual since 2003, with the costs borne by the NHS as health expenditure.

**11.6** Provision of social services is a devolved responsibility in Scotland, Wales and Northern Ireland. The financial arrangement in Scotland differs from the rest of the United Kingdom, in that since 2002 personal care as well as nursing care for older people has been provided free of charge. However, other costs remain subject to a means test. In Northern Ireland, the delivery of personal social services is integrated with that of health (see paragraph 8.6).

**11.7** Local government provision of social services is funded by grants from central government or from the Devolved Administrations, and by local taxation (council tax). In England, the Department of Health (DH) is responsible for social services for adults. Following a machinery of government reorganisation in 2003, the Department for Education and Skills (DfES) is responsible for children's social services. DH is responsible for matters relating to the social care workforce. The Office of the Deputy Prime Minister (ODPM) is responsible for funding of local authorities and for the framework of financial and performance accountability of councils in England. The Devolved Administrations are responsible for personal social services in Scotland, Wales and Northern Ireland.

**11.8** All social care institutions including councils with social services responsibilities are subject to statutory inspection by the Commission for Social Care Inspection (CSCI) in the case of England, and by the Scottish Care Commission, the Care Standards Inspectorate for Wales, and the Northern Ireland Social Services Inspectorate in the other countries.



**11.9** Access to publicly funded social services is through an assessment of care needs co-ordinated by the local authority social services department. Eligibility criteria, arrangements for assessments and budgetary arrangements are determined locally, in the light of national legislation and guidance and local circumstances and priorities.

**11.10** There are in England approximately 400,000 ‘children in need’ in any one week, that is children assessed by local authorities as requiring services in order to meet one of a variety of defined needs. Examples of categories of need include ‘absent parenting’ or ‘abuse and neglect’. Within this total, there are approximately 60,000 looked after children on any one day who receive care under the authority of social services, such as in fostering arrangements, in children’s homes or in other arrangements. Care may be of short or long duration depending on the needs of the child; around 3,700 looked after children are adopted each year. In Scotland, there are around 12,000 looked after children.

**11.11** Under the Children Act 2004, local authorities in England and Wales assume lead responsibility for the co-ordination of the delivery of all services to children across government agencies at local level. The objective of the Act is to encourage integrated delivery of such services in order to achieve better a number of specified outcomes for children. In Scotland, integrated service delivery has been developed in recent years, although not through statutory means.

**11.12** The Children Act 2004 lists five dimensions of the well-being of children which local authorities are required to aim to improve. Further and more detailed guidance is expected to be provided. The five outcomes are:

- physical and mental health and emotional well-being;
- protection from harm and neglect;
- education, training and recreation;
- the contribution made by them to society; and
- social and economic well-being.

**11.13** The Children Act outcomes span several COFOG categories of government functions: Health, Education, Social Protection, Public Order and Safety, and Economic Affairs. One of the intentions of the Act has been to cut across compartmentalised responsibilities for ensuring children’s welfare. Integrated delivery of services and pooling of operational budgets for related activities carried out by different public agencies are encouraged. Such changes in the delivery of services could in future pose issues to be resolved in statistical classification of government expenditure and activities in the National Accounts.

**11.14** Statements of the government’s current policy priorities for England are set out periodically in the form of departmental Public Service Agreements (PSAs). Similar frameworks are set by the Devolved Administrations. The 2004 Public Service Agreements with DH and DfES include the following objectives for social care:

- Safeguard children and young people, improve their life outcomes and general well-being, and break cycles of deprivation. (DfES)

This has subsidiary targets:

- Narrow the gap in educational attainment between looked after children and that of their peers, and improve their educational support and the stability of their lives so that by 2008, 80 per cent of children under 16 who have been looked after for 2.5 or more years will have been living in the same placement for at least two years, or are placed for adoption. (DfES)
- Improve the quality of life and independence of vulnerable older people by supporting them to live in their own homes where possible by:
  - increasing the proportion of older people being supported to live in their own home by 1 per cent annually in 2007 and 2008; and
  - increasing by 2008, the proportion of those supported intensively to live at home to 34 per cent of the total of those being supported at home or in residential care. (DH)

**11.15** A fuller statement of social services performance objectives in England is provided in *Social Services Performance Assessment Framework Indicators 2003–04*, published by CSCI. Under the Performance Assessment Framework (PAF) system introduced in 2000, local authorities are assessed annually. This process includes an assessment of their performance against a range of PAF Indicators. The indicators take a variety of forms: unit cost measures of inputs; objective quantitative measures of achievement; subjective client satisfaction surveys. Performance information is available for Scotland but is not as extensive as that for England and Wales.

**11.16** The identification and measurement of attributable incremental contributions of personal social services to outcomes pose conceptual challenges. In this area, incremental contribution might be considered by comparison with what would have happened had there been no service, for example: deterioration, disability, further loss of dignity or autonomy, exposure to danger. The purpose of social services is to avert or mitigate such consequences, and therefore the increment to welfare ought to depend on both the outlook at the starting point, say a young child at risk of abuse, and the end-position, say a looked-after child achieving educational and other life outcomes by the time they enter adulthood. For certain individuals, the increment to welfare may be simply the prevention of further or faster decline than might otherwise have occurred.

**11.17** Outcomes of social services will also depend on the impact of other government agencies, including those with education, health and housing responsibilities. There is joint production (see paragraphs 6.22–6.25). This complicates the attribution of improvements in quality of life to activities specifically identified as social services.

**11.18** An important part of the outcome will be attributable to unpaid personal care provided by other members of a household and friends. By convention, unpaid and informal care arrangements within households are not included in the National Accounts. In a submission to the review, the Women’s Budget Group has drawn attention to women’s predominant role in providing unpaid care. They note that substitution between government and unpaid care provision will contribute to a change in measured GDP, even if aggregate provision of care by paid and unpaid sectors remains unchanged. The Women’s Budget Group argues that a broader understanding of economy would require measurement of total output, taking market, government and unpaid sectors together. We agree that this is an important point but, as explained in paragraph 1.3, it lies outside our Terms of Reference.

### Administration of Social Security

**11.19** The function of social security, as it is understood in the COFOG classification, is to provide cash benefits to eligible individuals defined by states of need, such as unemployment, disability, sickness, old age, and so on. Administratively, it involves the processing, assessment and payment of claims for benefits under a variety of programmes. We note that this is a narrow definition of function in that it excludes activities related to the wider welfare objective of promotion of work and economic opportunity.

**11.20** Examples of social security benefits in the United Kingdom include:

- the state basic Retirement Pension, Pension Credit and other pension benefits and entitlements;
- Jobseeker’s Allowance, Income Support and other income replacement benefits;
- Child Benefit, which is a flat-rate universal transfer;
- child support maintenance payments where parents are separated, which includes both government payments and mandatory private transfers;
- housing cost subsidies, known as Housing Benefit;
- disability-related benefits for individuals and their carers; and
- provision of collective and individualised information on benefit entitlements.

**11.21** Social security within Great Britain is a responsibility of the Department for Work and Pensions (DWP). In Northern Ireland, there are parallel arrangements under the responsibility of the Northern Ireland Department for Social Development. DWP’s social security activities are mostly provided through its executive agencies. Administration of Housing Benefit is done by local authorities, with most of their costs met through transfers from DWP.

**11.22** Not all DWP's activities are classified under COFOG as part of Social Protection. One example is the classification of the Health and Safety Executive Agency to Public Administration. Another is the operation of Council Tax Benefit, a system of income-related reductions in local government taxes administered by local authorities, which is categorised to Public Administration as a function of tax collection. Tax credits administered by Inland Revenue are also categorised as Public Administration even though they have many similarities with social security benefits. Quantitatively, the most important example is the classification of the activities of Jobcentre Plus in matching job-seekers to job vacancies, which is classified to Economic Affairs, as a labour market activity. (Other employment-related DWP activities, such as the provision of employment advice and the encouragement of employment opportunities for the disabled, are also classified to Economic Affairs.) Expenditure and outputs of the Jobcentre Plus agency therefore relate to two distinct COFOG categories: Social Protections and Economic Affairs.

**11.23** Some social security activities are the responsibility of departments other than DWP. For example, the social security functions of paying Child Benefit and collecting compulsory national insurance contributions are now the responsibility of the Inland Revenue, and the administration of war pensions is the responsibility of the Ministry of Defence.

**11.24** DWP was formed in 2001 as a result of machinery of government changes. Following its formation, it began a considerable programme of change in organisational structures and delivery methods, which is still continuing. Programme changes include a range of new employment programmes targeted at particular groups of jobseekers (eg those with low skills, lone parents, ethnic minorities); the introduction of Pension Credit which provides a guaranteed level of income for all pensioners aged 60 or over; and reform of the child support system.

**11.25** The following objectives for DWP are listed in its 2004 PSA:

- Ensure the best start for all children and end child poverty by 2020;
- Promote work as the best form of welfare for people of working age, while protecting the position of those in greatest need;
- Combat poverty and promote security and independence in retirement for today's and tomorrow's pensioners;
- Improve rights and opportunities for disabled people in a fair and inclusive society; and
- Ensure customers receive a high quality service, including high levels of accuracy.

**11.26** These objectives are supplemented by PSA targets and by operational delivery targets covering areas such as the processing of benefits claims, promotion of awareness of pension provision, reductions in overpayments arising from fraud and error, collection of child maintenance, and achieving job outcomes for categories of job-seekers.

## Current Methods of Output Measurement, and Critique

**11.27** Direct output measurement of social services and social security was introduced in its current form in 1998, backdated to 1994.

### Personal Social Services

**11.28** Personal Social Services output is measured in the National Accounts by a cost weighted index of selected activity indicators. These are of two types:

- numbers of individuals receiving residential accommodation, broken down by children and adults, and by available categories of residential placement. There are nine categories of residential placement for children, of which the two most important by expenditure are foster placements and community homes. For adults, the three main categories are: local authority homes, independent residential care homes, and independent nursing homes.
- the volume of domiciliary care, or ‘home help’, home care support provided to adults living at home, measured in hours.

**11.29** In total, the current ONS measure of social services output is a function of 14 basic activity indicators. Each of these is measured once a year: at 31 March for the residential care numbers, and in an annual survey in September for home help hours.

**11.30** The coverage of Personal Social Services activities in the current output index corresponds to some 46 per cent of expenditure recorded from the PSS EX1 statistical return (see paragraph 11.35): it is far from complete. Cost weightings are grossed up so that they sum to 100 per cent of expenditure. So, for example, looked-after children account for 12.2 per cent of total net expenditure, but receive an output indicator weighting of 28 per cent. However, it is clearly unsatisfactory to assume that changes in outputs for the measured 46 per cent of activities are an adequate proxy for all other areas of Personal Social Services. (See Table 11.1.)

**11.31** Personal Social Services activities that are omitted from the current measure include:

- activities to help younger adults with mental health problems or learning or physical disabilities;
- children’s services other than residential care and fostering payments in relation to looked after children; and
- social care activities that have a ‘throughput’ dimension, such as assessments of need, including casework relating to discharge of patients from hospital who cannot cope without support, casework on child protection and support for care leavers, and fitting of home adaptations for people with disabilities.

Table 11.1 Personal Social Services: England local authorities net expenditure by PSS EX1 categories. Weights in ONS output index 2000/01

| Heading / subheading   | £ billion | Share of total net expenditure, % | Output indicator weighting, % |
|--|-----------|-----------------------------------|-------------------------------|
| A: Service Strategy  | 0.1       | 1.0                               |                               |
| BA: Children's services –<br>commissioning and social work           | 0.8       | 7.4                               |                               |
| BB: Children looked after  | 1.3       | 12.2                              | 28                            |
| BC: Family support   | 0.4       | 3.8                               |                               |
| BD: Youth justice  | 0.1       | 0.9                               | 0.2                           |
| BE: Other children's and family services                             | 0.2       | 2.2                               | 1.4                           |
| C: Older People  | 4.3       | 39.9                              | 70.4                          |
| <i>Of which:</i>   |           |                                   |                               |
| <i>residential</i>   | 2.2       | 20.6                              | 47.1                          |
| <i>home care</i>   | 1.1       | 10.2                              | 23.3                          |
| <i>other</i>   | 1.0       | 9.1                               |                               |
| D: Adults under 65 with physical disability<br>or sensory impairment | 0.8       | 7.1                               |                               |
| E: Adults under 65 with learning disabilities                        | 1.5       | 13.7                              |                               |
| F: Adults under 65 with mental health needs                          | 0.6       | 5.6                               |                               |
| G: Asylum seekers  | 0.5       | 5.1                               |                               |
| H: Other adult services  | 0.1       | 1.0                               |                               |
| Total Personal Social Services                                       | 10.7      | 100.0                             | 100.0                         |

Source: Department of Health and Office for National Statistics

**11.32** The activities which are measured do not capture the value of changes in status caused by the intervention of social services, such as the placement into adoption of a looked-after child, or the attainment by a looked-after child of education qualifications better than might have been expected in the absence of intervention.

**11.33** Some 77 per cent of the volume measure is represented by residential care of children, older people and younger adults. Home help accounts for the remaining 23 per cent. Table 11.2 shows the detailed coverage of different types of residential accommodation, by accommodation provider for children and adults. 21 per cent of the total social service indicator is for local authority provided residential care for adults. There is no breakdown in terms of levels of dependency or type and quality of accommodation provided. The measure depends on a snapshot of resident numbers in different placement types once each year. This will represent total occupant days only if there are no significant variations in resident numbers or between types of placement within year.

**11.34** There is no quality dimension in the current social care measures. This is a major concern, given our desire to measure added value for the individuals who receive services, which may succeed to a greater or lesser extent in meeting their needs and improving the quality of their lives.

Table 11.2 Activity components in ONS Personal Social Services index: levels and weights 2000/01

| Sub-index  | Number (000s) | Weighting, % |
|--|---------------|--------------|
| Adults in residential care, of which:              |               | 47.1         |
| <i>Local authorities</i>                           | 44.8          | 20.6         |
| <i>Independent residential care home</i>           | 140.3         | 13.8         |
| <i>Independent nursing homes</i>                   | 72.9          | 12.8         |
| <i>Unstaffed, etc.</i>                             | 5.7           | 0.0          |
| Home helps (hours)                                 | 2,836         | 23.3         |
| Children in residential care at 31 March, of which |               | 29.6         |
| <i>Foster placements</i>                           | 38.1          | 11.7         |
| <i>Lodgings</i>                                    | 1.2           | 1.4          |
| <i>Community homes</i>                             | 4.8           | 6.7          |
| <i>Voluntary homes</i>                             | 0.7           | 2.8          |
| <i>Private registered</i>                          | 1.2           | 1.3          |
| <i>Schools, etc.</i>                               | 1.1           | 1.4          |
| <i>Placed for adoption</i>                         | 3.3           | 0.8          |
| <i>Placed with parents</i>                         | 6.7           | 2.8          |
| <i>Other accommodation</i>                         | 1.8           | 0.6          |

Source: Department of Health and Office for National Statistics

**11.35** The cost weights applied to the activity indicators are derived from available net expenditure data compiled from the annual PSS EX1 statistical data returns which local authorities are required to submit to central government. Net expenditure is government's gross expenditure on service, less any required contributions paid by individuals. Although the weights are determined on a net expenditure basis, they are applied to activities numbers measured on a gross basis.

**11.36** There is no breakdown by dependency or other needs factors in the current measure. There is evidence (Darton and Miles 1997) that the average dependency of older care home residents has risen in the past and that home care services for older people have become more concentrated on those with higher dependency. For individuals receiving home care, greater dependency might be expected to be correlated with more hours of care, which will be captured in the output measure. However, data on residential care numbers do not take account of any changes in the degree of capacity to benefit of clients in care homes (see paragraph 11.49). Unless variations in care home costs by the client's capacity to benefit are correlated with the categorisations of care homes in the current index, then shifts to higher dependency clients may not be taken into account in the cost weights of the current index.

**11.37** ONS uses England data as a proxy for UK output. The key PSS EX1 data for the activities indicators, which are local authority financial year returns, are updated only once a year. They are converted into quarterly observations by smoothing adjacent annual estimates. Local authorities are required to submit returns by end-July. DH publish national data in the following February. Output estimates for the National Accounts are therefore available for the *Blue Book* only with a two year lag.

**11.38** The two year time lag arises because the required local authority expenditure data are compiled on a financial year basis, and are not available accurately until authorities close their accounts in the summer. This by itself is sufficient to miss the *Blue Book* deadline for the previous calendar year; and additional time elapses because of DH requirements to quality-assure data before final publication.

### Administration of Social Security

**11.39** Administration of Social Security output is currently measured as a cost-weighted index of activity volumes for the processing of new benefit claims for eight categories of benefit programmes. Income Support accounts for a weighting of more than half in the index; the next most significant is Housing Benefit. The weightings are fixed weights re-based every five years and were last updated in 2000. Important new entitlements such as Pension Credit are not included, and some benefits in the list have been abolished or superseded by new benefits or tax credits (see Table 11.3).

Table 11.3 Components of Administration of Social Security output index

| Indicator (number of new claims) | Weight, % |
|----------------------------------|-----------|
| Retirement Pension               | 3.1       |
| Widows Benefit                   | 0.5       |
| Jobseeker's Allowance            | 2.0       |
| Sickness Benefit                 | 5.1       |
| Income Support                   | 58.2      |
| Family Credit [ceased]           | Nil       |
| Social Fund                      | 7.9       |
| Other Benefits                   | 5.8       |
| Housing Benefit                  | 17.3      |
| Total                            | 100       |

Source: Office for National Statistics

**11.40** The measure is based on claims received rather than claims processed, so cannot take account of variations in throughput. There is also no count of work done to continue payment of existing claims, including for example any measures of queries, changes in beneficiaries' details, fraud checks or annual updates in payment rates. It is unlikely that ongoing costs are a constant ratio of the costs of handling new claims for each type of benefit, as rates of churn vary considerably for different benefits. A more detailed count of ongoing work would add to the validity of the overall measure.

**11.41** As cost weights, weights are higher for those benefits which are relatively expensive to administer, for example because they are means-tested or they are of limited duration. Relative expenditure weights in the current measure may have become out of date as benefit design and administrative processes have changed. DWP has investigated the weights used in the current index as part of this review, and has concluded that they are not reliable.



- 11.42** The current measure fails to register important dimensions of quality of service such as accuracy of claims, turnaround time, and the reduction of fraud. It does not assess whether DWP is adding value in respect of its wider PSA objectives, in respect of social security or labour market and other functions. The current measure covers Great Britain only and does not use any data on outputs from the Northern Ireland social security system.
- 11.43** The method of calculation of the current measure by ONS does not make best use of quarterly data on benefit claims and maintenance volumes measured by DWP. For some components of the index, annual data are employed when higher frequency measures are available from departments. The timeliness of data on housing benefit depends on processes of collation of data from local authorities, and these are constrained by the frequency with which they can be collected, aggregated and validated. .

### Future Methods of Output Measurement

- 11.44** This section reports on progress made by the review, working with ONS and departments responsible for Social Protection functions, in constructing improved methods of output measurement.
- 11.45** Ideal methods of measurement for the services that fall within Social Protection should reflect the principles set out in Chapter 4 and the criteria for output measures in Recommendation 6.1 (see paragraph 6.5). That is, they should represent quantitative indicators of attributable incremental contributions of services to outcomes experienced by individuals, including quality adjustment, and relate to correctly classified Social Protection expenditures of the government sector. They should be comprehensive and detailed, timely and have full UK geographical coverage. They should serve as indicators of services that deliver final value to individuals or society collectively.
- 11.46** The requirement is to establish objective methods of identification and measurement of Personal Social Services outputs, which accommodate diverse forms of operational activities. This should start with a translation from packages of social care into improvements in welfare which are capable of valuation (see Chapter 6 Figure 6.1). There is then the need to measure value from available data, and to identify any new data sources that may be needed. In seeking objective identification of outputs to be measured, we have considered two test questions. These are:
- Does the activity contribute to welfare and arise from government final consumption expenditure?
  - If the activity were not provided by government, would an individual be willing to pay for it, either on their own account or for someone else?

- 11.47** By definition, government's contribution to Personal Social Services output is limited to that stemming from its expenditure on services, net of receipts from charges to individuals. Payments made by individuals for such services, even if they are in the form of charges payable to local authorities, count as household final consumption expenditure. The treatment of 'direct payments' in social services is a borderline case. They are monetary payments made to eligible individuals who elect to commission their own personal care directly. We understand the National Accounts conventions to require that these payments should be treated as transfers to the household sector, and any outlays on care services that they finance to be treated as household final consumption expenditure.
- 11.48** The test of willingness to pay helps determine the added value from a particular activity. In social security, a measure of claims accurately processed is superior to one based on all claims received, because the latter would also count claim decisions made in error, and it would fail to take account of backlogs or delays. This is equivalent to the example of letters posted versus letters delivered in paragraphs 4.13-4.16.
- 11.49** An important issue in the measurement of social care services is the link between 'capacity to benefit' and required effort to care for an individual. These are distinct concepts. Capacity to benefit is the extent to which care has value in improving the well-being of the person concerned – for example, an immobile individual might have a greater capacity to benefit, in this sense, than someone who is frail but ambulatory. By contrast, required effort may be defined as the volume of inputs required to deliver a given improvement in quality of life – for example whether one care worker or two are required to handle an individual, depending perhaps on their physical or behavioural characteristics.
- 11.50** We noted in paragraph 6.20 that the cost of providing a service was not directly material to measuring the value of the output. We are looking to measure output by reference to value, not costs. For the reasons set out there, we suggest that capacity to benefit but not effort should be the basis for measuring output of social services. However, in practice, capacity to benefit and effort are likely to be correlated. So, in circumstances where a good direct indicator of capacity to benefit is not available, then a second best approach would be to allow required effort, which might be estimated by weights based on unit costs, to act as a proxy.
- 11.51** The identification of measurable outputs seems to be a particularly difficult task in children's social services. DfES has argued that the highly individualised nature of services provided to children in need makes it impractical to construct simple quantitative measures. For example, while regular case review of each child on a child protection register is an intermediate but measurable activity, the ultimate output could constitute a range of interventions such as monitoring, investigation, contacts, or liaison with other public agencies – or the results of these – and is inherently more difficult to quantify. The issue is at what stage to identify finality in the process which contributes to welfare, and define the entity whose volume should be measured.

**11.52** One case at the margin in the area of adult social services is the treatment of care assessments. Assessments could be treated as an intermediate activity, because they are preparatory to the implementation of a package of care, or as final output on the grounds that they convey valuable or essential information to the recipient and their carers as to what their future options are. Not all assessments lead to packages of care, and so on balance it may be right to include them as final output.

### Adult social services

**11.53** DH has adopted a two-stage approach to the improved measurement of adult social services. The first stage is to improve the existing measure of adult social services in the National Accounts to address the identified problems of incomplete coverage and lack of detail. The department, working with the review team, has developed a revised cost-weighted activity index which it has submitted to ONS for adoption into the National Accounts. The new index would contain the following changes compared to the current measure.

- Measured outputs would comprise 90 per cent of expenditure on adults, compared to about 60 per cent at present.
- Assessments of care would be included as a measured activity. This is on the basis that assessments have final value because they yield important information to recipients and their families, and so should be regarded as more than intermediate processes leading to final decisions on care arrangements.
- Provision and installation of equipment and home adaptations would be included, and would be measured by numbers of recipients.
- There would be a more precise measure of the net amount of social care attributable to government expenditure. Activity data for each year would be adjusted by the ratio of net to gross expenditure on that activity in that year, to exclude the proportion of the activity funded by user charges.
- The index would be based on a more detailed list of individual activity measures, which would number more than 20 compared to five at present.
- The measure would be annually chained, whereas the current measure is calculated according to base year weights last updated in 2000–01.

**11.54** The proposed new index would seem, subject to due processes of examination by ONS, to represent a desirable improvement in accuracy and comprehensiveness. DH has shared the methodology of its proposed new method for England with the Devolved Administrations, and they are each considering whether it is feasible to use it and how best to do so. This is important work and should continue.

### Current and proposed expenditure weights for adult PSS

This table summarises how the proposed measure of adult social care differs from the existing measure. Cost weights correspond to the adults component of total social services expenditure. The proposed weights on residential care and home help hours are lower than in the current measure, because the new index reflects a wider range of outputs within adult social care.

| Existing measure  | Weights<br>2000 | Proposed measure   | Weights<br>2002/03 |
|---|-----------------|--|--------------------|
| Number of adults accommodated, by 4 accommodation types, based on annual snapshot surveys | 66              | Number of adults accommodated – client weeks, by 4 client groups and by 3 provider types (new data source) | 53                 |
| Home care – in hours, based on annual snapshot survey                                     | 33              | Home care – in hours   | 19                 |
|   |                 | Day care – sessions, by 4 client groups  | 11                 |
|   |                 | Meals provided – number  | 1                  |
|   |                 | Equipment provided – client numbers  | 1                  |
|   |                 | Needs assessments made – numbers, by 4 client groups   | 14                 |

Weights sum to 100; quoted figures are rounded.

**11.55** In Scotland, the joint working between local authorities and the NHS on the delivery of services, including elements of joint resourcing, to some extent blurs the boundary between what counts as Health and what counts as Personal Social Services. The implications of this for measuring outputs, and corresponding inputs, have yet to be thought through. There are important policy and legal differences between Scottish and English social services, so it is not desirable to continue with the practice of using English data as a proxy for Scotland any longer than necessary.

**11.56** The Scottish Executive Health Department, under its Joint Future policy, is implementing progressively the Indicator of Relative Need. This uses information from the single shared assessment, to categorise people with community care needs according to their relative dependency. This can provide a new dimension to outcome measurement in Scotland in future years, and may be a valuable precedent for similar work elsewhere in the United Kingdom.

**11.57** Timeliness of output data produced under the new measure would have the same problems as the current method, because they will rely on the same local authority data returns (see paragraphs 11.37-11.38). It would be helpful for the National Accounts if DH were able to shorten period for data collection, and work with ONS on ways of improving estimates for years where final data is not yet available. ONS also needs to make estimates of quarterly output; this would benefit from regular health departments' advice on any relevant budget or legislative changes that might impact on the quarterly profile.

**11.58** DH's second stage is to consider the results of research commissioned by the Department from the Personal Social Services Research Unit (PSSRU) at the University of Kent and the London School of Economics, which is due to report in summer 2005. The research is a welcome initiative to build on a social production of welfare approach (Netten and Davies, 1990) that will define a measure of social care output by its contribution across a number of standardised domains of household activities. This research is designed to offer the following benefits:

- calculation of an output measure in which activities are weighted by the value of outcomes rather than by costs, in line with the discussion at paragraphs 6.17-6.19;
- value of outcomes will be measured in a 'capacity to benefit' framework, in line with the discussion at paragraphs 11.49-11.50;
- explicit quality adjustment factors which would capture the extent to which packages of social care met their objectives: these would be informed by the results from existing programmes of triennial user satisfaction surveys, and from annual CSCI inspection data; and
- expanded coverage for services to younger adults.

**11.59** The suggestion of the Women's Budget Group to consider the contribution to GDP resulting from unpaid work goes beyond the remit of this review. ONS investigated measurement of unpaid household activities including adult care, in an experimental household satellite account (ONS 2002). This used information from the Family Resources Survey commissioned by DWP to estimate hours of care, and values these according to pay rates in the residential care market sector. If ONS resumes the experimental household sector account, it would be desirable to integrate the information provided by the Family Resources Survey with any measurement framework arising from the PSSRU research commissioned by Department of Health.

**11.60 Recommendation 11.1:** we recommend that ONS should update the output measures for adult social services with wider and more detailed coverage and updated cost weights, making use of similar information from the Devolved Administration as soon as this is available, and updating timeliness of data collection or interim estimates through joint work with the health departments. For the future, the research commissioned by DH into a welfare-based approach to the measurement of adult social care output may lead to further improvements including the use of weights based on value and other quality adjustment factors. This could also be used in conjunction with the ONS experimental household sector satellite account if this is resumed.

### Children's social services

- 11.61** Conceptual difficulties in identifying outputs and measurement of their value, and poor availability of quantitative data have hampered the development of more advanced measures of output of children's social services. In particular, there is a lack of data on activities and outcomes relating to children in need but who are not 'looked after', known as 'children supported in families or living independently' (CSFI). Services provided to these children accounted for some 39 per cent of expenditure on children's social services in 2002-03 in England. The current measure is based entirely on looked-after children.
- 11.62** The government conducted a first census of children in need in 2000, through a survey of all local authorities in England. The most recent census was in February 2003, and future censuses are to be conducted biennially thereafter, in February. The census collects expenditure and activities data, where the latter are measured in terms of child contact hours, broken down by ten classifications of need category. Qualified and trainee social workers account for some 83 per cent of contact time, with related professions accounting for the remainder. Although these data are fairly complete in the sense that they account for over 90 per cent of children's social services spending in 2002-03, and the completion rate is close to 100 per cent, they provide little quantified information on the exact types of service being received.
- 11.63** Detailed results from the 2000 census were published in October 2000, a lag of some eight months. If this is the pattern of future publication timings, then census data attributable to a given calendar year would become available in time for the following year's *Blue Book*, and intervening years would be subject to an additional lag of a year.
- 11.64** The system of Performance and Assessment Framework (PAF) indicators, established in 2001 by DH but now the responsibility of the CSCI, offers measures of some more precisely defined outputs, but their coverage of children receiving social services is partial. Activities data from the 18 PAF indicators relevant to children's services in 2003-04 cover placements into adoption and into fostering, registrations and reviews of registrations of children on child protection registers, and annual health assessments and dental checks received by looked after children. Five of the 18 PAF indicators relate only to looked after children, so they offer no additional information on the wider population of children in need. DfES considers that the PAF indicators data cannot be meaningfully aggregated into an adequately comprehensive measure of children's social services activities.
- 11.65** The PAF data cover not only outputs but also information on outcomes, such as the proportion of looked after children who enter education, employment or training by age 19. Outcome indicators such as these will be affected in part by non-social services expenditures and the historical experiences of the young people covered, but may nevertheless be considered for their potential as indicators of the quality of social care provided.

- 11.66** Implementation of the Children Act 2004 will require changes to the measurement of performance and quality of services by the statutory inspection bodies. Ofsted, working with the other inspection bodies, have issued consultation proposals for Joint Area Reviews (JARs), which will assess the quality of services delivered for children and young people, and make judgements about how well services work together to improve the well-being of children and young people, as defined by the five Children Act outcomes. Ofsted and CSCI are also consulting on Annual Performance Assessment of local authority children's services, which will be based on a subset of the JAR methodology and data. It is to be hoped that the new inspection arrangements will improve the availability of quantitative data useful to the measurement of services to children in the National Accounts, but it is too soon to say.
- 11.67** A modified form of cost weighted activity index, that took better account of services to children in need but not looked after, would be a step forward. To make further progress would require data on a more detailed breakdown of activities and unit costs than is currently understood to be available. DfES is considering, as an interim step, the development of a revised cost-weighted activity index that would rely on data from the Children in Need census, for children not looked after, which would supplement the existing measure based on residential accommodation numbers for looked after children. A measure based on contact hours with children would be analogous to using 'chargeable hours' as a direct measure of output of professional services in the market sector. Application of the method would require an interpolation process for the years in between census dates. Use of the census data would offer an improvement in the measurement of activities provided to children in need who are not looked after, since these are currently not captured at all.
- 11.68** DfES also wishes to consider, in consultation with social services practitioners and inspectors, the construction of possible quality adjustment measures that would be defined using PAF indicator data. Further consideration of possible methods, with informed professional opinion, would be helpful. It would be important to ensure the form of quality adjustment relates, appropriately to the basic quantity measure of output, with any specific adjustment factors applied to the activity indicators to which they are relevant.
- 11.69** DfES has been considering whether, to make further progress beyond what can be achieved by a modified cost-weighted activity index, it might be necessary to commission academic research to establish a framework of welfare outcomes corresponding to different activities. We would encourage DfES to consider whether the welfare-based approach under development in research commissioned by DH (see paragraph 11.59) offers a fruitful starting point for this.
- 11.70** The Devolved Administrations are following DfES development work on an improved output measure with a view to adapting it to take account of different regulation and practice across the United Kingdom.

**11.71 Recommendation 11.2:** we recommend that ONS should consider using a revised cost weighted index of children's social services which uses information about children supported in families or living independently, but only after careful assessment of the problems on frequency and timeliness from using a biennial census as source data. Information from the Devolved Administrations should be included at the earliest possible stage. We encourage continued development work to use the full range of children's social services quantity and quality data available to local authorities and inspection bodies, in consultation with practitioners and other experts, to develop both volume measures and quality adjustments.

### Administration of Social Security

**11.72** Compared with Personal Social Services, identification and measurement of outputs from Administration of Social Security is more straightforward. DWP has undertaken an analysis of the shortcomings of the current social security output index and, in consultation with the review team, is developing a revised cost weighted index with a number of enhancements. This will cover all significant DWP benefit programmes, and DWP intend to extend it to cover the activities of the Child Support Agency. DWP has also reviewed the measurement of Housing Benefit, which is delivered through local authorities, and will make proposals for improvement. Revised measures of DWP benefits and activities will be based on data from the department's management information systems, where these are available, and this should help to ensure the continuing robustness of the new measure.

**11.73** A good measure of social security output should have a coherent treatment of fraud and error. We understand that the National Accounts require that the estimated value of over-payments of benefit, less any recoveries by the department, is required to be treated as a transfer payment. We recommend, subject to the availability of robust estimates, that the administration of such payments ought not to be counted as output, since the erroneous or fraudulent activities do not correspond to the intended operation of social security or therefore represent added value. (This is similar to the example of defining postal services by letters delivered rather than posted in paragraph 4.13.) It would also be appropriate to include measures, if they can be developed, for specific anti-fraud initiatives, to recognise them as positive outputs of the department's work.

**11.74** It will be important to compile revised back data calculated according to the new method, or, where this is not fully possible because raw activity or cost weight data are lacking, to propose reasonably robust approximations based on what is available. In judging how to revise back data, and how far back to go, ONS and DWP should have regard to the clear problems with the Administration of Social Security data already used in the National Accounts (see paragraphs 11.39-11.43).

**11.75** Work by DWP with the review team is leading to a new index with the following improvements.

- It will measure new claims processed, rather than new claims received.



- For each benefit type, maintenance of existing claims will form a new component of the revised measure, with a different weighting.
- The existing unit costs will be replaced by weightings constructed from new activity-based information, derived from DWP management data, which will ensure up to date unit cost estimates capable of annual chain linking. Overheads will be appropriately allocated.
- Coverage of types of benefit will be wider, covering some 90 per cent of DWP's expenditure on inputs. New outputs to be covered will include pension credit, disability and carers' benefits and provision of individual pension forecasts.
- Output will be measured quarterly. This will be based on quarterly measures of activity indicators, which are available soon after the end of the quarter.
- Output will be adjusted for quality, based on meeting timeliness and accuracy measures. Raw activity numbers will be multiplied by the proportion of benefit processing volumes that meet required thresholds for each of timeliness and accuracy. Quality adjustment measures will be available on an annual basis, but with a time lag as they are mainly based on sample data.
- Expenditure will be correctly mapped on to appropriate COFOG categories.

**11.76** It would be very desirable for a similar measure to be developed for the separate Administration of Social Security function in Northern Ireland, adjusting as needed for differences in legislation, service delivery and data availability.

**11.77** The DWP proposals will also provide a direct measure of output corresponding to job entries, which are a component of the Economic Affairs function within COFOG. Currently Economic Affairs is measured as (outputs=inputs) and is categorised as a collective service: we explained in paragraphs 7.24–7.28 our approach to developments in this area. DWP are developing a quality-adjusted direct measurement of this output, using an internal points-based system that is designed to value job-entries more or less highly according to the priority of the jobseeker's circumstances. In principle, we would support the use of such a form of quality adjusted direct output measure for this component of Economic Affairs.

**11.78 Recommendation 11.3:** we recommend that ONS should update the output measure for Administration of Social Security, with a wider range of benefits, accurate unit costs and weights, differentiation between new and existing claims, and quality adjustment in respect of timeliness and accuracy. It would be very desirable to include measures on a similar basis for Administration of Social Security in Northern Ireland and to extend the same approach to benefit programmes delivered by other departments, including child benefit and housing benefit. We also recommend that ONS should take advantage of the development of a quality-adjusted direct measure of Jobcentre Plus labour market outputs for use in the Economic Affairs function of COFOG.

## Inputs and Deflators

### Personal Social Services

**11.79** Data on social services activities and expenditure are available mainly from statistical returns compiled by local authorities. Information on amounts of government expenditure at current prices on social services activities in England are relatively good in respect of accuracy and coverage, but are available only annually (see paragraphs 5.67-5.69).

**11.80** Volume measures of inputs, distinguishing between economic components, require good quality information on pay and price deflators and capital consumption. Much of social care provision, estimated to be over 50 per cent in the case of adults' expenditure, is obtained through the purchase of care from the independent sector. Changes in pay rates for staff employed in the independent sector should not directly affect the calculation of pay deflators or employment volumes in the calculation of government inputs, although they might be expected to have an impact on social care prices in the independent sector. Calculation of input volumes and deflators for the government sector can therefore be defined in terms of:

- employment volumes, or pay bill and pay deflators of staff directly employed;
- price indices of packages of care purchased from the independent sector;
- estimates of capital consumption.

**11.81** Pay and employment data for the directly employed sector are available in a variety of forms. Annual data for local authority employed staff are collected in September each year, and they are subdivided by a number of functional and client group categories. New Earnings Survey (NES) data are available for pay rates by occupational groups, such as nurses, social workers, and administrative and related groupings, although a number of these groupings cross over the health and social care classifications. These relativities might be useful in developing specific deflators for social care.

**11.82** DH calculates an annual index of pay and prices in the social care sector, reported periodically in a Memorandum to the House of Commons Select Committee on Health. The index has a 70 per cent weighting on pay, using NES data, and 30 per cent for prices, using the GDP deflator. This is an approximation to an index of costs incurred by all providers of social care – government and independent sectors – rather than specifically of inputs purchased by government in the delivery of social care. The earnings data are sector-wide not specific to labour costs in the National Accounts, and the weightings do not reflect the balance of government expenditure between directly employed staff and services procured from the independent sector. The GDP deflator is not intended as a measure of change in the price of goods and services bought by local authorities from the independent social care sector.

- 11.83** Much government expenditure on personal social services, particularly for adults, is on purchases from independent providers in a specific market, eg nursing homes and residential children's homes. There is a need for an appropriate price index for this expenditure. However, there are doubts as to the reliability of prices surveys for contracted-out services in the local authority sector, arising from the complexity of the contracts, and changes in client mix. Experimental indices of input prices in the social care sector have been produced by ODPM but have not been sustained.
- 11.84** Availability of data at the industry level will be enhanced by the current project of TOPSS England, the body responsible for workforce development in the social care sector, to develop a 'National Minimum Data Set' (NMDS) of social care workforce data under a commission from DH. The NMDS would be a new co-ordinated data framework to facilitate the collection of data on composition and characteristics of the social care workforce. The NMDS is expected to have an optional field on pay rates. It is designed to reduce compliance burdens by replacing a number of existing but uncoordinated data surveys, which in aggregate achieve poor coverage of the sector. Consultation is current on the best single compulsory means of collecting the data. It is unlikely that data from the NMDS will become available before 2007.
- 11.85** Volume of inputs have to be estimated, for comparison with volume of outputs, from the perspective of government as the funder of care services, whether they are directly provided by government or purchased from the independent sector. Deflators to meet this need should be specific, and meet the criteria proposed in Table 5.1. Further work is needed on social care deflators. In particular:
- the NES data may not be sufficiently specific to estimate changes in earnings, allowing for changing skill mix, of public sector employees in social care;
  - further work is needed to establish robust price indices of care services provided by the private sector; and
  - there should be separate consideration of pay deflators for spending by the Devolved Administrations, if there are reasons to expect different changes in earnings and in prices.

- 11.86 Recommendation 11.4:** we recommend that work continues to develop pay and price deflators which enable measurement of changes in volume of inputs used in social care.

#### Administration of Social Security

- 11.87** In the Interim Report, we noted with concern the improbably sharp increase in Social Protection expenditure occurring in 2002, as reported in the *Blue Book 2003*. Expenditure corresponding to the employment part of the old Department of Education and Employment which transferred to the new DWP, was misclassified to Social Protection. Revisions to these data were published by ONS in the *Blue Book 2004*, and there has been subsequent collaboration between DWP, HMT and ONS in reviewing the COFOG classification of DWP expenditures; this may lead to further revisions.

**11.88** Within DWP's expenditure on Administration of Social Security, there has been significant spending on change and modernisation programmes: at their peak, these will account for about £1.4bn, or 20 per cent of DWP's administrative expenditure in 2004-05. A relatively small amount of this is capital, such as modernised offices and new IT, and would be treated in the National Accounts as fixed investment. Much of it is non-capital and non-recurrent, for example training of staff, or outlays on consultancy, but is designed to give a return on investment in future. Non-recurrent current expenditure may have a discernible impact on the time profile of input volumes and implied short term productivity; there is also a need to examine whether there is a lagged return in future years on expenditure designed to improve efficiency. This could be explored by ONS in a future productivity article.

**11.89** An important issue for pay deflators and estimates of labour volumes is the extent of grade or skill mix changes within the composition of the labour force (see paragraphs 5.63-5.66). This will matter if there are discernible changes in the skills composition of the workforce, for example as part of a modernisation programme in which technology, with more highly trained and expensive specialist staff, substitutes for low-skilled labour. A shift to a higher grade mix has been observed historically for DWP and this trend is anticipated to continue in the future as more emphasis is placed on customer-facing roles and routine processing work is automated.

**11.90** At one end of the range, pay deflators based on the methodology of the Public Sector Average Earnings Index (AEI) are based on simple heads measures of employment. In a period where numbers of highly skilled and paid staff are increasing relative to people with lower skills and pay, these deflators would tend to overstate underlying wages growth, understate labour volumes and overstate productivity growth. But alternative objectively-defined pay deflators that do take account of skills mix may be difficult to construct.

**11.91** DWP are working on establishing a pay deflator based on average earnings by grade for DWP. This can be compared with Civil Service pay data and with the AEI. In line with Recommendation 5.8 (see paragraph 5.66), it is important to deflate DWP pay costs by a deflator based on DWP pay, but taking proper account of skill and grade mix. Separate work would be needed for pay costs in Northern Ireland social security administration, which may not mirror those in the rest of Great Britain.

## Productivity and Triangulation

**11.92** Implied productivity measures derived from new National Accounts measures of Social Protection output and volume of inputs can be calculated, when the work described in this chapter is complete. However, they would need to be assessed for their plausibility against available independent measures of service quality and productivity change.

- 11.93** In the area of social services there has been a considerable development of performance measurement indicators under the PAF, which is now the responsibility of the inspection bodies. Elaboration of the inspection frameworks to deal with the Children Act 2004 may yield additional data. Additional information on performance may be inferred from user experience surveys, and from outcomes data for children or adults who receive care services.
- 11.94** Examination of lags between input spending and the changes in outputs which they are designed to deliver will be particularly interesting for social security administration. The Efficiency Technical Notes designed to measure DWP's contribution to government efficiency targets may lead to useful information. For children's social services, the changes in the Children Act 2004 will put increasing emphasis on joint planning and integrated delivery with education, children's health services and other agencies. This raises the joint production issues in paragraphs 6.22-6.25. Further analysis of the mix of inputs and outputs in different parts of COFOG which relate to children's services would be informative.
- 11.95 Recommendation 11.5:** we recommend that ONS should continue to develop analysis of productivity in Personal Social Services and Administration of Social Security, taking account of a wide range of information to add context to estimates derived from the National Accounts.

# 12 Executive Summary

## Key Points

### Highly challenging task

The task with which we have been faced is highly challenging. How we measure government non-marketed output can make a considerable difference to the recorded growth rate of the economy. Yet the absence of market transactions means that it is hard to place a value on the services provided.

### Convention that (output=input)

In the face of these difficulties, some might wish to return to the earlier convention that (output=input). If we were to do so, there would still be problems. Much of our report has been concerned with the shortcomings of present measures of inputs. Our investigations have shown the complexity of data flows and weaknesses in the processing chain; we have identified issues regarding the definition and classification of government spending; we are concerned about timeliness; we have recommended the development of measures of capital services; we have recommended the specification of criteria for price deflators. All of these are necessary if ONS is to provide reliable National Accounts measures of government inputs. They are necessary to measure accurately the resources absorbed by the public sector in assessing the macroeconomic supply and demand balance.

### Direct measures of output should be used

It is not, however, possible for the United Kingdom to return to the convention that government (output=input). The 2002 European Commission Decision requires that, by the 2006 accounts, direct measures of output be introduced in the case of individual services. Nor do we believe such a return to be desirable. There is an intrinsic case based on public accountability for seeking to measure what is achieved by spending on public services. We cannot simply assume that outputs equal inputs in such a major part of the economy. To fail to measure the output would be to miss the essential complementarity between public services and private economic growth.

### Need for major improvements

The route taken by ONS is therefore the right one. The 'first generation' direct measures of government output were pioneering, but they also revealed the need for major improvements, improvements that are already underway. Output indicators have been limited in their coverage of activities; output indicators have been too aggregate; inappropriate classifications have been adopted; geographical coverage of the United

Kingdom has been incomplete; indicators have been affected by changes in the machinery of government; and there have been issues of timeliness.

### A principled approach

In seeking to take this work forward, a number of choices have to be made. We believe that these choices are best made within a principled framework and we have enunciated nine principles covering the measurement of outputs, inputs, and productivity. These principles underlie the detailed recommendations of the report, and the checklists that we have given for the criteria to be applied when revising output measures and choosing price deflators. The precise methods adopted will need to change in response to the introduction of new services, and to changes in the machinery of government and the availability of new data, but the principles provide a fixed point of reference in a dynamic situation.

### Quality change

Central to our concerns, and to the proposed work programme, is the issue of quality. We are firmly of the view that, in principle, measures of output growth should take account of quality change. Quality has many dimensions, and some will prove elusive, but there are several possible ways forward. At the same time, the greater degree of subjectivity in making quality adjustments, compared with volume measures, means that a higher acceptability threshold should be set for their introduction into the National Accounts. It is essential that the measures employed in the National Accounts should command support from appropriate service experts and from end users. If quality adjustments cannot be comprehensive, they should be representative of the range of dimensions. This will not always be straightforward and may take some time.

### Productivity change

Output divided by inputs provides a measure of productivity change. However, the move from the (output=input) convention to direct measurement of government output should be carefully interpreted. It is a definite advance in the sense that government output is no longer simply assumed to equal measured inputs, but the move should not be seen as solving at a stroke the complex problem of measuring government productivity. The statistic obtained by dividing outputs by inputs may no longer be equal to 1 by definition, but no single number, however carefully constructed, can fully capture the performance of complex public services with multiple objectives. Productivity change should be interpreted in the light of a range of other information – the triangulation principle.

### A dynamic process

This review is part of a dynamic process. ONS has carried out significant revisions to the health indicators, which we have welcomed, and work, in conjunction with the relevant departments and the Devolved Administrations, is well underway in other fields. While our remit was for the United Kingdom, we are conscious that other countries are undertaking similar work and we put a strong premium on joint learning and development, to underpin international comparability of economic statistics.

### Transparency

We would encourage ONS and the departments to carry out this work in a transparent manner, engaging the substantial expertise of academic and regulatory bodies, and others with a legitimate interest including service users, to comment on interim work and further improvements. In an area of such public interest, this risks figures being misinterpreted. It would be highly regrettable if objective study of a matter of public importance were to be inhibited by misunderstanding and public criticism of figures that are clearly interim. Equally, it is essential for ONS and others to make clear in publications the limitations of measurement and the purposes to which analysis may properly be put.

### Summary

The National Statistician, Len Cook, asked me in December 2003 to conduct an independent review of the measurement of government output in the National Accounts, with a Final Report to be produced by the end of January 2005. An Interim Report was published in July 2004. This volume constitutes the Final Report.

The terms of reference of the review set out by the National Statistician were:

‘To advance methodologies for the measurement of government output, productivity and associated price indices in the context of the National Accounts, recognising:

the full scope of government outputs;

differences in the nature and quality of these outputs over time;

the relationship between government outputs and social outcomes;

the need for comparability with measures of private sector services’ output and costs;

the existing work of the Office for National Statistics (ONS); and

the appropriate measurement of inputs, including quality and the distinction between resource and capital, so that, together with the measurement of output, light can be thrown on developments in government productivity.

The review has been conducted with support from a team of staff from ONS and the Bank of England, directed by Joe Grice, Deputy Head of the Government Economic Service and with Aileen Simkins of the Department of Health as co-Director. The team consulted extensively with the ONS National Accounts Group and worked with officials in the spending departments, the Devolved Administrations, and the Treasury. We also consulted international statistical bodies and other national statistical offices who are working actively on measurement of public service outputs for national accounts. We are very grateful to these bodies, and others, for their contributions to our work, including comments on the Interim Report. None of these bodies or individuals should, of course, be held in any way responsible for the views expressed in this report.



## Introduction

Chapter 1 explains that:

This report is about methodology and does not contain any new figures with regard to government output or productivity; the aim of the review is to establish the future strategic direction for work in this area.

The construction of government output measures for national accounts purposes depends very much on co-operation from the relevant government departments including the Devolved Administrations.

National accounts serve several purposes, and no one single number will serve all purposes; different aggregates are relevant to answering different questions.

National income is an indicator of the contribution to welfare of specified economic activities; it is not a measure of total economic welfare; aggregate welfare is not the only objective of government policy.

National accounts estimates for the government sector are related to, but different from, microeconomic measures of public sector performance, and have different purposes; to try to use them in the same way as public sector performance targets misunderstands their nature and limitations.

National accounts are built on a series of agreed conventions; they are subject to margins of error that vary across different parts of the national accounts; the significance of these errors depends on the purpose for which the figures are used.

## Measuring Government Output in the UK

Chapter 2 sets out the history of measuring Government output in the National Accounts and identifies some of the key issues:

Since 1998, ONS has moved progressively towards the replacement of the (output=input) approach by direct measures of the volume of government output. This is an important development. The direct estimates now cover some two-thirds of General Government Final Consumption, which is an impressive achievement.

From the earlier experience in the 1950s and 1960s of the use of the direct measurement approach, we can see that the design of direct output measures needs considerable care and the investment of significant resources. Direct measures of output should be continuously monitored to ensure that they are capturing changes in quality. ONS has to steer a careful course with regard to changes in government policy, guaranteeing the independence of the approach to measuring government output while ensuring that its implementation reflects the realities and circumstances of public spending.

Institutional change in the public sector poses problems for output measurement, and these may be more severe for the direct approach than for the (output=input) convention. Effects of technological change, both specific and general, may not be easily captured, an issue that affects private as well as public services.

The implied measure of productivity for the government sector is obtained from three elements: spending, input price index and direct output measurement. The reliability of all three of these different elements needs to be assessed. While the introduction of direct output measures has received most attention, we attach considerable importance to the measurement and deflation of inputs. In the measurement of productivity, adjustment for quality is important for both inputs and outputs.

The process by which the underlying data are assembled, requiring collaboration between ONS, the Treasury and other government departments, is a highly complex one that warrants closer investigation.

If the government wishes to have reliable estimates of government output and productivity, then the statistical resources have to be supplied, and we welcome the indications already given by the National Statistician regarding the allocation of staff to this area of work.

## The International Context

Chapter 3 explains the various sources of international guidance, their status and the implications for taking forward measurement of government output in the United Kingdom:

The programme of work initiated by ONS in 1998 was in harmony with the SNA 1993 guidelines; other countries are engaged in the process of revising their methods for estimating government output, although the United Kingdom leads the way in terms of the extent of use of direct volume measures.

It is hoped that the work of ONS on the output of the government sector will influence the SNA 2008.

The ESA 1995, and the *Eurostat Handbook on Prices and Volumes Measures in National Accounts*, have expanded the SNA guidance, introducing an A/B/C classification. By 2006, C methods will no longer be acceptable under a European Commission Decision of 2002. In the case of individual services, this precludes use of the (output=input) convention in measuring government output; in the case of collective services, input measures may be retained as a B method providing that they satisfy certain criteria.

A number of countries are working on the development of direct output measures, including the treatment of quality change, and it would be desirable if cooperation could be formally established.

## Methodology for the Future: The Principles

The use of direct measures of government output is justified both by its intrinsic merits and by the obligations placed on the United Kingdom by the European Commission Decision. Chapter 4 discusses a range of important issues which underlie the international guidance, and need to be understood clearly in order to determine the appropriate way of measuring output, inputs and productivity for the UK national accounts. In view of the high profile of these statistics in political debate, we believe that it is important to begin by enunciating a set of principles on which to base National Accounts measurement.

**Recommendation 4.1:**

The direct measurement of the output from government spending, and the measurement of inputs and productivity, should be based on a set of principles, within the framework set by international guidelines.

The principles cover outputs, inputs, deflators and productivity:

**Principle A:** the measurement of government non-market output should, as far as possible, follow a procedure parallel to that adopted in the national accounts for market output.

**Principle B:** the output of the government sector should in principle be measured in a way that is adjusted for quality, taking account of the attributable incremental contribution of the service to the outcome.

**Principle C:** account should be taken of the complementarity between public and private output, allowing for the increased real value of public services in an economy with rising real value of public services in an economy with rising real GDP.

**Principle D:** formal criteria should be set in place for the extension of direct output measurement to new functions of government. Specifically, the conditions for introducing a new directly measured output indicator should be that (i) it covers adequately the full range of services for that functional area, (ii) it makes appropriate allowance for quality change, (iii) the effects of its introduction have been tested service by service, (iv) the context in which it will be published has been fully assessed, in particular the implied productivity estimate, and (v) there should be provision for regular statistical review.

**Principle E:** measures should cover the whole of the United Kingdom; where systems for public service delivery and/or data collection differ across the different countries of the United Kingdom, it is necessary to reflect this variation in the choice of indicators.

**Principle F:** the measurement of inputs should be as comprehensive as possible, and in particular should include capital services; labour inputs should be compiled using both direct and indirect methods, compared and reconciled.

**Principle G:** criteria should be established for the quality of pay and price deflators to be applied to the input spending series; they should be sufficiently disaggregated to take account of changes in the mix of inputs; and should reflect full and actual costs.

**Principle H:** independent corroborative evidence should be sought on government productivity, as part of a process of ‘triangulation’, recognising the limitations in reducing productivity to a single number.

**Principle I:** explicit reference should be made to the margins of error surrounding national accounts estimates.

The analysis underpins the discussion of inputs and deflators in Chapter 5 and the approach to output measurement set out in Chapter 6.

## Inputs

Consideration of the measurement of inputs, and of the price deflators applied, has turned out to be an important element of the review. Chapter 5 describes the way in which inputs (expenditure on Government services) are measured for the National Accounts, setting out issues about current data sources and processes, and developments in hand. The recommendations are:

**Recommendation 5.1:** We recommend that the importance of accurate data on government spending for the National Accounts be recognised at the highest level, for example, by including suitable requirements in the letters of appointment of Accounting Officers and Principal Finance Officers (see paragraph 5.4).

**Recommendation 5.2:** We recommend that ONS should continue work to document the data flows on government spending on public services in the National Accounts, both inside and outside ONS. This should be kept up to date as the Treasury's single data system, COINS, is implemented, and ONS should be ready to adapt and improve its current processes to take full advantage of COINS. The requirements for supply of data to ONS from COINS should be managed as part of the Service Level Agreement between the Treasury and ONS, and similar formal relationships may be needed in other areas (see paragraph 5.17).

**Recommendation 5.3:** We recommend that ONS and the Treasury should work together, and with ODPM and the Devolved Administrations, to improve the accuracy of data classification for government spending on public services in the National Accounts. In particular:

- ONS should engage actively in the Local Authority Working Group which ODPM are setting up, aiming for data to be collected at source in ways consistent with ONS economic categories, and to improve timeliness;
- ONS and the Treasury should plan to collect Level 2 COFOG data, as now required by Eurostat, and should work with departments to ensure they understand what is required so that data are classified accurately at source;
- ONS should review accuracy of current classification in the National Accounts, by government function and by economic category, and should rectify any inconsistencies;
- ONS and the Treasury should review their respective roles in advising departments on classification issues to assess whether current arrangements are the best that could be achieved, in the interests of clarity for data suppliers and accuracy in compiling the National Accounts, and other purposes for which the same data are used;
- ONS and the Treasury should develop a satisfactory basis for attributing government spending, consistent with the National Accounts, between functional classification, economic category and country within the United Kingdom, as this will be required for productivity analysis (eg matching appropriate deflators for different countries (see paragraph 5.33)).

**Recommendation 5.4:** We recommend that ONS, and the Treasury should regard ONS as an important end-user of the COINS system, fully engaged in plans for future development. We suggest that ONS is involved in a thorough Post-Implementation Review of COINS; ensure there is an ongoing mechanism by which issues of data quality can be addressed; and is involved in the design and delivery of enhanced training for data suppliers (see paragraph 5.47).

**Recommendation 5.5:** We recommend that ONS should continue to develop estimates of capital services, aiming to increase the level of detail presented to distinguish between functions and public and private sectors, to assist in analysis of productivity of public service spending (see paragraph 5.50).

**Recommendation 5.6:** We endorse the ONS decision to move towards use of the accounts of departments and other public bodies as a basis for estimating capital consumption, rather than its own Perpetual Inventory Model, and recommend that transition should continue, as technical issues are resolved (see paragraph 5.56).

**Recommendation 5.7:** We recommend that ONS should continue work to clarify why there is a divergence between the amount of capitalised ICT software in the UK national accounts compared with other countries, with particular reference to public sector spending, and should publish revised estimates and commentary when available (see paragraph 5.61).

**Recommendation 5.8:** We recommend that ONS should continue to develop its estimates of labour inputs using both the direct and indirect approaches, exploring issues on data availability and interpretation in the light of comparisons between the results of both methods. For the direct approach, ONS should expand the analysis by function, introduce a public/private split and incorporate information on changes in skill mix. On the indirect approach, ONS should improve the quality of the deflators used for public spending on labour services (see paragraph 5.65).

**Recommendation 5.9:** we recommend that ONS should agree quality criteria for price deflators for public services such as those in Table 5.1 (ONS might prefer to subsume them as part of wider work on quality criteria for deflators), and use them to improve deflators used in measurement of volume of public service spending and productivity (see paragraph 5.68).

## Outputs

Chapter 6 discusses a number of over-arching issues affecting the development of new or improved output measures in the UK context. Recommendations are:

**Recommendation 6.1:** we recommend current direct measures of output should be improved, where needed, by:

- a) widening the coverage of output volume indicators for each function;
- b) increasing the level of detail at which output indicators are measured;
- c) adopting a more reliable data source;
- d) revisions of the weighting process;

- e) replacing activity indicators with output measures that reflect changes in quality or outcome attributable to a unit of output;
- f) introducing or revising an overall quality adjustment;
- g) improving timeliness and in-year indicators; and
- h) improving UK coverage by making full use of measures from Scotland, Wales and Northern Ireland (see paragraph 6.5).

**Recommendation 6.2:** we recommend that ONS should be satisfied on the following conditions, before introducing a replacement output measure:

- a) there should be evidence of significant improvement in one or more of the directions listed above, giving particular emphasis to completeness of coverage and to measures that reflect quality change;
- b) an analysis should have been carried out of the relevant output data from past years, with sensitivity testing for possible future changes;
- c) the validity of the proposed measure should be tested by those with expert knowledge of the relevant function; and
- d) there is assurance of the likely continuation of the key data sources (see paragraph 6.8).

**Recommendation 6.3:** we recommend that ONS should monitor changes in government services, and in the machinery of government, with regard to their impact on direct output measurement and the need to add further output indicators or to transfer activities (see paragraph 6.11).

**Recommendation 6.4:** we recommend that collective services should be measured by the appropriate international standard, i.e. either a volume index of activity or the volume of inputs, aiming to satisfy Eurostat's requirements for a 'B' method, taking account of quality change of inputs. The same approach should be used for collective elements included in a function classified overall as 'individual', rather than assuming their output changes pro rata to other areas for which there are direct output measures (see paragraph 6.16).

**Recommendation 6.5:** we recommend that the ideal approach to developing a single aggregate output measure for a function is to weight together different elements by weights based on their marginal valuation. This requires indicators of output values that are comparable for different components. If that is not possible, it may be necessary to use marginal costs. In practice, average costs may be the only information available. Cost weights may be most appropriate where an outcome is affected by several government services and it is not possible to calculate the value of relative contributions (see paragraph 6.25).

**Recommendation 6.6:** we recommend that ONS choose on a case by case basis whether to measure quality by differentiation of service, success of activity or attributable contribution to outcome, having regard to:

- the nature of the service;
- the extent to which the service is, or should be, differentiated; and
- the degree to which the change in outcome can be directly and confidently attributed to the service concerned (see paragraph 6.27).

**Recommendation 6.7:** we recommend that ONS should give priority to work on quality adjustments, but consider that a relatively high threshold should be set for their introduction into the National Accounts; in particular, ONS should not introduce quality adjustments until it is assured that the dimensions covered are sufficiently representative (see paragraph 6.33).

**Recommendation 6.8:** we recommend that ONS should seek to improve the timeliness of annual estimates of outputs of public services (as a greater priority than more accurate estimates for quarterly outputs) (see paragraph 6.36).

## Implementation

Chapter 7 makes proposals for the approach to implementation of our recommendations. The recommendations are:

**Recommendation 7.1:** we recommend that the National Statistician and Statistical Heads of Profession in relevant government departments should discuss arrangements for formalising their joint responsibilities in respect of the National Accounts (see paragraph 7.5).

**Recommendation 7.2:** we recommend that ONS should make public information about new or revised output series, once decisions have been taken that they are fit for use in the National Accounts, including information about the basis for that decision (see paragraph 7.8).

**Recommendation 7.3:** we recommend that ONS should undertake a formal review, with external expertise, of each area of public service output measurement about every three years, and that the results should be made public, with any recommendations for change and action taken (see paragraph 7.12).

**Recommendation 7.4:** we recommend that ONS should continue to publish articles about outputs, inputs, deflators and productivity, commenting on data sources, methods and results, explaining limitations of different methodologies and interpreting the available data in that light (see paragraph 7.15).

**Recommendation 7.5:** we recommend that ONS should explore ways of analysing and publishing information about public service outputs in parallel to the National Accounts, such as satellite accounts. In particular, it would be useful to have a satellite account on human capital resource formation (paragraph 7.20).

**Recommendation 7.6:** we recommend that ONS should work collaboratively with other countries on public service output measurement, as joint agreement on the broad techniques to be used would aid comparability between measures of government final consumption in different countries (see paragraph 7.23).

**Recommendation 7.7:** we recommend that ONS should give priority to consolidating the treatment of that part of General Government Final Consumption covered by existing direct output measures. Extension to other areas should proceed circumspectly, where opportunities present themselves and as resources allow (see paragraph 7.28).

**Recommendation 7.8:** we recommend that ONS, with the Devolved Administrations, should consider how to make progress towards separate regional accounts (see paragraph 7.33).

**Recommendation 7.9:** we recommend that ONS make resources available to support the developments we have proposed; resources will also be needed in other departments, including the Devolved Administrations (see paragraph 7.36).

## Health

Chapter 8 explains the current Health output measures in the National Accounts, including recent improvements; identifies areas where further improvements are needed and recommends the way forward. The major concerns are about inclusion of output data from Scotland, Wales and Northern Ireland, measurement of primary care output, movement towards measuring whole courses of treatment, and measurement of quality change. The recommendations are:

**Recommendation 8.1:** we recommend that ONS should continue working with the four health administrations to make use of information from computerised general practitioner research databases to improve measurement of GP output, and should update cost weights (see paragraph 8.32).

**Recommendation 8.2:** we recommend that ONS and the health departments should work together to incorporate the widening scope of Reference Costs into the Health output measure as this becomes possible, with further improvements in timeliness; should keep under review the NHS services for which there are no direct output measures, taking expert advice on the potential impact on overall NHS output and productivity estimates; and should distinguish appropriately between individual services, collective services and overheads (see paragraph 8.36).

**Recommendation 8.3:** we recommend that ONS and the health departments in Scotland, Wales and Northern Ireland should introduce measures of Health output in those countries into the National Accounts once sources and methods have been verified (see paragraph 8.38)

**Recommendation 8.4:** we recommend that ONS should explore, with DH and the wider health information and research community, ways of taking forward work on whole courses of treatment, technical change and substitution, and should make use of the results in Health productivity articles (see paragraph 8.45).



**Recommendation 8.5:** we regard the measurement of quality change in health care as a difficult area, but have a number of suggestions for work which should be taken forward. The results of research commissioned by DH from the University of York and National Institute for Economic and Social Research will also be important. We recommend that:

- a) a number of dimensions of quality should be measured, with results weighted together by marginal social valuation: more work would be required to underpin these weights;
- b) a range of expertise should be used to develop quality measures, including public health medicine, epidemiology, health service management, health informatics and health economics;
- c) ONS and the health departments should assess options for collecting new information on health outcomes resulting from NHS treatment, with particular consideration to the needs ONS has for measurement of change over time;
- d) ONS and the health departments should consider studies of changing treatment patterns for particular major disease groups to assess whether these could provide useful estimates of improved health outcomes resulting from changes in clinical practice;
- e) ONS and the health departments should explore the data set on quality standards in general practice, resulting from the new GP contract, to see whether this could be the basis for a measure of quality change;
- f) ONS and the health departments should consider whether, with advice from the National Institute for Clinical Effectiveness, it might be possible to identify treatments where marginal valuation and cost weights are very different, and explore the difference in output growth resulting from use of estimated marginal valuation instead of cost weights;
- g) ONS and the health departments should develop a measure of quality change based on speed of access to elective treatment, using the Hospital Episode Statistics data set and taking account of non-linearity, with further developments if new measures of total waiting time are introduced;
- h) ONS and the health departments should explore whether measures of quality change could be developed from information sources for time taken for admission to hospital from accident and emergency departments, time before seeing a general practitioner and ambulance emergency response times;
- i) ONS and the health departments should explore whether measures of quality change over time could be based on the national patient survey programme which measures aspects of patient experience (see paragraph 8.66).

**Recommendation 8.6:** we recommend that ONS should work with the four health departments to improve the deflators for current price expenditure on health, and the matching expenditure weights (see paragraph 8.70).

**Recommendation 8.7:** we recommend that ONS should continue to publish health productivity articles and extend the range of sources and issues explored in them (see paragraph 8.76).

**Recommendation 8.8:** we recommend that ONS should consider developing the framework for health accounts further, developing full satellite accounts including health production accounts (see paragraph 8.80).

## Education

Chapter 9 explains the current Education output measures in the National Accounts; identifies areas where further improvements are needed and recommends the way forward. The major proposals are to update the quality measure for schools as an interim measure while further development work is done on an extended quality measure, which should include further consideration of measuring the value of education through increased earnings, and to increase the completeness of coverage by adding additional output measures, for initial teacher training and for publicly funded nursery places. We also emphasise the importance of including information from Scotland, Wales and Northern Ireland at the earliest possible stage. The recommendations are:

**Recommendation 9.1:** we recommend that pupil attendance, rather than the number of pupils, should be used as the volume measure of output, and that school cost weights should be updated annually (see paragraph 9.19).

**Recommendation 9.2:** we recommend that ONS should update and revise the quality adjustment factor for schools, using later information about GCSE results, and if possible also information from all parts of the United Kingdom (see paragraph 9.26).

**Recommendation 9.3:** we recommend that ONS and the four education departments should continue to work on a longer term revision of the quality adjustment for the schools output measure. This should take full account of results from throughout the United Kingdom, measure if possible the quality of education delivered at younger ages rather than relying on examinations at age 16 to proxy the whole education output, include information about attainment of school pupils who are 16 and over, and consider an adjustment to reflect the value of education for future earnings. We regard the sources of information on quality of teaching and class size as useful for assessment in productivity articles rather than the National Accounts measure (see paragraph 9.42).

**Recommendation 9.4:** we recommend that ONS should introduce a new output measure for Initial Teacher Training courses, using a cost weighted index of student numbers. This should, as soon as possible, include information from the Devolved Administrations, and further work should be done to develop a quality measure (see paragraph 9.44).

**Recommendation 9.5:** we recommend that the health professional education output measure is updated by using total student numbers, cost weighted by type of course, with UK data added as soon as possible, and working towards a quality adjustment based on Quality Assurance Agency for Higher Education or Higher Education Statistics Agency information (see paragraph 9.47).

**Recommendation 9.6:** we recommend that a new output measure should be introduced for publicly funded private nursery places, including inclusion of information for all parts of the United Kingdom and consideration of how to develop a quality measure (see paragraph 9.49).

**Recommendation 9.7:** we recommend that ONS and the four Education departments should continue to work together to improve accuracy, timeliness and classification of figures for Education spending, and suitable deflators to measure volume of spending in a way which takes account of changes in the quality of inputs (see paragraph 9.60).

**Recommendation 9.8:** we recommend that ONS and the four Education departments should continue to work together on analysis of education output and productivity change, using National Accounts and other sources, to be published in ONS productivity articles and through development of a satellite account for human capital resource formation (see paragraph 9.65).

## Public Order and Safety

Chapter 10 explains the current Public Order and Safety output measures in the National Accounts; identifies areas where further improvements are needed and recommends the way forward. The major proposals are to improve current cost weighted activity indices by using more detailed activities and costs, with the possibility of a quality adjustment for Prison output, to reduce the value of overcrowded prison cells, and to measure Fire output on the basis of weights which reflect the cost to the community of fire, rather than the response costs for the fire service. We also recommend further development work on an integrated administration of justice approach to measuring output of the Criminal Justice System as a whole. The recommendations are:

**Recommendation 10.1:** we recommend that current methods for measuring Police, Courts and other Criminal Justice System delivery agencies are improved by extending detail of coverage and improving weights. This work should be extended to include information from Scotland and Northern Ireland as soon as possible. The measure for correctional services output should be reviewed when the National Offender Management System is in place. In the interim, we consider it would be reasonable to adopt a quality adjustment to reduce the output value of crowded prison cells (see paragraph 10.34).

**Recommendation 10.2:** we recommend that the administration of justice approach be developed further for future use in the National Accounts, and that work is undertaken to replicate this approach for Scotland and Northern Ireland (see paragraph 10.43).

**Recommendation 10.3:** we recommend that ONS should measure civil courts output through a detailed cost weighted activity index, subject to the Department for Constitutional Affairs completing work to identify unit costs for each type of case, and to further work to replicate the approach for Scotland and Northern Ireland (see paragraph 10.45).

**Recommendation 10.4:** we recommend that ONS should measure fire response output using an index based on consequential costs, which measure damage to life and property, but should also continue to calculate an alternative index based on response costs which reflect the costs to the Fire Service, and monitor the sensitivity of the index to different weights. We also recommend continued work on the output of fire prevention and non-fire activities (see paragraph 10.56).

**Recommendation 10.5:** we recommend that specific deflators for labour, intermediate consumption and capital consumption should be developed for expenditure on Public Order and Safety where they do not already exist (see paragraph 10.56).

**Recommendation 10.6:** we recommend that ONS should analyse changes in productivity in Public Order and Safety services in the context of a range of other triangulation information, and should continue to develop analysis in this area (see paragraph 10.62).

## Social Protection

Chapter 11 explains the current Social Protection output measures in the UK National Accounts; identifies areas where further improvements are needed and recommends the way forward. The major proposals are to improve the adult social services output measure by improving detailed coverage and cost weights; to consider an extension to the children's social services measure though with issues about frequency of the data source; to continue development work towards quality adjustments for adult and children's social services; and to update the index for Administration of Social Security. The recommendations are:

**Recommendation 11.1:** we recommend that ONS should update the output measures for adult social services with wider and more detailed coverage and updated cost weights, making use of similar information from the Devolved Administration as soon as this is available, and updating timeliness of data collection or interim estimates through joint work with the Health Departments. For the future, the research commissioned by DH into a welfare-based approach to the measurement of adult social care output may lead to further improvements including the use of weights based on value and other quality adjustment factors. This could also be used in conjunction with the ONS experimental household sector satellite account if this is resumed (see paragraph 11.61).

**Recommendation 11.2:** we recommend that ONS should consider using a revised cost weighted index of children's social services which uses information about children supported in families or living independently, but only after careful assessment of the problems on frequency and timeliness from using a biennial census as source data. Information from the Devolved Administrations should be included at the earliest possible stage. We encourage continued development work to use the full range of children's social services quantity and quality data available to local authorities and inspection bodies, in consultation with practitioners and other experts, to develop both volume measures and quality adjustments (see paragraph 11.72).

**Recommendation 11.3:** we recommend that ONS should update the output measure for Administration of Social Security, with a wider range of benefits, accurate unit costs and weights, differentiation between new and existing claims, and quality adjustment in respect of timeliness and accuracy. It would be very desirable to include measures on a similar basis for Administration of Social Security in Northern Ireland and to extend the same approach to benefit programmes delivered by other departments, including child benefit and housing benefit. We also recommend that ONS should take advantage of the development of a quality-adjusted direct measure of Jobcentre Plus labour market outputs for use in the Economic Affairs function of COFOG (see paragraph 11.79).

**Recommendation 11.4:** we recommend that work continues to develop pay and price deflators which enable measurement of changes in volume of inputs used in social care (see paragraph 11.87).

**Recommendation 11.5:** we recommend that ONS should continue to develop analysis of productivity in Personal Social Services and Administration of Social Security, taking account of a wide range of information to add context to estimates derived from the National Accounts (see paragraph 11.96).

## Appendix A: Consultation

The following are members of the Interdepartmental Coordination Group.

| <b>Government Dept</b>               | <b>Name</b>               | <b>Position</b>  |
|--------------------------------------|---------------------------|--|
| Bank of England                      | Charles Bean              | Chief Economist  |
| Department for Education<br>& Skills | John Elliot               | Director of Strategic Analysis<br>(from July 2004)                           |
|                                      | Stephen Kershaw           | Director – School Workforce Unit   |
| Department of Health                 | Professor Barry McCormick | Chief Economic Adviser, Research<br>Analysis and Information Directorate     |
|                                      | Richard Douglas           | Director of Finance & Investment   |
|                                      | John Fox                  | Director of Statistics   |
|                                      | Martin Campbell           | Finance and Investment Directorate   |
|                                      | Andrew Jackson            | Economic Adviser, Finance &<br>Investment Directorate                        |
| Department of Work & Pensions        | Nick Dyson                | Director of Information & Analysis   |
|                                      | Sue Rice                  | Senior Manager, Analytical Support   |
| HM Treasury                          | Sir Nicholas Stern        | Second Permanent Secretary and<br>Head of the Government Economic<br>Service |
|                                      | Paul Johnson              | Director of Public Services and Chief<br>Microeconomist                      |
|                                      | Jonathan Stephens         | Managing Director of Public Services<br>Directorate                          |
| Home Office                          | Professor Paul Wiles      | Director, Research, Development &<br>Statistics                              |
|                                      | Dr Stephen Almond         | Economic Advisor   |
|                                      | William Nye               | Director of Performance and Finance  |
| Office of the Deputy Prime Minister  | Michael Kell              | Senior Economic Advisor  |
|                                      | Meg Green                 | Divisional Manager of Statistics   |
| Office for National Statistics       | Len Cook                  | National Statistician – Chair  |
|                                      | Colin Mowl                | Director, Macroeconomics & Labour<br>Market                                  |

### UK Consultation

We have consulted with, or given presentations to, the following:

Advanced Institute of Management Research

The Audit Commission

Bank of England and the Monetary Policy Committee  
 Institute of Fiscal Studies  
 National Audit Office  
 Ofsted  
 Prime Minister's Delivery Unit  
 The Royal Statistical Society  
 Statistics Commission  
 Centre for Health Economics, University of York  
 Personal Social Services Research Unit, University of Kent  
 Quality Assurance Agency.

We consulted Robin Lynch and others members of the National Accounts Group. Many other civil servants helped our work.

## International Consultation

We also consulted the following people internationally:

| International Body  | Name                 | Position   |
|---|----------------------|--|
| Australian Bureau of Statistics                                     | Rob Edwards          | Former Deputy Australian Statistician, Economic Statistics |
|   | Peter Harper         | First Assistant Statistician, Economic Statistics          |
| Brookings Institution   | Jack Triplett        | Research Fellow  |
| Bureau for Economic Analysis, USA                                   | Dr Barbara Fraumeni  | Chief Economist  |
| European Central Bank   | Steven Keuning       | Director General, Statistics                               |
| Eurostat  | Michel Vanden Abeele | Director General   |
|   | Brian Newson         | Acting Director, Economic and Monetary Statistics          |
|   | Paul Konijn          | Unit C1, European System of Accounts                       |
| Government Institute for Economic Research – Finland                | Kalevi Luoma         | Research Chief   |
| International Monetary Fund   | Rob Edwards          | Director of Statistics                                     |
| National Institute of Statistics (Italy)                            | Luigi Biggeri        | President  |
|   | Alfonsina Caricchia  | Head of Department of Integration and Technical Standards  |
|   | Daniela Collesi      | Senior Researcher  |
|   | Silvia Zannoni       | Researcher   |
| Office of Economic and Statistical Research – Queensland, Australia | Massimo Anzalone     | Researcher   |
|   | Peter Crossman       | Assistant Under Treasurer and Government Statistician      |
|   | Jon Blondal          | Budgeting and Marketing Division                           |
| Organisation for Economic Co-operation and Development (OECD)       | Michael Ruffner      | Budgeting and Marketing Division                           |
|   | Enrico Giovannini    | Head of Statistics Division                                |
|   | Francois Lequiller   | Head of National Accounts Statistics Division              |

|                        | <b>International Body</b> | <b>Name</b> | <b>Position</b>                         |
|------------------------|---------------------------|-------------|---|
| OECD<br>(continued)    | Paul Schreyer             |             | Statistics Division                     |
|                        | Dave Turner               |             | UK Country Desk                         |
|                        | Jens Lunsgaard            |             | UK Country Desk                         |
|                        | Manfred Huber             |             | Health Division                         |
| Statistics Finland     | Raimo Nurminen            |             | Senior Statistician – National Accounts |
|                        | Olli Seppanen             |             | Researcher, National Accounts           |
| Statistics Netherlands | Peter van de Ven          |             | Head of National Accounts               |
|                        | Sake de Boer              |             | Government Output Measurement           |
|                        | Foske Kleima              |             | Health and Education                    |
| Statistics Norway      | Svein Longva              |             | Director General                        |
|                        | Olav Ljones               |             | Assistant Director General              |
|                        | Knut Sorensen             |             | Research Division for National Accounts |
|                        | Anne-Britt Svinnset       |             | Head of Division – Public Finance       |
|                        | Tor Skoglund              |             | Researcher – National Accounts          |
|                        | Ann Lisbet Brathaug       |             | Head of Division – National Accounts    |
|                        |                           |             |   |
| Statistics Sweden      | Per Ericsson              |             | Head of National Accounts               |
|                        | Brigit Magnusson          |             | Deputy Head of National Accounts        |
|                        | Jenny Davidsson           |             | National Accounts                       |
|                        | Ann-Louis Paivinen        |             | National Accounts                       |
|                        | Anna Widenfalk            |             | National Financial Management Authority |

We have received written comments on the interim report from the following people:

| <b>Name</b>                 | <b>Organisation</b>  |
|-----------------------------|--|
| Richard Alldrit             | Chief Executive, Statistics Commission   |
| David Bell                  | Her Majesty's Chief Inspector of Schools, Ofsted   |
| Peter van de Ven            | Head of National Accounts, Statistics Netherlands  |
| Rob Edwards                 | Director of Statistics, IMF  |
| Cornelius Gorter            | International Monetary Fund  |
| Professor Dr Richard Hauser | Johann Wolfgang Goethe-Universität, Frankfurt-am-Main  |
| Sir Jack Hibbert            | Former Director of the Central Statistical Office, UK  |
| Professor Stephen Jenkins   | University of Essex  |
| Erin Leigh                  | Project Officer, Women's Budget Group  |
| Francois Lequiller          | Statistics Division, OECD  |
| Martin Maycock              | Project Support Analysis Branch, Department of Health, Social Services and Public Safety, Northern Ireland |
| Dr Gunnar Viby Mogensen     | Director, Rockwool Foundation Research Unit, Statistics Denmark  |
| Olli Seppanen               | Researcher – National Accounts   |
| Professor Alan Williams     | University of York   |



# Appendix B: International Guidance

---

**B1** This appendix gathers the international guidance on compilation of general government final consumption (GGFC) for national accounts, particularly focusing on text which raises key issues. Some of the guidelines included are general to national accounts whereas some are specific to the general government sector. The implications of the ongoing review of the System of National Accounts for GGFC are also explored. As productivity is not a national accounts concept, the guidance for this area is distinguished from national accounts guidance and OECD guidance on estimation of productivity outside of the national accounts framework has also been included.

The appendix covers the following areas:

- a) Sources of International Guidelines
- b) Timing of Recording in National Accounts
- c) General Government Sector and Non-Market Producers
- d) Classification of Government by Function
- e) GGFC Expenditure and Actual Final Consumption
- f) General Government as a Producer
- g) Valuation of Government Output
- h) Measuring the Volume of Government Output
- i) Capital Measures and Definition
- j) OECD Guidance on Productivity
- k) ESA Guidance on Satellite Accounts

Table B1 Sources of international guidance used as reference material for the Atkinson Review of Measurement of Government Output

| Title   | Organisation/s  | Status   | Type of guidance   |
|---|---|--|--|
| System of National Accounts (1993)  | UN, OECD, World Bank, Commission of the European Communities and the IMF. Document prepared by Inter-secretariat Working Group on National Accounts and approved by UN Statistics Commission. | Recommended but not mandatory – recognises need for flexibility. Currently under review for an SNA 2008 edition.   | High-level guidance only   |
| European System of Accounts (1995)  | Eurostat  | An EU version of SNA but with a legal basis to ensure strict application' to ensure 'harmonised and reliable statistics on which to base decisions'. Inventories of methods carried out country by country.  | Broadly consistent with SNA (1993) guidance with more clarification.   |
| Handbook on Prices and Volume Measures of National Accounts               | Eurostat  | Driven by the needs of the 1997 Growth and Stability Pact. SNA 93/ESA 95 'not sufficient to guarantee harmonised price and volume data'. Introduces an A/B/C score for methods.                              | Expansion of ESA (1995) guidance for government output distinguishing activities, outputs and outcomes and with examples of each.  |
| Organisation for Economic Cooperation and Development Productivity manual | OECD  | One of its objectives: to improve international harmonisation: although there is no strong prescriptive element in the manual, it contains indications about desirable properties of productivity measures.' | 'Comprehensive guide to the various productivity measures aimed at statisticians, researchers and analysts involved in constructing industry-level productivity indicators'. |
| United Nations website  | UN  | Guidance for Classification by Function of Government  | <a href="http://unstats.un.org/unsd/cr/registry/default.asp">http://unstats.un.org/unsd/cr/registry/default.asp</a>  |

- B2** The following sections are divided by guidance topics, with different sources of guidance where applicable and an outline of the UK practice in relation to the guidance given. The text shown is not exhaustive but has been selected to illustrate the key issues.

### Timing of Recording in National Accounts

#### SNA guidance

- B3** 'The System recommends recording on an accrual basis throughout.' (paragraph 3.91)

'Accrual accounting records flows at the time economic value is created, transformed, exchanged, transferred or extinguished. This means that flows which imply a change of ownership are entered when the ownership passes, services are recorded when provided, output at the time products are created and intermediate consumption when the materials and supplies are being used' (paragraph 3.94)

‘Furthermore, some transactions, in particular government units, do not keep records of purchases on an accruals basis. In these cases, the rules of consistency in the System require that efforts should be undertaken to correct basic statistics for major deviations and flaws.’ (paragraph 3.96)

#### ESA guidance

- B4** ‘However, in some cases it is necessary to show flexibility as regards time of recording. This applies in particular to taxes and other flows concerning general government, which are often recorded on a cash basis in government accounts. It is sometimes difficult to carry out an exact transformation of these flows from cash basis to accrual basis. In these cases, it might therefore be better to use approximations... Consequently, transactions may be recorded at different times by the transactors involved. These discrepancies must be eliminated by adjustments.’ (paragraph 1.57)

‘Output is to be recorded and valued when it is generated by the production process.’ (paragraph 3.46)

ESA 1995 was modified in two legal acts:

- B5** i) The following text is in *Regulation (EC) No 2516/2000* published Nov 2000: ‘General principles: The impact on net lending/borrowing of general government of taxes and social contributions recorded in the system shall not include amounts unlikely to be collected...’ and ‘Taxes and social contributions recorded in the accounts may be derived from two sources: amounts evidenced by assessments and declarations and cash receipts... if assessments and declarations are used, the amounts shall be adjusted by a coefficient reflecting assessed and declared amounts never collected... if cash receipts are used, they shall be time-adjusted so that the cash is attributed when the activity took place to generate the tax liability...’
- ii) The following text is in *Regulation (EC) No 995/2001* published May 2001 ‘...taxes and social contributions payable to the general government can either be recorded net of the part unlikely to be collected or, if this part is included, it should be neutralised in the same accounting period by a capital transfer from the general government to the relevant sectors’.

## General Government Sector and Non-Market Producers

#### SNA guidance

- B6** ‘General government: institutional units which, in addition to fulfilling their political responsibilities and their role of economic regulation, produce principally non-market services (possibly goods) for individual or collective consumption and redistribute income and wealth’ (paragraph 2.20)

‘The general government sector consists mainly of central, state and local government units together with social security funds imposed and controlled by those units. In addition, it includes non-profit institutions engaged in non-market production that are controlled and mainly financed by government units or social security funds.’ (paragraph 4.9)

### ESA guidance

**B7** ‘for the purposes of the system, the institutional units are grouped together into five mutually exclusive institutional sectors composed of the following types of units: (paragraph 1.28)

- a) non-financial corporations;
- b) financial corporations;
- c) general government;
- d) households;
- e) non-profit institutions serving households..’

**B8** ‘The sector general government (S.13) includes all institutional units which are other non-market producers (...) whose output is intended for individual and collective consumption, and mainly financed by compulsory payments made by units belonging to other sectors, and/or all institutional units principally engaged in the redistribution of national income and wealth. (paragraph 2.68)

**B9** The institutional units included in sector S.13 are the following: (paragraph 2.69)

- a) general government entities (excluding public producers organised as public corporations or, by virtue of special legislation, recognised as independent legal entities, or quasi-corporations, when any of these are classified in the non-financial or financial sectors) which administer or finance a group of activities, principally providing non-market goods and services, intended for the benefit of the community;
- b) non-profit institutions recognised as legal entities which are other non-market producers and which are controlled and mainly financed by general government;...

The general government sector is divided into four sub-sectors: (paragraph 2.70)

- a) central government (...);
- b) state government (...);
- c) local government (...);
- d) social security funds (...).’

**B10** ‘Definition: Other non-market producers are local kind-of-activity units or institutional units whose major part of output is provided free or at not economically significant prices.’ (paragraph 3.26)

‘if less than 50 per cent of the production costs are covered by sales, the institutional units is an other non-market producer and classified to the sector Non Profit Institutions serving Households (NPISH). But other non-market non profit institutions that are controlled and mainly financed by general government are classified to the general government sector. (paragraph 3.32)

- B11** In distinguishing market and other non-market producers by mean of the 50 per cent criterion, sales and costs are defined as follows: (paragraph 3.33)
- a) sales cover the sales excluding taxes on products but including all payments made by general government... and granted to any kind of producer in this type of activity, i.e. all payments linked to the volume or value of output are included, but payments to cover an overall deficit are excluded...
  - b) production costs are the sum of intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production. For this criterion other subsidies on production are not deducted. To ensure consistency of the concepts sales and production costs when applying the 50 per cent criterion, the production costs should exclude all costs made for own-account capital formation.
- B12** The 50 per cent criterion should be applied by looking over a range of years: only if the criterion holds for several years or holds for the present year and is expected to hold for the near future, it should be applied strictly. Minor fluctuations in the size of sales from one year to another do not necessitate a reclassification of institutional units...'

## Classification of Government by Function

### SNA guidance on individual services

- B13** (on collective versus individual services)

'Individual goods and services are essentially "private", as distinct from "public" goods. They have the following characteristics: (paragraph 9.81)

- a) It must be possible to observe and record the acquisition of the good or service by an individual household or member thereof and also the time at which it took place;
- b) The household must have agreed to the provision of the good or service and take whatever action is necessary to make it possible - for example, by attending a school or clinic;
- c) The good or service must be such that its acquisition by one household or person, or possibly by a small restricted group of persons, precludes its acquisition by other households or person...

'From a welfare point of view, the important characteristic of an individual good or service is that its acquisition by one household, person or group of persons brings no (or very little) benefit to the rest of the community...' (paragraph 9.82)

### SNA guidance on collective services

- B14** 'Most goods can be privately owned and are individual in the sense used here. On the other hand, certain types of services can be provided collectively to the community as a whole. The characteristics of these services may be summarized as follows:
- a) Collective services can be delivered simultaneously to every member of the community or of particular sections of the community, such as those in a particular region of a locality;

- b) The use of such services is usually passive and does not require the explicit agreement or active participation of all the individuals concerned;
- c) The provision of a collective service to one individual does not reduce the amount available to others in the same community or section of the community. There is no rivalry in acquisition.' (paragraphs 9.81-9.83)

'Expenditures incurred by governments at a national level in connection with individual services such as health and education are to be treated as collective when they are concerned with the formulation and administration of government policy, the setting and enforcing of public standards, the regulation, licensing or supervision of producers, etc... on the other hand, any overhead expenses connected with the administration or functioning of a group of hospitals, schools, colleges or similar institutions are to be included in individual expenditures...' (paragraph 9.86)

#### SNA guidance on the classification of functions of government

- B15** 'it may not be possible to classify transactions and, as an approximation, the units of classification may have to be agencies, offices, bureaus or project units within government departments...it may happen of course that the smallest units that can be identified still perform two or more classification of the functions of government functions; in such cases it will be usually be best to make an approximate division of the unit's outlays among the different functions performed rather than to allocate them all to that which is judged the largest.' (paragraph 18.10)

Table B2 Classification of the Functions of Government (COFOG) used for compilation of the expenditure measure of GDP

The COFOG classifications are guidelines provided in the System of National Accounts 1993 (UN,OECD, IMF, CEC and World Bank).

|   | Divisions                                     | Sub-divisions   |
|---|---|---|
| Collective services                         | 01 General Public Services                    | 01.1 Executive and legislative organs, financial and fiscal affairs, external affairs |
|   |   | 01.2 Foreign economic aid   |
|   |   | 01.3 General services   |
|   |   | 01.4 Basic research   |
|   |   | 01.5 R&D General public services  |
|   |   | 01.6 General public services n.e.c.   |
|   |   | 01.7 Public debt transactions   |
|   |   | 01.8 Transfers of a general character between different levels of government          |
|   | 02 Defence                                    | 02.1 Military defence   |
|   |   | 02.2 Civil defence  |
|   |   | 02.3 Foreign military aid   |
|   |   | 02.4 R&D defence  |
|   |   | 02.5 Defence n.e.c.   |
|   | 03 Public Order and Safety                    | 03.1 Police services  |
|   |   | 03.2 Fire-protection services   |
|   |   | 03.3 Law courts   |
|   |   | 03.4 Prisons  |
|   |   | 03.5 R&D Public order and safety  |
|   | 04 Economic Affairs                           | 04.1 General economic, commercial and labour affairs                                  |
|   |   | 04.2 Agriculture, forestry, fishing and hunting                                       |
| 04.3 Fuel and energy                        |   |   |
| 04.4 Mining, manufacturing and construction |   |   |
| 04.5 Transport                              |   |   |
| 04.6 Communication                          |   |   |
| 04.7 Other sectors                          |   |   |
| 04.8 R&D Economic Affairs                   |   |   |
| 04.9 Economic affairs n.e.c.                |   |   |
| 05 Environmental Protection                 | 05.1 Waste management                         |   |
|   | 05.2 Waste water management                   |   |
|   | 05.3 Pollution abatement                      |   |
|   | 05.4 Protection of biodiversity and landscape |   |
|   | 05.5 R&D Environmental protection             |   |
|   | 05.6 Environmental protection n.e.c.          |   |
| Individual services                         | 06 Housing and Community Amenities            | 06.1 Housing development  |
|   |   | 06.2 Community development  |
|   |   | 06.3 Water supply   |
|   |   | 06.4 Street lighting  |
|   |   | 06.5 R&D Housing and amenities  |
|   |   | 06.6 Housing and community amenities n.e.c.   |

Table B2 continued

| Divisions                           | Sub-divisions   |
|-------------------------------------|---|
| 07 Health                           | 07.1 Medical products, appliances and equipment<br>07.2 Out-patient services<br>07.3 Hospital services<br>07.4 Public health services<br>07.5 R&D health<br>07.6 Health n.e.c.  |
| 08 Recreation, Culture and Religion | 08.1 Recreational services<br>08.2 Cultural services<br>08.3 Broadcasting and publishing services<br>08.4 Religious and other community services<br>08.5 R&D Recreation, culture and religion<br>08.6 Recreation, culture and religion n.e.c. |
| 09 Education                        | 09.1 Pre-primary and primary education<br>09.2 Secondary education<br>09.3 Post-secondary non-tertiary education<br>09.4 Tertiary education<br>09.5 Subsidiary services to education<br>09.6 R&D Education<br>09.7 Education n.e.c.           |
| 10 Social Protection                | 10.1 Sickness and disability<br>10.2 Old age<br>10.3 Survivors<br>10.4 Family and children<br>10.5 Unemployment<br>10.6 Housing<br>10.7 Social exclusion n.e.c.<br>10.8 R&D Social protection<br>10.9 Social protection n.e.c.                |

## GGFC Expenditure and Actual Final Consumption

### SNA guidance

- B16** ‘Final consumption expenditure covers transactions on final consumption of goods and services for which a sector is the ultimate bearer of the expense. Government and NPISH produce non-market goods and services in their production account, where intermediate consumption or compensation of employees are recorded as uses. Final consumption expenditure of these producers relates to the value of their output of non-market goods and services, less their receipts from the sale of non-market goods and services at prices which are not economically significant. However, it also covers services that are purchased by government or NPISHs for ultimate transfer, without transformation, to households’. (paragraph 2.127)



‘The use of adjusted disposable income account (...) records adjusted disposable income as resources and actual final consumption as uses... Actual final consumption of households covers goods and services which are effectively available for individual consumption by households, regardless of whether the ultimate bearer of the expense is government, NPISHs or households themselves. Consequently, actual final consumption of government refers only to collective consumption, whereas NPISHs, whose final consumption expenditure is deemed to be in total individual, have no actual final consumption.’ (paragraph 2.128)

#### ESA guidance

- B17** ‘The use of adjusted disposable income account includes the concept of actual final consumption, which corresponds to the value of the goods and services actually at the disposal of households for final consumption, even if their acquisition is financed by general government or non-profit institutions serving households. (paragraph 8.40)

Consequently, the actual final consumption of general government corresponds only to collective final consumption. Since final consumption expenditure by non-profit institutions serving households is regarded as entirely individual, their actual final consumption is zero.

At the level of total economy, final consumption expenditure and actual final consumption expenditure are equal...’ (paragraph 8.41)

- B18** ‘Final consumption expenditures by general government or NPISHs are equal to the sum of their output, plus the expenditures on products supplied to households via market producers (i.e. Social transfers in kind) minus the payments by other units minus own-account capital formation.’ (paragraph 3.96)

### General Government as a Producer

#### SNA guidance

- B19** ‘Establishments owned by government or NPISHs commonly provide education, health or other services to individual households without charge or at prices that are not economically significant. The costs of providing these services are incurred by the government or NPISHs, and the values are recorded as internal transactions: that is, as final expenditures by governments or NPISHs on outputs produced by establishments they own themselves. (... the acquisition of these services by households is recorded separately under social transfers in kind, another form of non-monetary transactions that take place between the government units or NPISHs and the households in question.)’ (paragraph 3.47)

- B20** ‘Non-market producers providing final goods or services – such as public administration, defence, health and education - should be partitioned into establishments using the activity classification given in divisions 75, 80, 85 and 90 of the ISIC...’ (paragraph 5.38)

## Valuation of Government Output

### SNA guidance

**B21** ‘In contrast to output produced for own consumption or own gross capital formation by market producers, there are usually no suitable markets whose prices can be used to value government non-market output. By convention, therefore, such output is valued by its production costs.’ (paragraph 4.110)

**B22** ‘In the System, the intermediate inputs are recorded and valued at the time they enter the production process, while outputs are recorded and valued as they emerge from the process.... The increase between the value of intermediate inputs and the value of outputs is the gross value added against which must be charged the consumption of fixed capital, taxes on production (less subsidies) and compensation of employees. The positive or negative balance remaining is the net operating surplus or mixed income. The definition measurement and valuation of outputs and inputs is, therefore, fundamental to the System. (paragraph 6.37)

Output therefore consists only of those goods or services that are produced within an establishment that become available for use outside that establishment... (paragraph 6.38)

For simplicity, the output of most goods or services is usually recorded when their production is completed...’ (paragraph 6.38)

**B23** ‘There are no markets for collective services such as public administration or defence, but even in the case of non-market education, health or other services provided to individual households, suitable prices may not be available. It is not uncommon for similar kinds of services to be produced on a market basis and sold alongside the non-market services but there are usually important differences between types and quality of services provided. In most cases it is not possible to find enough market services that are sufficiently similar to the corresponding non-market services to enable their prices to be used to value the latter, especially when the non-market services are produced in very large quantities. (paragraph 6.90)

For these reasons, and also to ensure that the various non-market services produced by government and NPISHs are valued consistently with each other, they are all valued in the System by the sum of costs incurred in their production: that is, as the sum of: (paragraph 6.91)

- Intermediate consumption
- Compensation of employees
- Consumption of fixed capital
- Other taxes, less subsidies, on production.

The net operating surplus on the production of non-market goods or services produced by government units and NPISHs is assumed always to be zero.’

## Measuring the Volume of Government Output

### SNA guidance

- B24** ‘In principle, volume indices may always be compiled directly by calculating a weighted average of the quantity relatives for the various goods and services produced as outputs using the values of these goods and services as weights. Exactly the same method may be applied even when the output values have been estimated on the basis of their costs of production. (paragraph 16.134)

Of course, the calculation of quantity relatives for the outputs of many kinds of non-market services, especially collective services, presents problems. In the case of health and education services provided as social transfers to households, however, the problems are much less, both conceptually and in practice, than for collective services such as public administration or defence. The objective is to measure the quantities of the services actually delivered to households. These should not be confused with the benefits or utility derived from those services...’ (paragraph 16.135)

- B25** ‘Measuring changes in the volume of collective services is distinctly more difficult, however, as it is not possible to observe and record the delivery of such services. Many collective services are preventative in nature; protecting households or other institutional units from acts of violence, including acts of war, or protecting them from other hazards, such as road accidents, pollution, fire, theft or avoidable diseases. It is difficult to measure the output of preventive services, and this is an area in which further research is needed. In practice, it may not be feasible to avoid using changes in the volumes of inputs into such services as proxies for changes in volumes of outputs... (paragraph 16.139)

When it is not possible to avoid using an input measure as a proxy for an output measure, the input measure should be a comprehensive one and not confined to labour inputs... These volume measures can, of course, also be derived by deflating the current values by suitably weighted wage rate, price or tax rate indices.’ (paragraph 16.140)

### ESA guidance

- B26** ‘The establishment of a comprehensive system of price and volume indices covering all supply and uses of goods and services encounters a particularly difficulty when measuring the output of non-market services. These services differ from market services in that they are not sold at a market price and their value at current prices is calculated by convention as the sum of the costs incurred. These costs are intermediate consumption, compensation of employees, other taxes less subsidies on production and consumption of fixed capital. (paragraph 10.24)

In the absence of a unit market price, the change in the ‘unit cost’ of a non-market service can be considered as an approximation of the change in the price. If non-market services are consumed on an individual basis, it is in principle possible to estimate quantities which are homogeneous and which reflect the utilisation of these services and apply the unit costs of a base year to obtain data in constant prices. By such type of output-measurement it will be possible to analyse changes in productivity for individual non-market services. For collective services it is generally not possible to establish unit costs and quantities reflecting their utilisation. If attempts are made to account for changes in productivity for collective services by indirect methods, users should be made aware of this. (paragraph 10.25)

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, must be defined in terms of the actual flows of these goods and services and not in terms of the 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.’ (paragraph 10.26)

**B27** ‘For certain market and non-market service industries, such as finance, business services, education or defence, it may not be possible to obtain satisfactory estimates of price or volume change for output. In these cases the movements of value added at constant prices can be estimated by means of changes in compensation of employees at constant wage rates and consumption of fixed capital at constant prices. Compilers of data may be forced to adopt such expedients, even when there is no good reason to assume that labour productivity remains unchanged in the short or long term.’ (paragraph 10.29)

**B28** ‘In the case of services provided to individuals, changes in the volume of their output and consumption should in principle be measured on the basis of the use [sic] which is made of these services; this will avoid using different criteria for the same service depending on whether they are market or non-market. Of course, any change in quality must be treated as a change in volume; but this applies as much to market services as to non-market services provided to individuals.’ (paragraph 10.42)

‘The pure collective services are produced by general government for the benefit of the entire population. In fact, they cover a vast range of activities such as general public services, national defence, foreign affairs, justice and the police, town planning and the environment, economic policy, etc. Since these services are consumed collectively, indirectly and continuously, the volume of their output cannot be measured by the extent to which they are utilised.’ (paragraph 10.43)

#### Eurostat Handbook guidance

**B29** ‘Non-market output can only be produced by non-market producers... that may or may not also produce market outputs. The total value of output of a non-market producer is defined by convention as the total costs of production (i.e. the operating surplus is assumed to be zero). In the case of a local KAU [kind of activity unit] with secondary market output, non-market output is defined as a residual item, i.e. as the difference between the total costs of production minus the revenues from market output. (section 3.1.2)

It is important to note that this valuation principle (calculating current price output as costs) is applied to the producer rather than the product. Non-market producers are either public producers or non-profit institutions, classified in the sectors government or NPISH respectively.

Non-market output can be sub-divided into two types of output:

- individual goods and services: those that are consumed by individual households: and
- collective services: those that are provided simultaneously to the society as a whole (by definition, goods can not be collective)...

Examples of individual products are education, health, social security, recreation services and cultural services. Examples of collective services are general public administration, defence, police services and research and development' (section 3.1.2).

#### Input, activity, output and outcome

'The following criteria can be formulated for the appropriate use of output indicators: (paragraph 3.1.2.1)

- they should cover all the services produced by the producer that are provided to external users, and only those; activities that are in fact ancillary to the main output should not be counted;
- they should be weighted by the costs of each type of output in the base year;
- they should be defined as detailed as possible;
- they should be quality-adjusted.'

**B30** The problem of measuring prices and volumes for non-market output arises from the fact that by definition no market prices exist. For that reason, the value of output at current prices is defined as the sum of costs minus revenues as noted above. Without prices for the output, there are only two options for constant price measurement: deflating inputs and direct volume measurement.

Current practice for constant prices is mostly based on deflating inputs. This implies assuming that the change in volume of inputs is representative for the change in the volume of output. However, it is not at all certain that more or better inputs lead automatically to more or better output. Using this assumption makes it impossible to analyse change in productivity, and will wrongly estimate the true output change if this is different from the change in inputs.

Volume indicators can relate to:

#### Inputs

**B31** for example the number of employees. This would simply assume that twice as large a public service would mean twice as much output, irrespective of how those additional personnel were deployed. The advantage of the method is the ease of implementation, and the ready availability of data. This method however ignores all changes in productivity due to eg. improved equipment (for example increased use of PCs) or more efficient procedures.

A possibility would be to complement input methods with adjustments for changes in productivity...

The problem is that such adjustments are inevitably based on assumptions, which cannot be verified without genuine measurement of the output...

Another problem is that there might be double counting of the productivity changes, if the quality changes of the inputs (eg. the labour) were already taken into account...

### Activity

- B32** for example number of operations in hospitals or number of patrols carried out by the police. Such data can often be found. Activity indicators reflect what the non-market units are actually doing with their inputs and are therefore closer to the output. However, suppose for example that new improved forms of medical treatments reduce the number of operations necessary. Taking the number of operations as an indicator would imply a decrease of output and productivity, which does not seem appropriate in this case. Using activity indicators often does not lead to reasonable productivity numbers. However, for some collective services, activity indicators may be the only indicators that can be found.

### Output

- B33** the preferred approach. However, it is not always easy to define exactly what the unit of output is. For individual goods and services it is in principle possible to define the output, since an actual delivery of that output takes place from the producer to the consumer(s)... For example, for education, the output is the amount of teaching consumed by a pupil. For hospital services, the output is the amount of care received by a patient. For cultural services, the output is the amount of theatre plays consumed. For collective services, however, there is no transaction between producer and consumer since these are provided simultaneously to the society as a whole. It becomes therefore very difficult to define the output. It is very difficult to say for example what the unit of output is of defence or police services.

Table B3 Summarised from Section 3.1.2.3 of the Eurostat Price and Volume Manual

| Type of service     | A/B/C methods  |
|---------------------|--|
| Individual services | <p>A methods – output indicator approach where the indicators satisfy the following criteria</p> <ol style="list-style-type: none"> <li>they should cover all the services produced by the producer that are provided to external users, and only those; activities that are in fact ancillary to the main output should not be counted;</li> <li>they should be weighted by the costs of each type of output in the base year;</li> <li>they should be defined as detailed as possible;</li> <li>they should be quality-adjusted.</li> </ol> <p>B methods – output indicator approach where the criteria are not fully satisfied, eg level of detail could be improved or does not take into account changes in quality.</p> <p>C methods – if input, activity or outcome is used (unless outcome can be interpreted as quality-adjusted output) or if coverage of output method is not representative.</p> |
| Collective services | <p>Broadly the same as for individual services but:</p> <p>B methods – input methods are B methods as are the use of volume indicators of activity. If input methods are used they should estimate the volume of each indicator separately, taking quality changes of inputs into account. For each category of inputs (IC, other taxes and subs on prod, comp of employ and CC). Applying productivity or quality adjustments to the sum of the volume of inputs is not recommended.</p> <p>C methods – the use of a single input volume indicator is not a B method.</p>   |

### Outcomes

**B34** ‘for example indicators of the level of education of the population, life expectancy, or level of crime. Such indicators might be influenced by factors that are unrelated to the activity, and therefore are generally not representative of the output. In some cases, however, outcome indicators can be used as indicators for the quality of the output...’

**B35** Specifically for Education, Eurostat proposes several methods of measuring output, all classified as either A, B or C method. The criteria for the different methods are set out in full in section 4.2 of the Eurostat Handbook. In summary they are as follows:

- A method: complete or near-complete coverage, stratification by category, at least into pre-school, primary, lower secondary, upper secondary, higher education and other education. The A method for non-market education is to use ‘pupil hours’ adjusted for quality as appropriate. The number of pupils can be used as a proxy for pupil hours provided that it can be shown that the amount of hours that pupils spend being taught is sufficiently stable. It is encouraged for some levels of education (tertiary education and distance-learning).
- B method: complete or near-complete coverage stratification by category, at least into pre-school, primary, lower secondary, upper secondary, higher education and other education. The B method is to use ‘pupil hours’ without an adjustment for quality.
- C method: incomplete coverage or incomplete stratification by category. An input-base method is a C method, such as numbers of teacher hours.

### Measuring quality change

**B36** ‘When a constant price measure is not obtained by deflation with a price index but instead by extrapolation with a volume index, quality changes should also be accounted for. This however provides some special problems...’

When volume indicators with a detailed breakdown of products is used, shifts between different products will be included in the volume components. Therefore, part of the quality change (that part due to compositional changes in an aggregate...) can be captured by differentiating as many qualities of a product as possible. These different qualities are then in fact treated as different products’ (section 2.4.3).

## Capital Measures and Definitions

### OECD Manual guidance on capital input measures

**B37** ‘For any given type of asset, there is a flow of productive services from the cumulative stock of past investments. This flow of productive services is called capital services (sic) of an asset type and is the appropriate measure of capital input for production and productivity analysis. Conceptually, capital services reflect a quantity, or physical concept, not to be confused with the value, or price concept of capital. To illustrate, take the example of an office building. Service flows of an office building are the protection against rain, the comfort and storage services that the building provides to personnel during a given period.’

Because flows of the quantity of capital services are not usually directly observable, they have to be approximated by assuming that the service flows are in proportion to the stock of assets...’ (paragraph 5.2)

**B38** ‘The Australian Bureau of Statistics publishes two distinct and complementary capital measures. The Australian methodology stands out in that it ensures full consistency between the different measures:

- A measure of capital services, as part of ABS’ multifactor productivity series.
- An end-year net capital stock, as part of the Australian System of National Accounts.’

#### SNA guidance on the boundary between current and capital expenditure

**B39** ‘The distinction between maintenance and repairs and gross fixed capital formation is not clear-cut. The ordinary, regular maintenance and repair of a fixed asset used in production constitutes intermediate consumption. Ordinary maintenance and repair, including the replacement of defective parts, are typical ancillary activities but such services may also be provided by a separate establishment within the same enterprise or purchased from other enterprises. (paragraph 6.159)

The practical problem is to distinguish ordinary maintenance and repairs from major renovations, reconstructions or enlargements which go considerably beyond what is required simply to keep the fixed assets in good working order. Major renovations, reconstructions, or enlargements of existing fixed assets may enhance their efficiency or capacity or prolong their expected working lives. They must be treated as gross fixed capital formation if they add to the stock of fixed assets in existence. (paragraph 6.160)

**B40** Ordinary maintenance and repairs are distinguished by two features; (paragraph 6.161)

- a) They are activities that owners or users of fixed assets are obliged to undertake periodically in order to be able to utilise such assets over their expected service lives...
- b) Maintenance and repairs do not change the fixed asset or its performance, but simply maintain it in good working order or restore it to its previous condition in the event of a breakdown. Defective parts are replaced by new parts of the same kind without changing the basic nature of the fixed asset.

**B41** On the other hand, major renovations or enlargements to fixed assets are distinguished by the following features: (paragraph 6.162)

- a) The decision to renovate, reconstruct or enlarge a fixed asset is a deliberate investment decision which may be taken at any time and is not dictated by the condition of the asset...
- b) Major renovations or enlargements increase the performance or capacity of fixed assets or significantly extend their previously expected service lives...



**B42** Research and development are undertaken with the objective of improving efficiency or productivity or deriving other future benefits so that they are inherently investment - rather than consumption-type activities. However, other activities, such as staff training, market research or environmental protection, may have similar characteristics. In order to classify such activities as investment type it would be necessary to have clear criteria for delineating them from other activities, to be able to identify and classify the assets produced, to be able to value such assets in an economically meaningful way and to know the rate at which they depreciate over time. In practice it is difficult to meet all of these requirements. By convention, therefore, all the outputs produced by research and development, staff training, market research and similar activities are treated as being consumed as intermediate inputs even though some of them may bring future benefits.' (paragraph 6.163)

'When an enterprise contracts an outside agency to undertake research and development, staff training, market research or similar activities on its behalf, the expenditures incurred by the enterprise are treated as purchases of services used for purposes of intermediate consumption.' (paragraph 6.165)

### OECD Guidance on Productivity

**B43** Productivity is not defined (at present) within national accounts guidance. The following extracts are therefore from the OECD productivity manual.

#### OECD guidance

**B44** 'emphasis is given to productivity measures of those industries that are characterised by a large share of market producers, leaving aside those activities where non-market producers dominate in many OECD countries. These activities pose specific problems of productivity measurement, due to the difficulty or impossibility of observing and/or defining market prices or output. Reference will be made when appropriate but an in-depth treatment of the output measurement in each of these industries would go beyond the scope of the present manual.' (paragraph 1.2)

#### Defining productivity

**B45** 'Productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input use... there is neither a unique purpose for, nor a single measure of productivity. The objectives of productivity measurement include: (paragraph 2.1)

- to trace technical change;
- for identifying changes in efficiency;
- to identify real cost savings in production [where real cost savings are as a result of a myriad of sources behind productivity growth including technical change and changes in efficiency];
- to help identify inefficiencies; and
- [as] a key element towards assessing standards of living.

Table B4 Overview of main productivity measures

| Type of output measure | Type of input measure                       |  |   | Capital, labour and intermediate inputs (energy, materials, services) |
|------------------------|---|--|---|---|
|                        | Labour                                      | Capital                                      | Capital and Labour                                      |   |
| Gross output           | Labour productivity (based on gross output) | Capital productivity (based on gross output) | Capital-labour productivity MFP (based on gross output) | KLEMS multifactor productivity  |
| Value added            | Labour productivity (based on value added)  | Capital productivity (based on value added)  | Capital-labour productivity MFP (based on value added)  | —   |
|                        | Single factor productivity measures         |  | Multifactor productivity (MFP) measures                 |   |

Source: OECD Productivity manual, Table 1

## Satellite Accounts

### ESA guidance

**B46** 'For some specific data needs the best solution is to draw up separate satellite accounts... (paragraph 1.18)

Satellite accounts can serve such data needs by: (paragraph 1.19)

- showing more detail where necessary and leaving out superfluous detail;
- enlarging the scope of the accounting framework by adding non-monetary information, eg on pollution and environmental assets;
- changing some basic concepts, eg by enlarging the concept of capital formation by amount of the expenditure on research & development or the expenditure on education.

**B47** An important feature of satellite accounts is that in principle all basic concepts and classifications of the standard framework are retained. Only when the specific purpose of satellite account definitely requires a modification, are changes in concepts introduced. In such instances, the satellite account should also contain a table showing the link between the major aggregates in the satellite account and those in the standard framework. In this way, the standard framework retains its role as a framework of reference and at the same time justice is done to more specific needs. (paragraph 1.20)

**B48** The standard framework does not pay much attention to stocks and flows which are not readily observable in monetary terms... By their nature, the analysis of such stocks and flows is usually also well served by compiling statistics in non-monetary terms, eg. (paragraph 1.21)

...b) education can be described in terms of type of education, number of pupils, the average number of years of education before obtaining a diploma, etc...

Table B5 Purposes, advantages and limitations of the most widely used productivity measures, summarized from OECD Productivity Manual

| Type of measure                                      | Purposes   | Advantages  | Limitations   |
|--|--|---|---|
| Labour productivity based on gross output            | 'traces the labour requirements per unit of (physical) output.'  | 'Ease of measurement and readability. In particular, the gross-output measure requires only price indices on gross output, not on intermediate inputs as is the case for value-added based measures.' | 'Labour productivity is a partial productivity measure and reflects the joint influence of a host of factors. It is easily misinterpreted as technical change or as the productivity of individuals in the labour force.'   |
| Labour productivity based on value added             | 'Analysis of micro-macro links, such as the industry contribution to economy-wide labour productivity and economic growth... a direct link to a widely used measure of living standards, income per capita...' | 'Ease of measurement and readability.'  | As above, and 'Also, value-added measures based on a double deflation procedure with fixed-weight Laspeyres indices suffer from several theoretical and practical drawbacks.'   |
| Capital-labour productivity MFP based on value added | 'Analysis of micro-macro links, such as the industry contribution to economy-wide MFP growth and living standards, analysis of structural change'  | 'Ease of aggregation across industries, simple conceptual link of industry-level MFP and aggregate MFP growth. Data directly available from national accounts.'                                       | 'Not a good measure of technology shifts at the industry or firm level. When based on value added that has been double deflated with a fixed weight Laspeyres quantity index [sic], the measure suffers from the conceptual and empirical drawbacks of this concept.' |
| Capital productivity based on value added            | 'Changes in capital productivity indicate the extent to which output growth can be achieved with lower welfare costs in the form of foregone consumption.'   | 'Ease of readability.'  | Capital productivity is a partial 'productivity measure and reflects the joint influence of a host of factors. There is sometimes confusion between rates of return on capital and capital productivity.'   |
| KLEMS multifactor productivity based on gross output |  | 'Conceptually, KLEMS-MFP is the most appropriate tool to measure technical change by industry as the role of intermediate inputs in production is fully acknowledged.'                                | 'Significant data requirements, in particular timely availability of input-output tables that are consistent with national accounts.'   |

They [extended accounts] can also reclassify the final expenditure on regrettable necessities (eg defence) as intermediate consumption, i.e. as not contributing to welfare... In this way, one could try to construct a very rough and very imperfect indicator of changes in welfare. However, welfare has many dimensions, most of which are best not expressed in monetary terms. A better solution for measuring welfare is therefore to use, for each dimension, separate indicators and units of measurement. The indicators could be, for example, infant mortality, life expectancy, adult literacy and national income per capita. These indicators could be incorporated in a satellite account.' (paragraph 1.22)

# Glossary

---

**Deflation:** the technique used to change figures from nominal terms (current prices) into real terms (constant prices or volume terms), expressing the production (or consumption) of goods and services in the prices of a common year.

**Devolved Administrations:** Scottish Executive for Scotland, the Welsh Assembly Government for Wales and the Northern Ireland Civil Service.

**European System of Accounts (ESA 1995):** international framework for National Accounts measurement to which the UK National Accounts adhere, currently ESA 1995 (see also SNA).

**Final Consumption Expenditure:** total cost of inputs used in the production of the final output.

**General Expenditure Monitoring System (GEMS):** Treasury database which allows high level outturn and forecast figures for the current financial year. Data held here are monthly, quarterly and annual.

**General Government:** consists of the following group of resident institutional units:

- All units of central, state or local government;
- All social security funds at each level of government; and
- All non-market NPIs that are controlled and mainly financed by government units.

**Government On-Line Database (GOLD):** a web based Treasury data system which is a consolidation of audited annual outturn data.

**Great Britain:** Scotland, Wales and England.

**Gross Domestic Product (GDP):** headline measure of economic activity.

**Health Resource Groups:** standard groupings of clinically similar treatments, which use common levels of healthcare resource. They may be considered as 'units of currency' within the health service, allowing for costings across the services.

**Productivity:** commonly defined as a ratio of a volume measure of output to a volume measure of input.

**Public Expenditure Statistics:** Treasury database which holds detailed expenditure plans and outturn data. It covers three forward years, the current year and five prior years i.e nine years in total. Only annual data are held here.

**Public Service Agreement:** an agreement between a government department and the Treasury, as part of the Spending Review, including objectives and targets.

**Satellite Accounts:** accounts associated with the National Accounts, but which expand their analytic capacity for areas of social concern in a flexible manner by, for example, using alternative concepts, changing the production boundary (the definition of economic activity), linking physical data to data expressed in monetary terms, and so on.

# List of Abbreviations

---

|        |  |
|--------|--|
| ABS    | Australian Bureau of Statistics                        |
| AEG    | Advisory Expert Group                                  |
| AEI    | Average Earnings Index                                 |
| AFU    | Accountancy and Finance Unit                           |
| APS    | Average Points Score                                   |
| BEA    | Bureau of Economic Analysis                            |
| BLS    | Bureau of Labor Statistics                             |
| BMA    | British Medical Association                            |
| BUPA   | British United Provident Association                   |
| BVACoP | Best Value Accounting Code of Practice                 |
| CABG   | Coronary Artery Bypass Graft                           |
| CC     | Capital Consumption                                    |
| CFER   | Consolidated Fund Extra Receipts                       |
| CGA    | Central Government Accounts                            |
| CHAI   | Commission for Health Audit and Inspection             |
| CHP    | Community Health Partnerships                          |
| CIPFA  | Chartered Institute of Public Finance Accountants      |
| CJS    | Criminal Justice System                                |
| CoE    | Compensation of Employees                              |
| COFOG  | Classification of the Functions of Government          |
| COINS  | Combined On-line Information System                    |
| CPI    | Consumer Prices Index                                  |
| CPS    | Criminal Protection System                             |
| CSCI   | Commission for Social Care Inspection                  |
| CSFI   | Children Supported in Families or Living Independently |
| CSO    | Central Statistical Office                             |
| CSPI   | Corporate Services Price Index                         |
| CVM    | Chained volume measure                                 |
| DA     | Devolved Administration                                |
| DCA    | Department for Constitutional Affairs                  |
| DCMS   | Department for Culture, Media and Sport                |
| DDRB   | Doctors and Dentists Review Body                       |
| DEFRA  | Department for Environment, Food and Rural Affairs     |
| DfES   | Department for Education and Skills                    |
| DH     | Department of Health                                   |
| DHSSPS | Department of Health Social Services and Public Safety |
| DRG    | Diagnosis Related Group                                |
| DTI    | Department of Trade and Industry                       |
| DWP    | Department for Work and Pensions                       |
| EC     | Economic Category                                      |

|       |   |
|-------|---|
| EEA   | European Economic Area  |
| ESA   | European System of Accounts                                     |
| EU    | European Union  |
| FE    | Further Education   |
| FRS   | Fire and Rescue Service   |
| FTE   | Full Time Equivalent  |
| GAAP  | Generally Accepted Accounting Principles                        |
| GCSE  | General Certificate in Secondary Education                      |
| GDP   | Gross Domestic Product  |
| GEMS  | Government Expenditure Monitoring System                        |
| GFCF  | Gross Fixed Capital Formation                                   |
| GGDC  | Groningen Growth and Development Database                       |
| GGFC  | General Government Final Consumption                            |
| GHS   | General Household Survey  |
| GLA   | Greater London Authority  |
| GOLD  | Government Online Database                                      |
| GP    | General Practitioner  |
| GVA   | Gross Value Added   |
| HE    | Higher Education  |
| HES   | Hospital Episode Statistic                                      |
| HESA  | Higher Education Standards in Education                         |
| HMCI  | Her Majesty's Chief Inspector of Schools in England             |
| HMC&E | Her Majesty's Customs & Excise                                  |
| HRG   | Healthcare Resource Groups                                      |
| ICT   | Information and Communication Technology                        |
| IMF   | International Monetary Fund                                     |
| INSEE | L'Institut National de la Statistique et des Etudes Economiques |
| IR    | Inland Revenue  |
| IT    | Information Technology  |
| ITT   | Initial Teacher Training  |
| JAR   | Joint Area Reviews  |
| KS    | Key Stage   |
| LFS   | Labour Force Survey   |
| LGA   | Local Government Association                                    |
| MoD   | Ministry of Defence   |
| MOG   | Machinery of Government   |
| MPC   | Monetary Policy Committee                                       |
| NA    | National Accounts   |
| NAC   | National Accounts Codes   |
| NAG   | National Accounts Group   |
| NAO   | National Audit Office   |
| NCHOD | National Centre for Health Outcomes Development                 |
| NDPB  | Non-departmental Public Body                                    |
| NES   | New Earnings Survey   |
| NHS   | National Health Service   |
| NI    | National Insurance  |
| NICE  | National Institute for Clinical Excellence                      |
| NIESR | National Institute of Economic and Social Research              |



|        |  |
|--------|--|
| NISR   | National Standards for Incidental Reporting                  |
| NMDS   | National Minimum Data Set of Social Care                     |
| NOMS   | National Offender Management Service                         |
| NPISH  | Non Profit Institutions serving Households                   |
| NSIR   | National Standards for Incident Reporting                    |
| ODPM   | Office of the Deputy Prime Minister                          |
| OECD   | Organisation for Economic Co-operation and Development       |
| Ofsted | Office for Standards in Education                            |
| ONS    | Office for National Statistics                               |
| PAF    | Performance Assessment Framework                             |
| PCT    | Primary Care Trust   |
| PECT   | Public Expenditure Control Total                             |
| PEOWP  | Public Expenditure Outturn White Paper                       |
| PES    | Public Expenditure Statistics database                       |
| PESA   | Public Expenditure Statistical Analyses                      |
| PFI    | Private Finance Initiative                                   |
| PIM    | Perpetual Inventory Method                                   |
| PIRLS  | International Reading Literacy Study                         |
| PISA   | Programme for International Student Assessment               |
| POS    | Public Order and Safety                                      |
| PPAF   | Policing Performance Assessment Framework                    |
| PPI    | Producer Price Index   |
| PSA    | Public Service Agreement                                     |
| PSF    | Public Sector Finance  |
| PSR    | Pre-Sentence Report  |
| PSS    | Personal Social Services                                     |
| PSSRU  | Personal Social Services Research Unit                       |
| PTCA   | Percutaneous Transluminal Coronary Angioplasty               |
| PTI    | Practice Team Information database                           |
| QAA    | Quality Assurance Agency                                     |
| QALY   | Quality Adjusted Life Years                                  |
| QCA    | Qualification and Curriculum Authority                       |
| RO     | Revenue Outturn  |
| RPI    | Retail Prices Index  |
| RPIX   | Retail Prices Index excluding mortgage and interest payments |
| SAR    | Subjective Analysis Return                                   |
| SCOA   | Standard Chart of Accounts                                   |
| SDS    | Single Data System   |
| SE     | Scottish Executive   |
| SLA    | Service Level Agreement                                      |
| SNA    | System of National Accounts                                  |
| TES    | Total Expenditure on Services                                |
| TFE    | Total Final Expenditure                                      |
| TFP    | Total Factor Productivity                                    |
| TOPSS  | Training Organisation for the Personal Social Services       |
| TTA    | Teacher Training Agency                                      |
| VAT    | Value Added Tax  |
| WFJ    | Workforce Jobs   |
| WGA    | Whole of Government Accounts                                 |

## References

---

- Ahmad, N, 2003, 'Measuring investment in software', STI Working Paper 2003/6, OECD.
- Akritidis, L, 2002, 'Accuracy assessments of National Accounts statistics', *Economic Trends* no 589.
- Allsopp, C, 2004, 'Review of statistics for economic policymaking', HM Treasury.
- Ashaye, T, 2001, 'Recent developments in the measurement of general government output', *Economic Trends*, November.
- Atkinson, T, 2004, *Atkinson Review: Interim Report. Measurement of Government Output and Productivity for the National Accounts*, TSO, London, July.
- Bank of England, 2004a, *Inflation Report*, February.
- Bank of England, 2004b, *Inflation Report*, May.
- Baumol, WJ, 1967, 'Macroeconomics of unbalanced growth: the anatomy of urban crisis', *American Economic Review*.
- Baxter, M, 2000, 'Developments in the measurement of general government', *Economic Trends*, September.
- Beales, RE, 1967, *Estimates of Expenditure, Income and Product at Constant Prices*, IARIW conference, Maynooth.
- BMJ, 1994, *CHE Technical Paper Series 31: Developing New Approaches to Measuring NHS Outputs and Productivity*, Centre for Health Economics, University of York, July 2004, available at <http://www.york.ac.uk/inst/che/tp31.pdf>
- BUPA, 2004, 'Outcome monitoring to facilitate clinical governance: experience from a national programme in the independent sector', *BUPA Journal of Public Health*, vol 26, no 2.
- Bus, F, 2003, 'The national accounts as a tool for analysis and policy', Doctoral thesis, Universteit Twente.
- Caplan, D, 1998, 'Measuring the output of non-market services', *Economic Trends*, October.
- Central Statistical Office (CSO), 1956, *National Income Statistics: Sources and Methods*, HMSO, London.
- CSO, 1985, *United Kingdom National Accounts: Sources and Methods*, HMSO, London.
- CSCI, 'Social services performance assessment framework indicators, 2002-03', available at <http://www.publications.doh.gov.uk/paf/#pub>
- Cutler, DM, 2001, 'Pricing heart attack treatments', in DM Cutler, M McClellan, JP Newhouse and D Remler (eds), *Medical Care Output and Productivity*, Chicago, Chicago University Press.

- Darton, R and Miles, K, 1997, 'Cross-sectional survey of residential and nursing homes for elderly people: comparisons of residents in residential and nursing homes for elderly people, 1981-1996', PSSRU Discussion Paper 1374, December.
- Dawson D et al, 2004, 'CHE Technical paper series no 31: developing new approaches to measuring NHS outputs and productivity', Centre for Health Economics, University of York, July.
- Department for Education and Skills (DfES), 2004, *Departmental Report 2004*.
- DfES, 2004, *2004 PSA*.
- Drew, S and Morgan, D, 2003, 'Experimental monthly index of services: an update', *Economic Trends*, October.
- Drèze, JP and Stern, NH, 1987, 'The theory of cost-benefit analysis', in AJ Auerbach and S Feldstein (eds), *Handbook of Public Economics*, vol 2, North-Holland, Amsterdam.
- Eisner, R, 1988, 'Extended accounts for national income and product', *Journal of Economic Literature*, vol 26, pp 1611–1684.
- Eurostat, 1995, *European Systems of Accounts*.
- Eurostat, 1998, *Commission Decision 98/715 on measuring prices and volumes in ESA*.
- Eurostat, 2001, *Handbook of Price and Volume Measures of National Accounts*.
- Fisk, D and Forte, D, 1997, 'The Federal Productivity Measurement Program: final results', *Monthly Labor Review*, May, pp 19-28.
- Gershon, P, 1999, *Review of Civil Procurement in Central Government*.
- Gravelle, H, and Smith D, 'Discounting for health effects in cost-benefit and cost-effectiveness analysis', *Health Economics*, vol 10, pp 587-599.
- HM Government, 1998, UK National Accounts, *Blue Book 1998*.
- HM Government, 2003, UK National Accounts, *Blue Book 2003*.
- HM Government, 2004a, UK National Accounts, *Blue Book 2004*.
- HM Government, 2004b, *Spending Review July 2004*, White Paper.
- Hicks, JR, 1940, 'The valuation of social income', *Economica*, vol 7, pp 105-124.
- Hill, TP, 1977, 'On goods and services', *Review of Income and Wealth*.
- Holloway, S, Short, S and Tamplin, S, 2002, *Household Satellite Account (Experimental) Methodology*, ONS.
- House of Commons Treasury Sub-Committee, 2004, Minutes of Evidence, 8 September 2004, HC 1039-i, Session 2003-04.
- Hulten, 1984, 'Productivity change in state and local governments', *Review of Economics and Statistics*, vol 66, pp 256-266.

- Jorgenson, DW and Griliches, Z, 'The explanation of productivity change', *Review of Economic Studies*, no 34.
- Jorgenson, DW and Fraumeni, B, 1989, 'The output of the education sector', in Z Griliches (ed.), *Output Measurement in the Service Sector*, vol 56, Chicago, National Bureau of Economic Research, University of Chicago Press.
- Jorgenson, D, 1963, 'Capital theory and investment behaviour', *American Economic Review*, vol 53, pp 247-259.
- Jorgenson, D, 1965, *Productivity, Vols 1 and 2*, Boston, MIT Press.
- Lee, P, 2004, *Public Service Productivity: Health*, ONS, October.
- Levitt, MS and Joyce, MAS, 1987, *The Growth and Efficiency of Public Spending*, Cambridge, Cambridge University Press.
- Mai, N, 2004, *Measuring Health Output in the UK: A Diagnosis Based Approach*, ONS, September.
- Maurice, R (ed.), 1968, *National Income Statistics: Sources and Methods*, HMSO, London.
- Morgenstern, O, 1963, *On the Accuracy of Economic Observations*, 2nd edn, New Haven, Princeton University Press.
- National Research Council, 2003, *Designing Nonmarket Accounts for the United States: Interim Report*, ed KG Abraham and C Mackie for Panel to Study the Design of Nonmarket Accounts, Committee on National Statistics, Division of Behavioral and Social Sciences and Education, Washington DC, National Academies Press.
- Netten, A and Davies, B, 1990, 'The social production of welfare and consumption of social services', *Journal of Public Policy*.
- Neuberger, H and Caplan, D, 1998, 'Developments in the measurement of general government output', *Economic Trends*, February.
- OECD, 2000, *A System of Health Accounts*, Paris, OECD.
- OECD, 2001, *Measuring Productivity: OECD Manual Measurement of Aggregate and Industry-level Productivity Growth*, Paris, OECD.
- Office for National Statistics (ONS), 2004a, 'Revisions resulting from improving the methodology for measuring government healthcare output in the National Accounts', ONS, June, available at [http://www.statistics.gov.uk/articles/nojournal/Healthcare\\_Output.pdf](http://www.statistics.gov.uk/articles/nojournal/Healthcare_Output.pdf)
- ONS, 2004b, 'Measuring government health services output in the UK national accounts: the new methodology and further analysis', ONS, June, available at <http://www.statistics.gov.uk/cci/article.asp?id=988>
- ONS, 2004c, 'Public service productivity: health', ONS, October, available at <http://www.statistics.gov.uk/cci/article.asp?id=987>

- ONS, 2004d, 'Sources and methods for public service productivity: health', ONS, October, available at <http://www.statistics.gov.uk/cci/article.asp?id=989>
- Oulton, N, 'ICT and productivity growth in the United Kingdom', *Bank of England Working Paper* no 140.
- Pritchard, A, 2001, 'Measuring productivity in the provision of public services', *Economic Trends*, May.
- Pritchard, A, 2002, 'Measuring productivity in the provision of public services', *Economic Trends*, May.
- Pritchard, A, 2003, 'Understanding government output and productivity', *Economic Trends*, July.
- Personal Social Services Research Unit (PSSRU), 2003, *Unit Costs of Health and Social Care*.
- Quality Assurance Agency for Higher Education (QAA) located at <http://www.qaa.ac.uk>
- Samuelson, PA, 1950, 'Evaluation of real national income', *Oxford Economic Papers*, vol 2, pp 1-29.
- Samuelson, PA, 1954, 'The pure theory of public expenditure', *Review of Economics and Statistics*, vol 36, pp 387-389.
- Schreyer, P, 2003, *Capital Stocks, Capital Services and Multi-factor Productivity Measures*, Paris, OECD.
- Statistics Commission, 2004, *Statistics Commission Report: Revisions to Economic Statistics, no 17*, Statistics Commission, April.
- United Nations et al, 1993, *Systems of National Accounts*.
- Vinoles, A et al, 2000, *The Relationship between Resource Allocation and Pupil Attainment*, London School of Economics.

# Index

|   |  |
|---|--|
| <b>A</b>  |  |
| ABS <i>see</i> Australian Bureau of Statistics        |  |
| Accruals basis  | 202–3                                  |
| Action plans  | 2, 58                                  |
| Akritidis, L.   | 54                                     |
| Allsopp, C.   | 4                                      |
| Ashaye, T.  | 14                                     |
| Auditing  |  |
| need for closer integration with                      | 55                                     |
| sources of audited data                               | 58                                     |
| Australian Bureau of Statistics (ABS)                 |  |
| capital measures                                      | 29, 216                                |
| <b>B</b>  |  |
| Baumol, W.  | 13                                     |
| Baxter, M.  | 14                                     |
| Beales, R.  | 17                                     |
| <i>Blue Book see</i> National Accounts                |  |
| <b>C</b>  |  |
| Capital consumption                                   | 20                                     |
| data sources  | 68–9                                   |
| limitations in use of                                 | 68                                     |
| Capital measurement                                   | 29, 216                                |
| distinction between current and capital               |  |
| expenditure   | 216–17                                 |
| opportunity cost of capital                           | 49                                     |
| <i>see also</i> Capital services                      |  |
| Capital services                                      | 49, 50, 67–8, 215–16                   |
| Caplan, D.  | 7, 14                                  |
| Care pathways   | 110, 113–14                            |
| Central Statistical Office (CSO)                      | 17                                     |
| classification of margins of error                    | 54                                     |
| Chained volume measure (CVM)                          | 37                                     |
| Civil courts <i>see</i> Courts                        |  |
| CJS <i>see</i> Criminal justice system                |  |
| Classification of the Functions of Government (COFOG) | 3, 21, 60, 206                         |
| COINS <i>see</i> Combined On-line Information System  |  |
| Collective government final consumption               |  |
| expenditure   | 11, 54                                 |
| Collective services                                   | 11, 28, 43, 86, 87, 186, 190, 192, 205 |
| activity indicators                                   | 87                                     |
| direct output measures                                | 87, 101                                |
| Combined On-line Information System (COINS)           | 58, 59, 60, 66, 67, 80–3               |
| benefits of   | 66                                     |
| training requirements                                 | 67                                     |
| user support  | 67                                     |
| Constant prices                                       | 11                                     |
| limitations of  | 43                                     |
| Consultation sources                                  | 198–200                                |
| County courts <i>see</i> Courts                       |  |
| Courts  |  |
| output measurement                                    | 142, 143, 145, 148, 148–9, 150, 153    |
| triangulation work                                    | 157                                    |
| <i>see also</i> Public Order and Safety               |  |
| CPS <i>see</i> Crown Prosecution Service              |  |
| Crime-Sanction Matrix                                 | 152                                    |
| Criminal justice system (CJS)                         |  |
| Public Service Agreement                              | 142                                    |
| targets   | 142                                    |
| <i>see also</i> Public Order and Safety               |  |
| Crown Courts <i>see</i> Courts                        |  |
| Crown Prosecution Service (CPS)                       |  |
| output measurement                                    | 143, 145, 148, 150                     |
| <i>see also</i> Public Order and Safety               |  |
| CSO <i>see</i> Central Statistical Office             |  |
| Cutler, D.  | 114                                    |
| CVM   | 36                                     |
| <b>D</b>  |  |
| Darton, R.  | 167                                    |
| Data assembly process                                 | 21, 59, 60, 66–7                       |
| need for contextual information                       | 59                                     |
| validity of data                                      | 57                                     |
| <i>see also</i> Combined On-line Information System   |  |
| Data classification                                   | 60–4                                   |
| problems of   | 80–3                                   |
| Data discontinuities                                  | 96                                     |
| Data sources  | 96                                     |
| commitment of departments responsible for             |  |
| local government expenditure                          | 97                                     |
| variations in   | 21                                     |
| output volume measures                                | 21                                     |
| regulatory bodies                                     | 96                                     |
| <i>see also</i> Data assembly process                 |  |
| Davies, B.  | 173                                    |
| Deflators   | 22, 71                                 |
| criteria for  | 51, 71, 72                             |
| Department for Education and Skills (DfES)            |  |
| aims of   | 125                                    |
| Public Service Agreement                              | 125                                    |
| Department for Work and Pensions (DWP)                |  |
| employment-related activities                         | 164                                    |
| job-entry points system                               | 177                                    |
| programme of change                                   | 164                                    |
| Public Service Agreement                              | 164                                    |
| <i>see also</i> Social security                       |  |
| Department of Health (DH)                             | 103                                    |
| aims of   | 104                                    |

- see also* Health
- DfES *see* Department for Education and Skills
- Direct measures of output 14–16, 38, 43, 84, 182  
 criteria for improvements to 85, 86  
 extending coverage to new functions of  
 government 47–8, 101  
 geographical coverage 48  
 international usage 33  
*see also* Output measurement
- Dreze, J. 50
- DWP *see* Department for Work and Pensions
- ## E
- Economic categories 60
- Education  
 aims and targets 125–8  
 deflators 172–3  
 direct output measurement 43, 128  
 expenditure 125, 137, 139  
 components of 137  
 data sources 137  
 inconsistencies in data 137  
 goods and services deflating 138  
 health professionals' courses 129, 137  
 deflators 138  
 output measurement 129, 136  
 Initial Teacher Training (ITT) courses 135, 136,  
 137  
 deflators 139  
 labour, deflation of 138  
 private nursery places  
 deflators 139  
 output measurement 136  
 productivity  
 articles on 139–40  
 triangulation 139  
 satellite accounts 140  
 schools output measurement  
 adult/pupil ratios 135  
 earnings adjustments 133  
 pupil attainment 130–3  
 pupil attendance 129, 130  
 pupil numbers 43, 128  
 quality adjustments 135  
 school inspections 134–5  
 scope for productivity increase 44  
 teacher quality 134–5
- Eisner, R. 34
- ESA *see* European System of Accounts
- European Commission 30
- European System of Accounts (ESA) (1995) 28, 30  
 final consumption expenditure 209  
 non-market production 204–5  
 satellite accounts 218–20  
 timing of recording in National Accounts 203  
 volume of output 211–12
- Eurostat 27
- Handbook on Price and Volume Measures in*
- National Accounts* 28, 30  
 activities, outputs and outcomes 27, 31, 40  
 assumptions about productivity 31  
 capital services 215–16  
 classification of methods 30–1, 186, 215  
 direct output measures 31  
 healthcare 105–6  
 non-market output 212–15  
 quality change 215  
 scope of 31  
 project on accuracy assessment 54
- ## F
- Final consumption expenditure of government 11
- Fire  
 output measurement 143, 145, 154–5  
 triangulation work 157–8  
*see also* Public Order and Safety
- Fisk, D. 33
- Forté, D. 33
- ## G
- GAAP 58, 68
- GDP 2, 5
- General Government Final Consumption  
 Expenditure at Current Prices 19
- General practitioners (GPs) 108–9, 111, 119  
*see also* Health
- Generally accepted accounting practice (GAAP) 58,  
 68
- Goods and services  
 price indices 51
- Government policy 7
- GPs *see* General practitioners
- Gravelle 46
- Griliches, Z. 20
- Gross Domestic Product (GDP) 2, 5
- Gross Value Added 36
- ## H
- Health  
 aims 104–5  
 care pathways 110, 113–14  
 data sources example adjustments made to data  
 74  
 deflators 121–2  
 expenditure 103, 121  
 general practitioners  
 consultations 108–9, 111  
 contracts 119  
 Northern Ireland 104, 105  
 output measurement 85, 86, 106  
 coverage 112–13  
 improvements to methodology 107–8, 110  
 quality measurement 115–20  
 patient experience 120  
 primary care 110

|   |                         |   |                              |
|---|-------------------------|---|------------------------------|
| output measurement                                      | 110                     | measurement of                                    | 70–1                         |
| productivity measurement                                | 122, 123                | price indices                                     | 51                           |
| time lags   | 123                     | Legal Services Commission                         |                              |
| triangulation   | 122                     | output measurement                                | 143                          |
| satellite accounts                                      | 124                     | <i>see also</i> Public Order and Safety           |                              |
| Scottish Executive Health Department                    | 104, 105                | Levitt, M.  | 17                           |
| substitutable treatment                                 | 114                     | <b>M</b>  |                              |
| Welsh Assembly  | 104                     | Macroeconomic management                          | 4–6                          |
| Health professionals' courses                           | 129, 136, 137, 138      | Magistrates Courts <i>see</i> Courts              |                              |
| Hicks, J.   | 5                       | Mai, N.   | 114                          |
| Hill, T.  | 37, 42                  | Marginal value                                    | 39, 40                       |
| Human capital   | 50, 140                 | Margins of error                                  | 9, 54–5, 185, 187            |
| <b>I</b>  |                         | Maurice, R.                                       | 6, 8, 12, 17, 54             |
| ICT <i>see</i> Information and communication technology |                         | Miles, K.   | 167                          |
| Implementation of new measures                          |                         | <b>N</b>  |                              |
| ONS Revisions Policy                                    | 97                      | National Accounts                                 |                              |
| publication of methods to be adopted                    | 97                      | comparability of                                  | 8                            |
| quality assurance                                       | 96, 97                  | conventions                                       | 8, 182–3                     |
| Individual government final consumption                 |                         | functions of                                      | 4, 182–3                     |
| expenditure   | 11, 54                  | joint responsibility                              | 97                           |
| Individual services                                     | 11, 28, 86, 87, 205     | limitations of                                    | 8–9                          |
| Information and communication technology (ICT)          |                         | margins of error                                  | 9, 54–5, 185, 187            |
| capitalisation of software                              | 69–70                   | publication of                                    | 4                            |
| Initial Teacher Training (ITT) courses                  | 128, 135, 136, 137, 139 | National Health Service (NHS)                     | 103                          |
| Input measurement                                       | 28, 48, 49, 57          | aims of   | 104                          |
| change in number of employees                           | 37                      | NHS Trusts  | 103                          |
| coverage  | 49, 50                  | <i>see also</i> Health                            |                              |
| <i>see also</i> Inputs                                  |                         | National Offender Management System (NOMS)        | 148                          |
| Inputs  |                         | National Standards for Incident Reporting (NISIR) | 149                          |
| components of   | 12, 20                  | Netten, A.  | 174                          |
| data flows  | 59                      | Neuberger, H.                                     | 7, 14                        |
| communication   | 59                      | <i>New Earnings Survey</i>                        | 178                          |
| explanatory material                                    | 59                      | NHS <i>see</i> National Health Service            |                              |
| data sources  | 59                      | NISR  | 149                          |
| volume of   | 19                      | NOMS  | 148                          |
| <i>see also</i> Input measurement                       |                         | Non-market output                                 | 11, 36, 204–5<br>210, 212–15 |
| Institutional change in the public sector               | 18, 86, 185             | Non-sampling errors                               | 54                           |
| International co-operation                              | 100                     | <b>O</b>  |                              |
| International consultation                              | 198–200                 | OECD Productivity Manual                          | 28, 217                      |
| International guidelines                                | 27, 201–20              | inputs  | 30                           |
| constraints on ONS                                      | 27                      | objective of                                      | 29                           |
| sources of  | 28                      | scope of  | 29                           |
| ITT courses   | 128, 135, 136, 137, 139 | Office for Standards in Education (Ofsted)        | 134–5                        |
| <b>J</b>  |                         | Opportunity cost                                  | 5, 49                        |
| Joint products and joint producers                      | 90, 91                  | 'Option value'                                    | 39                           |
| Jorgenson, D.   | 20, 29                  | Output  |                              |
| Joyce, M.   | 17                      | volume of   | 19                           |
| <b>K</b>  |                         | <i>see also</i> Output measurement                |                              |
| Keegan, M.  | 58                      | (Output=input) convention                         | 12                           |
| King, M.  | 5                       | 'Output gap'                                      | 4                            |
| <b>L</b>  |                         |   |                              |
| Labour inputs   | 20, 50                  |   |                              |



|  |                                |   |   |
|--|--------------------------------|---|---|
| Output measurement                                     |                                | Productivity  | 13, 20  |
| attribution of timing of output                        | 93                             | assumptions about   | 12, 28, 31  |
| classification into individual and collective services | 86, 87                         | government productivity measurement programme   | 53  |
| cooperation, need for                                  | 186                            | reliability of figures  | 19, 186   |
| developments in  | 14–17, 185–6, 187, 189–90, 192 | triangulation   | 51–4  |
| difficulties of  | 12                             | <i>see also</i> OECD Productivity Manual  |   |
| (output=input) convention                              | 12                             | Productivity articles   | 53  |
| reviews of   | 98                             | PSAs <i>see</i> Public Service Agreements   |   |
| <i>see also</i> Direct measures of output              |                                | Public Order and Safety   |   |
| <b>P</b>   |                                | collective and individual services  | 146–7   |
| PCTs   | 103                            | deflators   | 155, 156, 157   |
| Performance measures                                   | 7, 8, 52, 53, 96, 183, 185     | capital consumption   | 156   |
| Periodicity problems                                   | 64, 65, 79, 80–3               | intermediate consumption  | 156   |
| Personal social services                               |                                | labour  | 156   |
| activities of  | 159                            | expenditure   | 155   |
| adult services   |                                | output measurement  | 142, 144  |
| care assessments                                       | 171                            | administration of justice approach  | 151–2   |
| measurement of   | 171–3                          | attributing final output  | 142   |
| aims and objectives                                    | 161–2                          | improvements to   | 147–50  |
| children's services                                    | 161, 181                       | productivity measurement triangulation  | 157–8   |
| identification of measurable outputs                   | 170                            | responsibility for  | 141, 142  |
| output measurement                                     | 174–6                          | subsections of  | 141   |
| deflators  | 178, 179                       | <i>see also</i> Courts; Criminal justice system; Crown Prosecution Service; Fire; Legal Services Commission; Police; Prisons; Probation |   |
| eligibility for  | 160, 161                       | Public Service Agreements (PSAs)  | 8   |
| extent of  | 160, 161                       | criminal justice system   | 142   |
| funding of   | 160                            | Department for Education and Skills   | 125   |
| inputs   | 178, 179                       | Department for Work and Pensions  | 164   |
| labour data  | 178                            | Department of Health  | 104   |
| output measurement                                     | 165, 166, 167, 167, 169, 170–1 | social care   | 161–2   |
| attributable incremental contributions                 | 162, 163                       | <b>Q</b>  |   |
| coverage   | 165, 167                       | Quality Adjusted Life Years (QALY)  | 46, 116   |
| quality  | 166                            | Quality considerations  | 20, 38–9, 42, 91–2, 183, 185, 186, 187, 191, 193, 194 |
| timeliness   | 167, 168                       | degree of attribution   | 42  |
| performance information                                | 181                            | differentiation of service  | 37, 42  |
| provision of   | 160, 161                       | indicators of success   | 42  |
| statutory inspection                                   | 160                            | international treatment   | 33  |
| <i>see also</i> Social protection                      |                                | <b>R</b>  |   |
| Police   |                                | Regional accounts   | 101–2   |
| data sources:  |                                | Regulatory bodies   |   |
| example data flow diagram                              | 74                             | data sources  | 96  |
| output measurement                                     | 144, 145, 148, 149, 150        | Resource requirements   | 22, 102, 186, 192                                     |
| <i>see also</i> Public Order and Safety                |                                | <b>S</b>  |   |
| Primary Care Trusts (PCTs)                             | 103                            | Sampling error  | 54  |
| Prisons  |                                | Samuelson, P.   | 4, 6  |
| output measurement                                     | 143, 148, 150                  | Satellite accounts  | 99–100, 124, 140, 218–20                              |
| Pritchard, A.  | 14                             | human capital formation   | 50  |
| Private nursery places                                 | 136, 139                       | Schools <i>see</i> Education  |   |
| Private sector   |                                | Schreyer, P.  | 29  |
| comparability with                                     | 36                             | Separate publication of output figures  | 98, 99  |
| complimentarity between public and private output      | 5–6, 45–46                     | Smith, D.   | 46  |
| Probation  |                                |   |   |
| output measurement                                     | 143, 145                       |   |   |
| <i>see also</i> Public Order and Safety                |                                |   |   |
| Production costs, variations in                        | 38                             |   |   |

|   |              |  |                  |
|---|--------------|--|------------------|
| SNA <i>see</i> System of National Accounts                |              | final consumption expenditure                  | 208–9            |
| Social Protection   |              | input measures                                 | 28               |
| elements of   | 159          | legal status                                   | 27               |
| expenditure, misclassification of                         | 179          | measuring volume of output                     | 211              |
| output measurement  | 169          | non-market production                          | 203, 210         |
| productivity measurement                                  | 180          | responsibility for                             | 27               |
| <i>see also</i> Personal social services; Social security |              | revision of                                    | 29               |
| Social security   |              | scope of                                       | 28               |
| benefits, examples of                                     | 163          | timing of recording in National Accounts       | 202–3            |
| deflators   | 180          |  |                  |
| expenditure   | 180          | <b>T</b>                                       |                  |
| functions of  | 163          | Technological change                           | 18, 185          |
| mix in composition of labour force                        | 180          | Terms of reference                             | 1–3, 184,        |
| output measurement  | 168–9, 176–7 | Time lags between inputs and outputs           | 13               |
| coverage  | 169, 176–7   | Timeliness                                     | 64, 65, 80–3, 93 |
| fraud and error   | 176          | Tobin, J.                                      | 7                |
| time lags between inputs and outputs                      | 181          | Triangulation, productivity                    | 51–4             |
| timeliness  | 169          | <b>U</b>                                       |                  |
| productivity  | 181          | United States Federal Productivity Measurement |                  |
| responsibility for  | 163, 164     | Program  | 33, 53, 54       |
| <i>see also</i> Department for Work and Pensions;         |              | <b>W</b>                                       |                  |
| Social Protection   |              | Weighting                                      | 88–90            |
| Social services <i>see</i> Personal social services       |              | Welfare, contribution of economic activity to  |                  |
| Solow, R.   | 18           | increasing welfare                             | 6–7, 185         |
| Stern, N.   | 50           | Whole of Government Accounts (WGA)             | 58, 68, 69       |
| System of National Accounts (SNA) (1993)                  | 28           | Wiener, N.                                     | 54               |
| assumed productivity growth                               | 28           | Women's Budget Group, contribution of unpaid   |                  |
| classification of functions of government                 | 206          | household activities                           | 173              |
| collective and individual services                        | 28, 205      |  |                  |
| current and capital expenditure                           | 216–17       |  |                  |
| direct measures   | 29           |  |                  |





















