

## 12TH OECD-NBS WORKSHOP ON NATIONAL ACCOUNTS

### MEASUREMENT OF HEALTH SERVICES

Comments by Luca Lorenzoni, Health Division, OECD

1. In the paragraph “Existing issues and improvement considerations” of the paper on China’s measure in real term for education and health, it is stated that “it is quite difficult to find a reasonable volume indicator to measure the real growth on non-market health services” (page 9). This assertion is the starting point of my discussion, which will focus on a proposal of a methodology to derive volume measures of output. Moreover, my comments will address the issues that relate to the comparison of the volume of health services across countries.

#### *Output: general measurement issues*

2. The value of output of institutional units in the health care industry is measured by the observed money value of output in the case of market producers and by the sum of costs of production<sup>1</sup> in the case of non-market producers. This follows national accounts conventions (System of National Accounts 2008, 6.99 and 6.130).

3. The efforts to derive volume measures of output that are separate from volume measures of inputs stems from the fact that the equality of inputs and outputs in value does not imply equality of inputs and outputs in volume or quantity. The main difference between cost-based prices of outputs and prices of inputs is that the former corresponds to cost per unit of output whereas the latter corresponds to the cost per unit of input.

4. When it comes to measuring volume (indices), there are two basic options: construction of a direct volume index; deflation of values by a price index.

5. In a market-based health system where there is information on market prices or where prices are significant, expenditure on the treatment of a disease can be deflated by a disease-specific price index to arrive at a volume output measure of the disease. For example, Berndt et al (2001) have estimated a price index for heart attacks and this index can be used to deflate disease-specific expenditures. This is similar to what happens in other market sectors in the economy where volume output measurement is accomplished by dividing data on revenues or sales by a price index. Under ideal conditions, the prices for privately

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<sup>1</sup> The value of the non-market output provided without charges to households is estimated as the sum of intermediate consumption, compensation of employees, consumption of fixed capital, and other taxes (less subsidies) on production.

provided health goods and services would reflect the marginal costs of production and the marginal utility to consumers.

6. In some instances, it may also be possible to draw on market price information for purposes of deflating values of non-market production. A potential candidate is the medical services part of the Consumer Price Index. However, care has to be exerted to make sure that the CPI is representative for the deflation of the non-market production. In particular,

- the services supplied by the market provider have to be sufficiently similar to those supplied by the non-market provider – this is true for each type of service and for the mix between different services;
- the scope of the CPI has to match the scope of non-market production. This may not be the case when the CPI is designed to reflect prices for out-of-pocket expenditures and when consumers only pay part of the full price for the medical good or service. In this case, the CPI is not an appropriate tool for deflation of non-market production which relies on a concept of measuring production at its full cost.

7. In the debate, deflation procedures are therefore often exclusively associated with market producers. This reflects the idea that constructing a price index requires the presence of market prices and the latter are directly associated with market production. While this argument is correct, things are less clear-cut if one allows for a more comprehensive meaning of ‘deflation’. In particular, ‘deflation’ can be understood as applying a true market price index but it can also be understood as applying a unit cost or quasi price index (Schreyer 2008).

8. Unit costs are the costs per unit of service. Note that despite the fact that ‘costs’ enter the picture, unit costs are defined via outputs (treatments) and not inputs. A unit cost index is therefore a weighted average of unit cost indices of particular diseases, where the cost share of each type of treatment constitutes the weight. Such a unit cost index mimics a price index and can be used for deflation when production is on a non-market basis.

9. Alternatively, direct volume indices can be constructed. These are based on the calculation of a volume indicator of output using adequately weighted measures of output of the various categories of non-market goods and services produced (SNA 2008, 15.113). This method is based on quantity indicators, adequately quality-adjusted, weighted together using average cost weights (SNA 2008, 15.117).

10. Following the SNA advice, we can define Laspeyres ( $Q_L$ ), Paasche ( $Q_P$ ) and Fisher ( $Q_F$ ) output quantity index in the simplified case of two procedures ( $y = 1, 2$ ) performed in period  $t$  ( $t = 0, 1$ ) by a particular establishment as follows<sup>2</sup>:

$$Q_L = \frac{(p_1^0 y_1^1 + p_2^0 y_2^1)}{(p_1^0 y_1^0 + p_2^0 y_2^0)}$$

$$Q_P = \frac{(p_1^1 y_1^1 + p_2^1 y_2^1)}{(p_1^1 y_1^0 + p_2^1 y_2^0)}$$

$$Q_F = [Q_L Q_P]^{1/2}$$

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<sup>2</sup> This paragraphs draws on the paper from Diewert (2008). In particular, the example reported here assumes constant returns to scale and fixed coefficients production function

The unit cost of production for procedure  $i$  in period  $t$  can be defined as:

$$p_i^t = w_i^t a_i^t$$

where  $w_i$  represent the input prices and  $a_i$  the input-output coefficients for technology.

11. Cost weighted Laspeyres type output quantity indexes are used widely in the UK in recent years when constructing measures of output quantity growth (Mai 2004).

### ***The definition of products***

12. How do we define products? The target definition of health care output is the number of complete treatments with specified bundles of characteristics so as to capture quality change and new products. A complete treatment refers to the pathway that an individual takes through heterogeneous institutions in the health industry in order to receive full and final treatment for a disease or condition. This definition of the ideal measure is similar to that used in the Eurostat Handbook (2001), Berndt et al (2001) and Aizcorbe et al (2008).

13. We can qualify this ideal definition in several respects, mainly imposed by data constraints. A first limitation arises with regards to measuring complete treatments. In concept, 'complete' is understood as a complete treatment pathway across the health care system. An example of a complete treatment pathway is a hip replacement operation. In this case, the pathway approach would imply aggregating all services or procedures associated with the intervention for the condition whether it is received from primary care services such as a general practitioner, specialists, at hospitals, or at a rehabilitation service. Thus, using the pathway complete would entail collecting data on outputs from a number of health care providers and aggregating them in a meaningful way. Assembling the data required for aggregating health volume output by disease approach is very challenging. This is particularly so in the absence of market prices.

14. There are additional reasons why the principle of complete treatment is difficult to implement in the national accounts:

- in the SNA, total output of an industry is based on summing up outputs of various service providers (establishments), and therefore the principle of a complete treatment is directly applicable only if the service provider is the same during the whole treatment. Even if it were possible to observe complete treatments if there are several service providers involved (e.g. hospitals and outpatient services), there would be no simple way to allocate the overall service to the different participating units and yet this is a requirement for national accounts purposes;
- most data retrieval systems do not have the capacity to link the treatment of an individual across institutions to enable measurement of the complete treatment. Data on both expenditures (value of inputs) and services received would be required. Thus a health care pathway approach has demanding data requirements as patient records have to be linked across activities and institutions. Even within institutional settings, data may not be appropriately linked;
- the beginning and end point of a treatment pathway is observable in the case of acute health conditions but unclear for chronic health problems or for medical conditions that give rise to long-term care and services provided in nursing homes. Many of the diseases associated with ageing and most psychiatric conditions are chronic, long-term conditions, and the patient may be treated for more than one illness or problem within a period. Thus the boundaries of the complete treatment would be unclear.

15. Given the difficulty with compiling complete treatments, estimates of health care output usually occurs at the institutional level. Thus a narrower view of a treatment is that defined by the type of health service. This measure captures the full treatment only within an institution and generally by function or type of

service. As an example, Dawson et al. (2005) compile an output index with 1700 categories of UK National Health Service activity including primary care. This aligns with standard practice in national accounting.

16. Thus, rather than reasoning in terms of complete pathways of treatment across the health system, the output measures proposed are best thought of episodes of treatment of particular diseases as provided by a given institutional unit. Furthermore, this measurement objective will mainly be applicable for curative care whereas other measures will have to be targeted for long-term care and other specialised services where it is difficult to establish when an episode of treatment is complete. For example, inpatients in nursing homes do not generally receive treatment for a specific illness or illnesses where there is an obvious start and end point. For such institutions, a strong case can be made that the output is defined by the activities of the institution of care, not a treatment. The same applies to chronic and progressive health conditions where the patient faces a slow, variable and unpredictable progression of a disease.

17. The present considerations suggest that it is best to treat the measurement of output of medical services by type of health care provider. The most important drawback of this approach is that it is not able to capture substitution effects between providers. For instance, if treatment of a disease moves from a hospital-based, inpatient treatment towards an outpatient treatment, this shift and the ensuing consequences for unit costs of output will not be captured.

### ***Measuring health services across countries***

18. This part of the paper deals with the comparison of the volume of health services across countries. It describes the approach proposed by a Task Force<sup>3</sup> set up by the OECD to calculate health-specific purchasing power parities (PPPs) with a special focus on PPPs for Hospital services.

19. PPPs are spatial deflators and currency converters that eliminate the effects of the differences in price levels between countries, thus allowing volume comparisons of GDP components and comparisons of price levels. The PPPs are calculated as quasi-weighted geometric averages of relative prices (parities) between pairs of countries for the basket of products which are representative in both countries. To produce multilateral comparisons, a multi-step procedure is used to adjust for differences in the sets of “representative products” across countries in order to make results obtained for pair countries “transitive”.

20. Why do we need health specific PPPs? Health expenditures are probably the most commonly used single indicator of comparative policy analysis in the health sector. They are also of importance in fiscal policy as health expenditure in most countries is publicly funded and represents a large and growing share of governments’ budgets. Those seeking to assess health expenditures most commonly benchmark their country’s expenditure against international rankings of health expenditure using measures such as health expenditure per capita or health expenditure as a percentage of GDP. While useful indicators for the amount of resources committed, nominal expenditure indicators are sometimes also used to draw direct conclusions about the amount of health care provided. Simple expenditure comparisons, however, cannot take into consideration price and wage differences between countries or differences in productivity between health sectors.

21. Health-specific PPPs are meant to address these issues. Health-specific PPPs are ratios of prices (or unit costs) for health services in different countries. Applied to money values of production or

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<sup>3</sup> The Health Division of the Directorate for Employment Labour and Social Affairs and the National Accounts Division of the Statistics Directorate have convened a Task Force with the objective of developing output-based PPPs for health goods and services. The 1<sup>st</sup> meeting of the TF was held on 8<sup>th</sup> June 2007, while the 2<sup>nd</sup> one was on 7<sup>th</sup> and 8<sup>th</sup> February 2008. The 3<sup>rd</sup> meeting will be held on 11<sup>th</sup>-12<sup>th</sup> December 2008 in Paris.

consumption expenditure on health for a given year, they yield a volume comparison of health services between the countries under consideration. In principle, PPPs are derived from price ratios of the same products in different countries. In practice, prices are not always meaningful in the health industry and other methods have to be employed to develop PPPs, the spatial deflators. In particular, in calculations of health PPPs, prices are often replaced by unit costs, i.e., by the total costs per unit of medical service provided.

22. As in volume comparisons over time within a country, volume comparisons at a point in time between countries can be achieved either by directly comparing volumes of health services or by deflating current values with health-specific PPPs. Both approaches require the same steps in measurement in the two dimensions. And they might also use the same sources of information. In this sense, comparisons within a country over time and comparisons between countries at a particular point in time are consistent.

23. The main differences between the two dimensions relate to the way products are identified and to the estimation of prices, or unit cost as would typically be the case for health products. Comparisons of volume over time for a given country require within-country consistency of the choice of health products. This means that the product taxonomy has to be stable but it can be country specific. Each country can use its own tools to identify and measure products. Because countries are different, the bundle of products whose quantities or prices are followed will be different for every country. For comparisons across countries, we need consistency in health product definitions among countries. This means that – in most cases – we cannot use the country-specific measurement tools as they are, but it is necessary to define a common sample of health products.

24. In time series comparisons, within country consistency of measurement is necessary. Thus country specific taxonomies, such as Diagnosis Related Groups (DRGs) systems<sup>4</sup>, may be used. In cross country comparisons, however the product descriptions must be as consistent as possible. As most DRG systems tend to have country specific modifications, using DRGs for comparison purposes is problematic.

25. In the PPP framework, the items for which costs are collected and reported should be comparable and representative within a basic heading (Eurostat-OECD, 2006). It is clear that such a list of items will not be exhaustive in that it covers all the activities within a type (as an example, inpatient hospital care). However, exhaustiveness is not necessarily required if the selected case types are considered representative for a broad set of activities.

26. To be able to compare unit costs between countries, there has also to be consistency of how costs are measured. In particular, the characteristics of cost allocation methods should be similar. As an example, there are significant variations between countries in which cost items are considered overheads and which cost items can be directly allocated to treatments. Differences in cost classification and scope should be controlled for to avoid biases in spatial comparisons.

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<sup>4</sup> Diagnosis Related Groups (DRGs) is a system for describing the patient case-mix in hospital care. It was developed by R. Fetter and colleagues at Yale University during the 1970s, initially as a tool for comparing hospital performance to improve cost control in hospitals and more recently has been used for reimbursement of costs. Conceptually, the DRG system assigns patients into groups based on their diagnosis, procedure codes, age, and the presence of complications and co-morbidities. A key characteristic of the DRG system is that the groups are assumed to be homogenous with respect to clinical and economic resource requirements.

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