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**MEASURING NON-MARKET OUTPUT IN THE
NATIONAL ACCOUNTS**

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MEASURING NON-MARKET OUTPUT IN THE NATIONAL ACCOUNTS

Introduction

1. The measurement of non-market output has been a challenge for national accounts ever since the system was introduced and applied in the 1940's and 1950's. There has been a remarkable spread of views on how to represent the activities of government in particular. One extreme advocates that only marketed output contributes to economic output, and so is a component of GDP. In this view, none of non-marketed output would contribute to value added. The other end of the spectrum of views is that non-market activity can be treated in much the same way as marketed output, the only challenge is how best to measure it. Recent studies and manuals have tended towards the latter view – the Eurostat handbook on price and volume measures in national accounts goes further along the route of measuring real change in government output through the approaches normally associated with marketed output. Most recently, the Atkinson Review has explored further the extent to which activities and outcomes can help in the measurement of real output of government.

2. This paper is an attempt to return to basic principles underlying the current national accounts presentation of government activities. It proposes that measuring government output through summing inputs is not simply a convenient measuring device, but one which reflects a conceptual framework consistent with the rest of the national accounts framework. The paper argues that this framework is a superior one to the alternative of pursuing the attractive but ultimately illusionary vision of treating non-market output as an inferior form of market output, to which the concepts and measuring devices of market output can be applied, albeit with more difficulty.

The role of government in society

3. Government can be viewed either as a consumer or a producer in the economy. Viewing it as a consumer enables measurement according to market transaction principles, whereby government consumes goods and services on behalf of society. This is the same role as a housewife performs on behalf of her household, engaging in consumption on their behalf. In the case of the housewife, the national accounts convention is that although there is economic production within the household, it is not possible to place a value on that production. There are no prices, and so no values can be imputed for the products. The lack of similarity with market equivalents prevents confident estimates by comparison.

4. The same convention is adopted for government activity. The government acts on behalf of society at large in the same way that the housewife acts on behalf of other members of the household. Economic production takes place within government, but as the production is not marketed, no price for the products is observable, and so no value can be placed on the production. This is not to say that government activity is without value to society in the normal English usage of the word “value”. But in the terms of value as used in the system of national accounts, government products cannot

be assigned a value. One way of presenting the activities of government in the national accounting supply use framework is shown in Table 1 below.

Table 1

	Private business	Government		Households	Government	Total supply
Private business	20	-		20	10	50
Government	-	-		-	40	40
Wages & salaries	30	40	GDP income = 70			
Total demands	50	40		20	50	GDP exp = 70

5. However in government, there is an important distinction from the case of households. Government employees are recompensed for their labour, whereas the housewife is not. Money the housewife receives from other members of the household or from society in the form of benefits, are treated as transfers, and so not part of the national income. Similarly, the only capital asset recognised to give a return which contributes to the national income is the owner occupied dwelling service – the rental a house owner is imputed to pay to themselves for the privilege of living in their own home. For government, all capital assets recognised in the private sector are considered to provide a return when employed by government, and this added to the labour income of employees gives a measure of value added for government which is taken to be part of the national income. All other purchases are taken to be a form of final consumption expenditure, entered into on behalf of society. The only output that government can be said to produce are the services from labour and capital employed. As it is impossible to allocate the output of these services to any particular consumer in the economy, the consumer of these services is by convention taken to be government itself.

An alternative presentation

6. In many countries, services such as health and education are provided to households by a mixture of public and private means. In order to facilitate inter-country comparisons of the delivery of such services to households, the national accounts system presents them alongside the market equivalents of industry inputs in the body of the supply use tables, and shows the total of these various inputs to government as being consumed by government itself. A further step was to recognise “actual” household final consumption as the sum of products delivered through the market and these government social benefits. These arrangements of the national accounts facilitate country comparisons of total spending on health and education. They also enable comparisons to be made between the private sector provision of health and the public equivalent in a single economy. So the national accounts present government activities characterised by those which can be identified with an individual recipient as *individual*, and those where the service is a true public service where all citizens benefit equally in a non-rival form, as *collective*. This is equivalent to characterising government activity as those which can have a market equivalent –

individual, and those where no market equivalent is feasible because of the non-rival nature of the service provided – *collective*.

7. This demand on national accounts was met by recasting the accounts to show government individual services alongside the market services in the body of the supply use framework, as shown in Table 2. Actual household final consumption can be easily derived by adding the government provided individual services to the market version of household final consumption. The individual and collective aspects of government are not shown in the table below due to lack of space.

Table 2

	Private business	Government		Households	Government	Total supply
Private business	20	10		20	-	50
Government	-	-		-	50	50
Wages & salaries	30	40	GDP income = 70			
Total uses	50	50		20	50	GDP exp = 70

8. The key message of this paper is that the presentation of individual services of government in a way which facilitates studies of these services whether provided by the market or non-market sector, does not imply that non-market services are conceptually equivalent to market services. There is scarcely a more fundamental distinction in the system of national accounts than that between market and non-market behaviour. A non-marketed service is one where no price is charged on delivery, and so no value can be observed. And from this stems important distinctions in the way that real change should be measured for non-marketed services, as distinct from those supplied to a market.

9. For example, the government health service provision is fundamentally different from the production and consumption of health care in the private sector. The key difference lies in who makes the choices which determine the nature of the service. In the private sector, the market is in place and the consumer preferences determine the value and nature of the product. For example, we can expect wealthy old customers to determine the prices and choice made to supply an appropriate product to the market. We may expect plastic hips, pain killers, and quality of life extending treatments to be popular and priced accordingly, reflecting the consumer marginal utilities.

10. Society as a whole can be expected to have a quite different view of the public provision of health care. Here there is a positive demand for illness prevention through healthy living styles in the young and less well off. And so a sizable part of government spending will be devoted to such campaigns with a payback in terms of increase in contributions to the national income. This will be reflected in the choices made on health spending in government, reflecting government policy, and so

reflected in the pattern of expenditure by government departments, and the allocation of labour and capital services within government. Spending pattern of government health departments need not mirror the consumer preferences of customers of the private sector health provision.

11. The inability to measure an output for government, even for individual services, and the interaction with the market economy only through the choice of purchases of goods and services, labour and capital, has resulted in the existing conventions in the system of national accounts. Where it is useful to compare the activities of government with the private sector, and compare the total provision of such services in the economy with other economies with a different mix of public and private provision, an output can be defined conventionally for the government non-market sector as having a value equal to the sum of costs. But it cannot be stressed too strongly that presenting the accounts in this manner, and imputing a value for government “output” as the sum of the values of costs, does not imply that government acts to combine inputs of labour, capital, goods and services to produce economic output in the same way that market entities do. An output of government cannot be observed because of the lack of prices for the final products, and the lack of an equivalent activity in the market from which imputations can be made.

12. The above argument is relevant when we wish to consider how best to measure the performance of government. Can we use national accounts measures suitable for marketed output to assess government performance over time and space? If we wish to do this, then we need to measure real changes in government output as well as nominal levels. But the lack of prices for the product of government prevents the national accounts framework being useful – the lack of prices means that value for the output either in nominal or real terms cannot be observed directly. This is not to deny that measuring government performance is desirable or susceptible to measurement – simply to observe that the conventions of national accounts as they currently stand are not appropriate.

13. Can we apply the current national accounts conventions to derive a real measure of output to be set alongside the market sector equivalents, and to enable productivity measures to be derived by comparing the real output with a real measure of inputs? It is of course possible to estimate the inputs to the government activity by the normal methods of volume measurement in the national accounts. Individual quantities are weighted together according to relative utilities as observed in the market through prices paid. The same principle applies to individual goods and services, which can be viewed as a bundle of characteristics over which the consumer exhibits preferences through the prices paid for the product bundle. It is difficult to estimate price relativities of product characteristics in practice – how much do consumers prefer juicy apples to good looking apples – but methods such as hedonic pricing of characteristics through regressing prices observed in the market with these characteristics over many similar products, enable price relatives of the characteristics to be estimated. Nevertheless, volume change in a product can be estimated using such techniques and this volume change will incorporate all changes in quality with sufficient differentiation of characteristics and the appropriate price weights. There is no quality change that cannot be expressed as a change in composition of the bundle of desirable characteristics which are reflected in the aggregate price.

Activity indicators

14. Given the lack of products, the Eurostat handbook follows the 1993 SNA in suggesting the use of activity indicators as a proxy for output, weighted together using the cost weights associated with each activity. The underlying assumption is that the labour services of government employees in real terms can be estimated through detailed measures of activity, and the appropriate weight of each activity should reflect their importance in the government provision of public services. As there are no values for these services, national accountants have adopted cost weights, reflecting the choices that government makes in undertaking each activity as reflecting the choice of society. It is the contention of this paper that activity indicators are not representative of the provision of public services by government measured in real terms. All such indicators are liable to arbitrary changes in government policies, and can only ever reflect part of the provision of services. It is instructive here to consider a simple example.

15. Consider an island with its own government, and one policeman, one teacher and one doctor. These correspond to the most quoted cases of individual services (teacher – education and doctor – health) and collective services (policeman – security). Consider the teacher has very few pupils in any one year, and for two years has none. However, the island local government decides that for the sake of continuity, to keep the teacher employed. In fact, the island sponsors her on a training course in the first year so that at the end of that year she has a higher qualification that earns her a raise in salary of 10%. The table below shows the running of the school over a six year period, showing the number of pupils and educational qualifications gained by the pupils.

Table 3

Year	Qualification	No of pupils	Teacher's salary	External exam passes
2000	Standard	3	50,000	1
2001	Standard	3	50,000	3
2002	Standard	0	50,000	0
2003	Higher	0	55,000	0
2004	Higher	1	55,000	0
2005	higher	2	55,000	0

16. It can be seen from the table that no teaching of pupils occurred in the years 2003 or 2004. If an activity indicator reflected the number of pupils receiving the teacher's service, it would show no real output in those two years. If the external exam passes were used as a quality adjustment to this simple indicator, then there would be less real output in 2005 than in 2001. If we adopt the input based conventions, then the nominal output of the island educational system rises from 50,000 in the year 2000, to 55,000 in the year 2005. And in real terms, taking the increase in salary due to the gaining of an additional qualification as reflecting a real increase in teaching quantity, there would be an increase of 5,000 in real terms due to this increase over the period. So we must now ask ourselves, what is the most useful presentation of the real change in provision of educational service over this period?

17. The “inputs” approach shows a steady provision of real educational service over the period, with a step increase at the end of 2002 when the teacher becomes better qualified. The activity indicator reflecting number of pupils taught shows a dramatic drop to zero at the end of 2001, only rising again at the end of 2004 as new pupils join the school. Quality adjusting would show the same picture as the activity one, but with greater output in 2000 and 2001 reflecting the external exam passes. So now comes the key question: what is the real output of the island educational system in the years 2002 and 2003? Is it nothing compared to 2000? Or is it the same as 2000 in 2002, and rising 10% in 2003 reflecting the higher qualification?

18. This paper proposes that in terms of the requirements of the island society, the economic reality is that the capacity of the island educational system has risen compared to the base year. And that society’s needs are met in real terms according to this model, even though no pupils are taught. This suggests that the educational system is there to provide a collective service for the island society, independent of the teaching delivered to pupils. This is of course not a comfortable view to take of the activity, but it is the only one consistent with the conventions and standards of the national accounts system.

19. It is the capacity of the system to deliver, which is the most economically meaningful concept of what the island society wants from the educational system, and this is independent from the teaching of the pupils, which is what the capacity allows to occur. This is exactly the same as for collective services such as the policewoman. A promotion to sergeant would show up as a real increase in the capacity of the security service, and so a real increase in the government output. But of course this would be largely independent of the number of crimes and patrols undertaken in that year. All of this is consistent with the approach to measuring collective services such as defence in the new revision to the SNA – it is the capacity of the military system to react to aggression which should be measured, and so the collective service of defence, and not the actual acts of engagement which it is designed to be capable of waging.

20. From the above then, it follows that there should only be one approach to measuring real government output, and that is to measure the real change in the labour and capital services provided as part of the capability of government to defend, educate, heal etc. This can be achieved by considering changes in the numbers and qualifications of government employees. All other measures which reflect the use of the capacity are highly important statistics reflecting the performance of each arm of government, but they have no direct relationship with the measurement of real output in the national accounts. Their use is not appropriate for national accounts and will give misleading measures of national income in real terms. Of course as a member of the island society I am very interested in the performance of our teacher – is she getting good results? Is she “better” than the one on the next island? How can we judge her effectiveness in educating our children? All of these questions are legitimate for the statistician to answer – but not through the national accounts framework. It may be that some of the national accounts concepts on the real measurement of market activities can provide a basis on which to judge the performance of the teacher, but this must be addressed through satellite accounts where the strict

conventions of the national accounts can be relaxed to enable a more research style agenda to be pursued.

Recent developments - Handbook on Price and Volume Measures in National Accounts

21. This handbook was published in 1998 as a result of collaboration of Eurostat with Member States to record methods for producing estimates of real growth for national accounts statistics. These methods would be adopted across Europe so that a harmonised set of growth statistics would be available to economic and fiscal policy makers. There is much in the handbook which is providing a useful standard for member states to aspire to in their production methods, and it has been a significant driver to standard methods and comparable statistics in Europe.

22. However, the section on non-market output has proven not to be so widely applied or accepted. This part of the paper examines how the manual guidance is misleading, and suggests that parts should be re-visited to ensure all the proposals are firmly based on the conventions and assumptions of the SNA 1993 and its European sister manual European System of Accounts 1995. The starting point in the manual for consideration of how best to measure real growth in government activity is to assume that there is a useful concept labelled government output which is similar to marketed output. Non-market output is presented as a form of marketed output, with the inconvenience that no prices and so values can be observed directly for non-market output. The impression is given that if only values and prices can be imputed some how, we can treat non-market output the same as marketed output, and carry out the same analyses of productivity by comparing real output change to real input change. The fundamental distinction between market and non-market output, in terms of who makes the choices and decisions with regard to interaction with the rest of the economy is not given sufficient prominence, and the result is misleading guidance which will result in false measures of the non-market economy.

23. Section 3.1.2 of the manual characterises the approach adopted in the manual, and so is reproduced here to illuminate the issue.

“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 cannot be collective)”*

24. These definitions encapsulate the false basis of the guidance on measuring non-market output, and sow the seeds of a move away from the fundamentals of the underlying standards. The national accounts show government principally as a final consumer, with only labour and capital services accepted as producing something which can be labelled production, and contributing to national income. Intermediate purchases are shown as final consumption – either directly as in Table 1 or indirectly in the current standards as set out in table 2. The situation is clearer in table 1, but

even in table 2 where the consumption of government of goods and services is set out as part of the intermediate inputs in the supply use framework of the accounts, the convention of treating government as final consumer is preserved by showing government as the sole final consumer of both material inputs as well as value added factors.

25. But the use of the phrase for individual goods and services “*consumed by individual households*” reveals the false assumption that an economic exchange has taken place between households and the government – the assumption is that government produces something which is acquired by households through an exchange, and prices and values can be imputed to describe that exchange. But the system of national accounts does not consider the delivery to households of services by government as an economic exchange, but rather a transfer of social benefits.

26. The false premise becomes more apparent in paragraph 3.1.2.1, and most of this section is inconsistent with the underlying standards. It assumes that there is an observable government output, and so ways of measuring real change in this output. Again, it is helpful to quote the text:

“Current practice for constant prices is mostly based on deflating inputs. This implies assuming that the change in the 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 outputs. Using this assumption makes it impossible to analyse changes in productivity, and will wrongly estimate the true output change if this is different from the change in inputs.”

This paragraph assumes there is an observable output of government different from the sum of the inputs, and so assumes that there can be a meaningful measure of government productivity. But given the lack of price and so market value, there can be no observable measure of government output and so it follows that there can be no useful measure of government productivity. There is no “true output change” as there is no observable output. The inability to measure productivity changes in non-market output as conventionally measured by the national accounts has not been readily accepted by policy makers and the desire to compile such estimates to satisfy political needs has led to stretching the national accounts concepts beyond their design. *Quote.*

27. It is tempting to continue quoting extracts from the manual, and attempting to demonstrate how they lead to false proposals to record government output in nominal and real terms, but of course the reason reduces every time to the assumption that government output is a concept which has an economic meaning in the national accounts framework, and can be observed directly in a manner analogous to how market production is observed.

28. It is suggested that activities can be taken as a proxy for output, but the same challenge remains unanswered for them as for output – what is the value to be applied to these activities, and how shall the relative importance be assessed which is different from the cost weighting of inputs approach?

29. For collective services it is stated that “*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 service”

30. The authors of this paper would simply say that if “*very difficult*” is replaced by “*impossible*” then the quote is consistent with the underlying national accounts standards. Given this statement on the output of collective services in the manual, it is extremely difficult to understand how the measurement of output indicators can be categorised as an A method for collective services, and all other approaches relegated to B and C methods. This is an inconsistent approach even within the flawed framework of the manual guidance on measuring non-market output. This alone requires the manual guidance to be revisited as a matter of urgency, given the existence of a regulation to enforce this guidance.

31. When we get to outcomes, none of the underlying standards suggest that these can be used as a proxy for output, for reasons that are well expressed elsewhere. Nevertheless, it is surprising that the manual guidance is as shown below

“Outcome

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 are generally not representative of the output. In some case, however, outcome indicators can be used as indicators for the quality of the output (see section 3.1.2.2)”

32. This statement is not simply misleading, it is downright dangerous. It is disingenuous to put it mildly to say that outcome indicators “*might be influenced by factors unrelated to the activity*”. A more straightforward way of putting it would be to say “*outcome indicators are invariably influenced by factors unrelated to the activity in an unquantifiable way*”.

33. The statement “outcome indicators can be used as indicators for the quality of output” does not follow from the previous argument and is misleading.

Quality change

34. Paragraph 3.1.2.2 describes how quality change can be taken into account in measuring non-marketed output in real terms. Three approaches to adjust for quality are described. All are misleading, as all assume that output can be observed and measured for government.

Direct measurement of the quality of the output

35. For marketed output, products should be differentiated into characteristics which affect consumer preferences reflected in the relative prices of these characteristics. These relative prices may not be observed directly, and hedonic pricing techniques are necessary to establish the relative price of each characteristic by running regressions over similar products with different combinations of characteristics. This is the only way that quality change is measured in the national accounts – combining together quantity changes of characteristics which can be weighted by consumer utility

measures reflected in observable relative prices. This of course is not easy in practice, but the theory is well established and accepted. Each of the three approaches for measuring quality change in the Eurostat Handbook will be assessed according to this theoretical model.

A. Direct measurement

36. This suggests an output with only one main characteristic so that all others can be discounted. An example from the market would be petrol – the dominant characteristic is volume by litres or gallons – a change in quantity could be directly observed as an increase in number of litres or gallons delivered. But this is quite different from the example given in the Handbook – here a survey of recipients is suggested as giving an indicator of quality. But as there is no observable product of government, such surveys would be valueless as they could not contain useful measures – people might feel that the health service was “better”, but they cannot give a useful estimate such as “twice as good” as there is no shared observable unit of output on which to base the observation. The handbook itself gives a more realistic description of the difficulties than any useful guidance on how such surveys could be conducted.

B. Measuring the quality of inputs

37. This is the method consistent with the underlying national accounts assumptions about non-market activity. Both the purchases of goods and services, and payments for labour services, are observable in the market place and so both are subject to the same kind of quality adjustments as are applied elsewhere in measuring the economy. Quality adjusting capital services is harder, but conceptually just as acceptable. The Handbook gives the example of quality adjusting the labour compensation by allowing for “quality changes in the work force”. This could be achieved by regressing labour wage rates against the characteristics of labour which have an observable effect on the rates – qualifications, training, experience are three obvious ones. This is wholly in line with the established theory. The mistake is made in thinking that such adjustments are second best because they cannot be gauged against a true measure of output.

C. Using outcomes

38. This paragraph is simply wrong. Just one sentence will illustrate the false reasoning “The quality of the output lies in its results i.e. the outcome. The most appropriate way of adjusting for quality therefore is to investigate changes in outcome indicators.” The remainder of the paragraph gives no basis on how this can be done, apart from simplistic ones such as “If the level of crime decreases, this could be due (probably in part) to improved effectiveness of the police.”

Conclusions

39. It is the contention of this paper that there has been an increasing tendency in international references on national accounts to treat the activities of government as production, leading to an observable and measurable product. This has been driven largely by the desire to enable comparisons of countries with different mixes of public and private provision of services such as education and health, by presenting the national accounts in a way which facilitated the combination of the market and non-market activities. The other major driver was to assess government performance by measuring the productivity of the activities in a way which allowed comparison with market activities - this required an observable and measurable output of government distinct from the inputs used. These drivers have introduced a creeping tendency to characterise government activity and the associated delivery of the social benefits to the public as very similar to market transactions – production of an output which is then exchanged with a consumer. But this is fundamentally flawed – there is no economic exchange, and no observable associated individual output or consumption.

40. In presenting the accounts to allow comparison and aggregation of public and private delivery of what on the face of it seemed the same product (e.g. education); the concept of actual final consumption was introduced in the 1993 SNA. This can be seen as the thin end of the wedge – the use of the word consumption to include non-market delivery of a service with no price, is misleading. The consumption only occurs as government buys goods and services, and its own labour and capital services. It does this on behalf of society and then delivers the benefits to the public at large, just as a housewife buys on behalf of all members of the household and delivers those purchases and her labour to the other members in a non-market, non-exchange manner. There is no more reason to characterise government as having output which is consumed, than housewives having output which other members of the household consume.

41. Given the confused situation of national accounts reference manuals, it is little wonder that reviews such as the Atkinson Review (2005) end up making recommendations for national accounts which are against the fundamental concepts of the national accounts. National accountants should recognise the misleading signals that have been given and seek to restore the clarity of difference in treatment in the national accounts between market and non-market which was established through the work of Hicks, Kuznets, Little, Samuelson, Hill and others.