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Outcome and National Accounts

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1. Importance of Volume Measures of Non-Market Output

Service production is notable in the public sector in almost all countries and government decisions have a strong influence on the actual direct services produced for customers. Volume measures of non-market production are one step towards obtaining an improved picture of the economic performance of a country in its national accounts. Volume measures are the way to go if we want to use national accounts data to measure the productivity of non-market production, and to measure how different products and services transform to others at the level of the whole economy. Measurement of productivity is one cornerstone in the economics of growth and it has a strong linkage with the concepts of national accounts (Diewert 2008, OECD 2001, Aulin-Ahmavaara 2003).

Policy makers need better information on what is happening in the economy, how wellbeing is changing and on what role and impact of every participant is in the economy. This creates pressure to develop a clearer and more understandable statistical picture of the outcome of government participation in the phenomenon of interest. On the other hand, if we combine every desired feature into a single measure, we may end up with a blurry picture.

In the present situation the value of non-market production at current prices is measured in national accounts through its costs. In the case of the volume of the non-market sector, output has been regarded as equal to the volume of inputs. This has resulted in zero change in productivity and presumably a wrong picture of the performance of the non-market sector. It could be a plausible picture in an investment situation where extra expenditure means more direct output, as in increasing of arsenal in defence, but when considering more ordinary service production, the assumption that output volume equals input volume is problematic. There is an actual production process in the non-market sector which produces goods and services and it should be visible whether the process is productive or not, and whether a non-market producer is successful or unsuccessful in its production process.

In the case of service production in the market and in non-market sectors the concept of volume, and especially its quality component, is very problematic. In this paper quality refers to differences of certain services compared to other similar services. The valuation of the different quality aspects of services is difficult in service production in the market or non-market sectors. Produced volume and value of output are always connected to national accounts through production accounts and this narrows the scope of interest.

There is ongoing development at the UN, the OECD and the EU on the volume measures of non-market production in national accounts. A revised SNA is pending and the OECD is developing a handbook for the measurement of non-market production in education and health. Eurostat has its handbook on volume measures, which will naturally be enhanced after the publishing of the revised System of National Accounts (SNA). This paper is based on the issues that have arisen at Statistics Finland in the development and compilation of volume indicators for non-market services. The paper also makes some observations about recent international developments in volume measures. The work at Statistics Finland has mainly focused on the individual services of education, health and social care but has also taken some collective services into consideration.

This paper concentrates on the features of production accounts and on the problems of volume measures from this narrow viewpoint. First we look at the principles of compilation of production accounts, and then at the concepts of welfare and outcome. We then try to highlight the friction points in combining these together and give some concluding remarks. In the Appendix we finally a look at the same conversation at the micro level in the data formation process.

2. Production Accounts in National Accounts

2.1. General Aim

"National accounting measures final consumption, that is, the use of goods and services that are not utilised to produce other goods and services. It aggregates expenditures of this type expressed in current monetary values. It attempts then to measure their change over time independent of price movements." (Vanoli 2005, p. 296). The macroeconomic theoretical skeleton for national accounting is based on the *General Theory of Employment, Interest and Money* (1936) by J.M. Keynes. It formulates, for example, the equations which describe the mutual relationship of concepts such as income, consumption, investment and saving (Vanoli 2005, p. 19). This is a general view of total consumption (private and public).

National accounts are simply the framework where individuals who have created different types of economic units are classified by their different roles as sectors and industries, and their economic transactions are measured in macroeconomic accounts, balance sheets and tables. The valuations of goods and assets are left 'outside' and only observed in the compilation process and system records as transactions between units (System of National Accounts 1993 (SNA93)).

Soundness, applicability and coherence are the key features of methods when volume measures of non-market production are introduced to national accounts. National accounts do not recognise the terms of right, wrong, good, bad, fairness or social value. This is because national accounts are not a direct measure of welfare, although they are often interpreted as such. The welfare aspect of national accounts has been seen as economic welfare and connected with total consumption (Weitzman 1976). There is debate on whether national accounts should be extended in the direction of welfare (Jorgenson and Landefeld 2004), but these welfare statistics have been viewed as satellite systems and not as part of the core of national accounts and productivity analysis.

As Jorgenson and Landefeld (2004) state: *"Economic growth creates opportunities for both present and future consumption. These opportunities are generated by expansion in the supply of capital and labour services, augmented by changes in the level of living: $Z(C,S) = B \cdot W(L,N)$ " In this equation "Net Domestic Expenditures in constant prices Z consist of consumption expenditures C and saving S , net of depreciation. These expenditures are generated by Net Incomes in constant prices W , comprising labour incomes L and property incomes N , also net of depreciation. The level of living B must be carefully distinguished from multifactor productivity. An increase in the level of living implies that for given supplies of the factor services that generate labour and property incomes, the [U.S.] economy generates greater opportunities for present and future consumption."*

According to the 1993 SNA: *"However, changes in the volume of consumption, for example, are not the same as changes in welfare."* (SNA93 § 1.76). *"[...] total welfare depends on many other factors besides the amounts of goods and services consumed. Apart from natural events, [...] welfare also depends on political factors [...]. Obviously, as a measure of production, GDP is not intended to embrace non-economic events."* (SNA93 § 1.77). In some cases GDP may rise while total welfare tends to fall. *"[...] the production and consumption of goods and services typically rise as a result of wars."* (SNA93 § 1.77). Usually this is due to risen production of war industry and government consumption on war materials. This normally compensates for the impending fall in household consumption on individual goods and services. One might ask whether or not welfare rises in this case. (SNA93 § 1.80). Welfare is discussed later in section 3.1.

"Production can be described in general terms as an activity in which an enterprise uses inputs to produce outputs." (SNA93, § 6.6.). We may use a more general term 'a producer unit' instead of 'an enterprise' since units that produce outputs are not necessarily enterprises. Every unit in national accounts has a production account to show how inputs are transformed to outputs (SNA93, p. 121). *"The economic analysis of production is mainly concerned with activities that produce outputs of a kind that can be delivered or provided to other institutional units."* (SNA93, § 6.6.). There are mainly two kinds of output: goods and services. *"[...] output is a concept that applies to a producer unit - an establishment or enterprise - rather than a process of production. Output has to*

be defined in the context of a production account, and production accounts are compiled for establishments or enterprises, and not for processes of production." (SNA93, § 6.38.).

2.2. Outputs and Inputs

From the national accounts' point of view inputs include labour, capital and intermediate consumption. In this paper inputs are not the point of interest and are, therefore, not discussed in detail, although they do in general give rise to much discussion. In economic literature factors of production are usually labour and capital which, when the volume of growth of output is considered, are included in a standard macroeconomic production function with some unknown term that covers all the unknown factors in production. This unknown factor cannot be attributed to changes in labour and capital inputs but represents something that we understand as productivity, that is, how well capital and labour are combined to produce outputs.

The aim in tracing inputs and outputs or supply/use is to transform monetary values to volumes and to determine if the volume produced has exceeded the volume used and what the difference in volume movements is (growth in real GDP). This is a simple aim of production accounts, but there are still difficulties with data when measuring this transformation process in them. In the case of non-market producers there is no market value of output and, as for all producers, the usage of non-market services is not shown in inputs. This means that in terms of money, we are tracing only partial output and input transactions in production accounts. Therefore, the system of national accounts uses the terms of collective production and public consumption to get round these difficulties.

There would be no problem if the non-market sector were merely a transit account of subsidies and transfers between sectors with no aspect of production or capital formation at all. The value of non-market supply would in that case be an insignificant issue and the debate over non-market value (Vanoli 2005, pp. 244-272) merely a minor matter of academic interest.

2.3. Classification Principles

In national accounts, supply and use tables derive their classifications from similarity of production (Classification of Products by Activity (CPA)) or detailed classification of industries (in EU Statistical classification of economic activities in the European Community (NACE) as an alternative) (European System of Accounts 1995 (ESA95)). This gives a very different picture of supply and use and productivity measures than would be obtained from the perspective of similarity of usage. This has to be borne in mind when we make product classifications of non-market services.

In terms of volume, the difficulty in production accounts is in determining what is observed as quantity, quality or price change. Market production is handled by determining price change from price statistics. Finding out prices is a difficult task when we are looking at very complicated products and services. The problem lies in what the quality and the price are that we can see from price statistics. This problem can be examined with various methods (Triplett 2004, Consumer price index (CPI) manual 2004). Price formation is discussed in section 2.4.

We must make a clear distinction of the grounds that we should adopt for assessing quality in an output index. If we are looking at production accounts of the non-market sector, we should be following the practice applied in Producer Price Indices (PPI) or Producer Price Indices for Services (SPPI) and not that applied in Consumer Price Indices (CPI). The distinction is that the PPI and the SPPI are based on the theory of a producer (revenue maximisation with fixed technology and fixed inputs). Under these assumptions, in parentheses, constraining the supply curve we have the resource cost approach which values the quality change at the price it costs the producer to provide. On the other hand CPI is based on the theory of a consumer (utility maximisation with fixed tastes and fixed budget) whose demand curve is constrained by assumptions mentioned in parentheses. This leads to the user value approach which values the quality change at the consumer's perceived value of the quality change. (Smedes 2007). This states that only particles of the production process are to be considered in production accounts.

In national accounts, prices and volumes of inputs and outputs are always indices that are classified at levels of industries and products as seen in Diewert (1983). Having said this, we may state that national accounts are very tightly connected with the index approach of measuring output and productivity for all sectors, as described in Diewert and Nakamura (2003). However, we know that there are other, econometric and non-parametric, approaches to the detecting of productivity. The point in having the different methods is to have answers to slightly different questions. For the making of producer accounts in national accounts, price and volume issues (and productivity) are about making indices by using appropriate classification.

It has to be said that the traditional way of looking at non-market activities is through the Classification of Expenditure According to Purpose (COFOG). This classification is based on the purpose and function of certain expenditure on the basis on the specific need for that expenditure (United Nations 2000). This classification is not part of production accounts, but tends to be at the back of the mind when the productivity of non-market production is discussed. Therefore, it should be clear that we cannot trace productivity change if output is measured with the COFOG classification. The COFOG classification is attached more to the measuring of change in planned wellbeing in GDP, not to that of production and productivity.

2.4. Prices and Values

According to the neo-classical microeconomic theory, price and quantity are determined by demand and supply factors. Individuals maximise their utility by consuming commodities. Each commodity has its own (marginal) utility from each individual's perspective. Under perfect competition individuals choose their commodity basket at a given price under the restriction of their budget constraint; assuming each normal commodity has a descending marginal utility for them. The demand function of a commodity is determined by individuals' marginal utilities. The supply function of a commodity is determined by firms' production functions as they maximise their profits. In equilibrium, demand equals supply. (See section 2.3., discussion on price indices.)

This is one link mentioned between economic theory and the national accounts manual (SNA93, p. 24). In reality, market pricing may be an overstatement because of taxes and subsidies on production and investments, market restrictions on quantities and pricing, that is, because of non-market intervention and non-market production itself. An observed price as an indicator of consumers' free choice is not a valid argument, even if there has been a clearly free or direct/indirect forced transaction. The main aim in production accounts is to combine factors of production of different units of measures with other factors of production of usage. This is done by converting these units into terms of monetary values. Monetary value can be seen as the means of making things comparable, we could use tons of steel or any other measure as a value as well. An imperfect market does not overrule the national accounts' frame of tracking transactions via money, because a transaction has evidently happened for a certain sum or price, not necessarily at the 'pure' market price.

The assumptions of perfect competition, which include free market, perfect information and foresight, completely determined rights and totally free choice, lead to the situation where observed market values are exactly the same, observed either from consumption or production, as market prices. If, by contrast, we assume that none (or just a few) of these elements exist, we can say that the observed price is telling us just what has been the average trading course in transactions between some items and the value of consumption is not fully reflected in the observed price because some/all consumption of commodities is over/under/zero charged in a transaction situation.

In theory we can say that the consumption volume of a commodity is at the point where price equals marginal costs. This is, or as Atkinson Review (2005, p. 6) quotes Maurice (1968, p. 14): "*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*" is true in a way. However, we cannot actually say that a higher (lower) price means higher (lower) utility derived from the examined product. This product may only have utility because of other products and services consumed and no utility without them. Therefore, utility is compared to total consumption and we cannot say on the basis of unit values what product of total consumption gives the highest unit of utility at the time of consumption, However, we can be sure that prices illustrate differences in marginal significance. For instance, we are in the short term willing to pay more for a propellant

than for a car but we cannot use either of them separately to obtain motorised transportation even if we had access to roads at zero prizes.

We can also say that the utility function is not static in the economy. It shifts when there is new knowledge, say changes in human capital. This means that, in principle, changes in values can only be changes in utility functions and have nothing to do with output volumes of any kind recorded in production accounts.

One must always remember that in production accounts we are not tracing output at purchaser's prices but at producer's prices, or at basic prices to be exact. This means that the value of output is different at the producer side and at the consumer side. Between these different price concepts are the aforementioned taxes, subsidies and all other margins that can make a vast difference. The value of output is, therefore, not directly linked with consumer valuations as proposed in Atkinson Review (2005). This has been discussed in national accounts for a long time and the discussion has mainly concentrated on total consumption at purchaser's prices (Vanoli 2005, pp. 395-402).

One point we can be quite sure of is that differences in unit values, costs or prices can arise from differences in quality. It is important to repeat that we cannot rank products by utility against their prices but can only spot differences. This means that seemingly similar products with different prices must be recorded independently and summed up to total output, and a relevant quality classification can be detected from unit prices that are explainable by qualitative differences.

On the part of services (as well as goods) we can trace the reasons for price differences to different quality characteristics of output units. This is standard procedure when indices are compiled for complicated services (Triplett 2004, OECD and Eurostat 2005) where differences in service quality are deduced by investigating the components or characters of the services. On the non-market side of service production it seems to be difficult to use such concepts as characteristics or components and they are hastily replaced with the concept of activity (see for instance Atkinson Review 2005). It tends to diminish the reality of the fact that service production is a sum of activities that are paid for. This leads us right back to the main principle of classification by differences in characteristics, as in the CPA.

2.5. Summing up to Total Output Value and Volume

In the neo-classical microeconomic theory firms transform inputs to outputs and maximise their profits. The production part of the profit function can be examined separately as a cost minimisation problem in which the level of output is taken as given. Firms' production functions summarise the technical constraints of their production decisions. By contrast, in profit maximisation firms must choose their output level in the current period and plan the outputs to be produced in future by finding the maximum gap between production and costs. On the other hand, the market tends towards equilibrium and the theory states that in perfect competition each firm's marginal profit equals zero in the state of equilibrium, that is, there are no excess profits.

In production accounts the total volume of a market producer's output is the weighted volume of different produced goods and services. The same result is obtained either by deflating every item with its price change or by deflating total output by the weighted price change of total output. The weight is the value of production of every item detected from transaction prices. The same treatment is applied to the inputs of production accounts for all producers. Output in production accounts in the national accounts frame leads straight to the usage of the index approach in the compiling of output volume.

The value (current prices) of non-market output (in production accounts) remains as the sum of costs in national accounts and this is not to be changed. Therefore, the difference in non-market production compared to the market situation is that there is no market pricing for output to determine the values in the transaction situation. The non-market producer operates with zero profit and the monetary value of the production is equal to production costs. This is the situation for every non-market product or service. (This equals the national accounts concept of production for own use for every producing unit.) These costs or units are not prices because the concept of price is formed when money and commodity change hands in a transaction situation.

ESA95 gives the solution of using market prices for non-market production, based on the assumption that the produced non-market outputs are the same and made by the same average production function as their market counterparts. Unfortunately, non-market production is in almost all cases totally different in its content compared to its market counterpart and usually cemented by laws and market restrictions. This means that using market prices as value weights brings only marginal relief to the problem.

The output volumes of non-market production (cost weight) and market production (price weight) give the same result in a situation where every product and service has the same share of average profits per unit cost. The only difference between the results of weighting the total volume with market value or with costs is the excess profit or negative profit of a market producer. This, naturally, holds true only under perfect markets, but in practice it raises the question: can we be relatively sure that cost weights are sufficient and give a close enough output volume index as against if the same output were aggregated through price weights? Something similar but from the perspective of total consumption is presented by Hicks (1942) according to Vanoli (2005) and Vanoli (2005, p. 259).

3. Welfare and Outcome from National Accounts' Perspective

3.1. Concept of Welfare

What is welfare? Several indicators exist which try to measure this abstract concept. From the national accounts' point of view, welfare is mainly connected with consumption and is, therefore, mentioned as economic welfare (Vanoli 2005, pp. 273-301). The effect of economy on welfare can be expressed as the maximum value of consumption over time (Weitzman 1976). In this paper welfare is understood as something subjective that an every individual experiences, and includes economic welfare as one of its component. In welfare economics this individual 'welfare' is commonly known as 'utility' and 'welfare' is usually some combination of individuals' utilities in the economy depending on which theory is under consideration.

Let us consider an example of a society where everyone drinks alcohol so that one-half use it moderately and one-half are large-scale consumers. Everyone maximises their utility and are, therefore, better off than without alcohol. This also maximises the total welfare of society, if one defines the total welfare of society as the sum of the utilities of its individuals. This is the definition used in this example to simplify the case. As years go by, the alcohol causes health problems to the large-scale consumers and their utility decreases, *ceteris paribus*, as does the welfare (we assume that the consumers haven't maximised their utility rationally over time). The demand of health services increases, but the labour supply decreases (assuming the heavy users have been employed and full employment prevails) as does the demand of alcohol products (assuming the heavy users cut down on alcohol). How this affects economic welfare is somewhat complicated issue but it depends on, by definition, what happens to the level of total consumption. On the other hand, how this affects individual's utilities and, through it, welfare is also a complicated issue, they may rise, fall or stay static. This simplified scheme is, of course, arguable.

In this example, such 'bads' exist which are defined as goods that cause loss of welfare. National accounts measure production and consumption of goods without committing themselves to whether they are in fact 'bads'. This means that goods and 'bads' produced and consumed at the same volume in an economy increase GDP by the same amount regardless of the 'bads' causing the loss in welfare. However, as already stated, *economic welfare* increases if total consumption rises but *welfare* may stay static or even decrease at the same time.

3.2. Concept of Outcome

An outcome is something that a particular activity causes. "*Among national accountants, 'outcome' is typically used to describe a state that consumers value, for example the health status without necessarily relating the change in this state to the medical intervention. [...] As long as a particular definition is used consistently, the substance of the argument is of course unaffected and the only question is the usefulness of definition or the other.*" (OECD 2007, Chapter 1.4., Box 2). Outcome is described at the level of consumer value of a situation or a considered aspect of the world. State of health, level of crime or pollution can be offered as examples (Atkinson Review 2005 and OECD 2007, Chapter 1.4., Box 2).

After this definition it is essential to say that consumer value is strictly different for every individual and decision-maker. In this paper, outcome is considered mainly as 'a state that consumers value'. This relates heavily to the definitions of utility and welfare used in this paper (see Section 3.1.). Outcome can be seen as a state of an individual valued by the individuals themselves or by an external evaluator. One may also postulate that an individual's level of utility changes due to outcomes caused by different activities. Outcome is also a concept between utility and consumption. It describes what happens to the state of the consumer after the consumption process.

Let us consider a simplified case in which an individual is employed and healthy in state 1. In state 2 he/she becomes ill, is on sick leave and receives needed medical treatment. After the treatment, in state 3, the person is cured of the disease and returns to work. The outcome of the treatment can be seen as the individual's subjective

utility so that it is constant in state 1, decreases first in state 2 but increases after the treatment and is static in state 3. The outcome can also be seen from an objective perspective in terms of money. In state 1 the individual's work input stays static as do his/her consumption, in state 2 they both decline at first but rise in the end of the state 2 and finally in state 3 the person's work input stays constant as do his/her consumption as well. In this case we must not forget the public consumption caused by the medical treatment in state 2.

Let us assume that the states (1 and 3) before and after the illness are similar in the sense that an individual's both subjective utility and consumption (we simply ignore work input at this point and observe this case only through consumption) are at the same level. We can now concentrate on examining what happens in state 2 as we have fixed states 1 and 3. Intertemporal outcome in subjective utility terms depends on the level of utility in state 2; how much the individual utility and welfare of the society decline, *ceteris paribus*, and for how long they stay at this lower level before they increase again. However, they decline by assumption, thereby the accumulated utility and welfare are at lower level in the end of the period under review than they would be without illness.

From the objective monetary point of view, the focus is on whether the public consumption of the treatment in state 2 is equal, smaller or larger than the loss in private consumption. For example, if the public consumption covers the loss in private consumption so that total consumption in the economy stays constant in state 2, intertemporal economic welfare is unchanged, *ceteris paribus*, during the considered states. Thus the accumulated consumption and economic welfare would be at the same level than without illness.

One might ask how this could be taken into account in national accounts. In an objective and quantitative way, the outcome from the treatment affects the individual's work input and consumption possibilities. On the other hand, subjective outcome is measured from the change in the health status and wellbeing of the individual. We can see the difference in the concept of outcome in this example. From the subjective point of view it has something to do with change of utility and welfare and from the objective point of view it has something to do with consumption and economic welfare.

3.3. Outcome in Production Accounts' Point of View

3.3.1. Outcome-based Quality Adjustments in Non-market Production

From the national accounts' point of view there have been suggestions to consider outcome as part of quality in non-market production. For example, OECD (2007) proposes that: "[...] *volume output should be adjusted for the improvement in health outcomes [...] Ideally, what is required is an indicator or indicators which reflect changes in outcomes as a result of quality changes.*" These kinds of practices were suggested in the OECD handbook version introduced at the OECD workshop: 'Measuring Education and Health Volume Output' held in Paris in June 2007. The practices proposed by the Eurostat handbook relaxed the outcome issue in national accounts as covered in Eurostat's 'Workshop on quality in non-market output measures' held in Luxembourg in March 2008.

A certain kind of objective outcome is an in-built characteristic of national accounts through value measures. One might ask whether we need subjective outcome adjustments in national accounts. From now on in this paper the term 'outcome' is used in a subjective sense. In education the proposed outcome measures include e.g. pupils' grades in some tests or their expected future earnings. One might ask what kind of a 'quality coefficient' could be used to adjust output and who is to decide on it. From the national accounts' perspective expected future earnings are real earnings in a few years' time and they will increase economic welfare if they lead to better consumption opportunities. We cannot add future earnings to output and then add them again in the future when the increased production begins. As the SNA93 states:

"It is often proposed that expenditures on education should also be classified as gross fixed capital formation as a form of investment in human capital. The acquisition of knowledge, skills and qualifications increases the productive potential of the individuals concerned and is a source of future economic benefit to them. However, while knowledge, skills and qualifications are clearly assets in a broad sense of term, they cannot be equated with fixed assets as understood in the System. They are not produced because they are acquired through learning,

studying and practising - activities that are not themselves processes of production. The education services produced by schools, colleges, universities etc. are consumed by students in the process of their acquiring knowledge and skills. Education assets are embodied in individuals as persons. They cannot be transferred to others and cannot be shown in balance sheets of the enterprises in which the individuals work (except in rare cases when certain highly skilled individuals are under contract to work for particular employers for specified periods)." (SNA93, § 1.52.).

"It may also be noted that final consumption consists of the use of goods and services for the direct satisfaction of human needs or wants, individually or collectively. Education services are undoubtedly consumed in this sense. They increase the welfare and improve the general quality of life of those consuming them. Moreover, they are not the only services consumed by individuals to bring long- as well as short-term benefits. For example, the consumption of health services brings long-term benefits and even the consumption of basic items such as food and housing is necessary in order to keep an individual in good health - and good working order." (SNA93, § 1.53.).

The reason for proposing the adoption of subjective outcome-based 'quality adjustments' in national accounts is because it is considered that the public sector does not get all the credit for its output. Yet, is this not one of the important functions of the public sector: to create ideal circumstances in the economy for all its actors by providing cheap services that anyone has an access to? To sum up, from the service evaluator's point of view outcome may be seen as a useful factor, but from the production accounts' perspective it is not a necessary element.

3.3.2. Outcome Measures Need a Valuation Process

Marginal contribution of public services to changes in outcome is offered as a straight quality measure of public production. This means that somebody has decided which states of outcome are more or less quality and has also deduced on what grounds the outcome movements should be added together. This is a tricky assumption, because it indirectly says that a society has an indifference curve and that we can keep track of this social value. It would be even trickier if it was assumed that adopted policy defines the indifference curve which would then be legitimated by the free choice of representatives of people.

Social valuation is always linked with the valuator, and related to methods such as social constructivism and relativism. This is not a question of the Keynesian general model on which national accounts are based. Economic welfare is a function of consumption (volume) of products and services as seen previously in section 2.1., not of consumption of outcomes. The fundamental issue lurking under the concept of outcome is that it always states from norms what is more (= better). As an example, is a 10 per cent decrease in cardiac diseases more or less than a 10 per cent decrease in diabetes?

3.3.3. Outcome as Quality

If we make quality corrections through outcome we are increasing volume with its marginal contribution to outcome and it can be positive, or even zero or negative in a situation where non-market production has no user value to consumers. This non-contribution to outcome is to be excluded from output if we interpret Atkinson Review (2005) to this extent. This result leads to quite an odd situation in terms of volume, because surely there has been production and the output has been consumed. This means that non-market output volume must always be something positive in production accounts irrespective of its contribution to outcome.

A significant thing is that the proposed quality corrections of outcome mean that for the non-market economy, production includes non-produced assets (Aulin-Ahmavaara 2004). As in the case of the education sector, output is determined by the value of human capital such as future earnings (Jorgenson and Fraumeni 1992). This definition of output is justified and true but in has to be re-examined because of restrictions in production accounts. If we are mainly investigating the production of a single institution, future earnings are not produced at a single school, not even a share of them as expressed by the regression model. Therefore, this definition of output (human capital) is not output of the industry (sector) but of the education function (all things that participate in the education process) at the total economy level. The object of interest here is not the producer but total consump-

tion. Human capital is formed in this case when an individual uses educational services among other goods and services. This must not be shown in the production accounts of educational services because it can be seen as a function inside the household sector.

Evidence-based policy making, on the other hand, relies on this kind of a concept of outcome. Without knowledge policymakers cannot compare things against one another and make value judgements on what, how much and for whom public services should be produced. When this information on outcome is supplemented with a clear picture on the economy and costs (provided by national accounts and other economic statistics), there is a chance that selected acts of policy may add social value, which is a concept determined differently by each and every one of us.

4. Can the Problems of Non-market Output be Solved with Outcome?

The question this paper asks is whether or not adopting outcome-based quality methods can make better volume measures for non-market production so that we would have a better picture of a nation's total output, value added and productivity in production accounts presented in volume terms. If we adopt any concept of outcome in national accounts, the main problem is that we have to relax the assumption of a single measure of GDP. As outcome and social valuation depend on points of view, outcome volume tells a different story every time assumptions of outcome quality corrections are revised.

4.1. Non-market Production and Consumption

When we adopt volume measures for non-market output, we only fill the gap in production accounts in terms of the volume of non-market supply. We are still in a situation where we are not aware of what institutions use the non-market supply and in what part of their production process. Therefore, we still do not have a complete picture of the consumption pattern of industries in an economy and we still have to use concepts like public consumption and collective services. The introduction of outcome quality measures does not help in this because outcome has no linkage with non-market production and consumption volumes in various sectors.

4.2. Non-market Production and Classification Principles

In production accounts we must adopt a classification by the same principles for market and non-market production. The classification of industries traces the same kind of production by same means in the same industry. The classification of products relies on similarity of manufacture and product characteristics (Eurostat 2008). Outcome is more in linkage with the COFOG classification, and COFOG classes are determined by total consumption for certain purpose, not by a certain production function and, therefore, do not provide a clear solution to the problem of classification of non-market products.

On the other hand, we can easily look at expenditure through the COFOG classification and say that money spent on certain purposes has or has not resulted in notable movements in the relevant output indicators. Some of these movements are actual changes in services and some are due to other economic or non-economic activities. This may or may not have something to do with productivity, however, we can easily say that it is a change in efficiency. Output volume is very directly linked with productivity and less so with efficiency. Using the concept of outcome does not provide any better classification principles for national accounts because it does not follow the idea of production being differentiated by characteristics.

4.3. Non-market Production and Price Information

As we have volume measures for non-market producers, there will be implicit prices for non-market services. These implicit prices are different for all users and depend on the individual usage of services and income, wealth and other structures determined by tax laws in any particular case. Consumers can therefore lower their own prices by changing their own behaviour. We cannot find these prices in production accounts, because a price formation chain like that in market production is missing. The 'implicit prices' are invisible in transactions in the distribution of income accounts between sectors.

When we adopt volume measures for non-market output and use cost weights, we are in a situation where the output prices (costs) of the public sector have different meanings compared to the market sector. The non-market output prices (costs) are different from the 'implicit prices' described above, and cannot be affected by the consumption of the services. The only difference in the market situation is that weights are derived from costs rather than prices.

Outcomes adjusted for quality are useless as price estimates because they do not solve the problem of lack of information on the price formation process. If we use outcomes we are not making prices but social valuations at

a given time and from certain points of interest. We can also measure outcomes, such as accumulation of human capital, as output for wrong actors, i.e. not for human capital owners but for the 'construction service providers' such as schools. This is strongly related to the debate on the value of consumption and production. Non-market production undoubtedly creates positive or negative value (or value added) for the consumers. In the national accounts frame, this cannot be shown separated from produced value (= consumed cost). This is because outcome is not shown identically at the uses and resources sides of balance sheets, as it should, as the value of production sacrificed for the value of non-market production gained. The user value of consumption should be different from the value of production. This is because observed prices (and costs) are not precisely market prices. The distinction should be made visible because it would allow us to analyse productivity from the production process perspective and welfare from the consumption perspective (Jorgenson and Landefeld 2004).

In a market situation we can make price deflators using just a small volume of price data because we can assume that for the rest of the products the market competition forces similar products to follow the general price movements. One big practical problem is that when we make volume measures for non-market production we are forced to use very detailed information on different outputs classified by quality characteristics. This is because we cannot deduce from the volume of a certain output the volumes of other similar outputs. In this case the market does not function as a link between producers. This means that we need a massive amount of data on non-market output volumes. Using outcomes does not solve the problem because it does not represent the full picture of consumer valuations and certainly not of production processes. It might tell us that there might be something happening in output quality but it does not tell the reason why and if the reason is difference in quality the answer is to measure output in quality groups.

The most significant feature is that when we use outcome measures we are actually taking non-produced assets into production accounts of national accounts. This is a major element that generates a totally different picture of the present total output of a nation. It is a big step towards the situation where national accounts are more than a present picture of economic activity and economic welfare. After the inclusion of outcome, the concept of volume would have a different content in market and non-market situations.

4.4. Summing up Non-market Output Volume in National Accounts

Outcome indicators are useful when decision-makers evaluate the sensibility of expenditure. A deeper understanding of what gives greatest gain is based on national accounts and their volume measures of non-market output. Well-defined volume measures, costs included, give the data that point out what services were produced and what their production costs were. When reconsidered with outcome indicators, the question of reallocation should be raised in the sense that if we would produce less of these services and more of some others would we get a better outcome effect for less expense? Only once we have these complete data could we trace, for example, the marginal contribution of the health care industry to outcome product by product.

On the grounds of the previous points presented in this paper we should keep the production boundary clean of any corrections deduced from outcome or allocative efficiency movements of consumption. When we formulate volumes of non-market production as services of different characteristics and classify them according to the principles of CPA or NACE, we can still gain a better picture of output volume and productivity change than with the present method of applying input to non-market production. This also means that there are still problems in national accounts data.

In the interpretation of results we must also accept that new, and hopefully better, non-market output means, at first, only the same amount of cost volume and no change in productivity. Cheaper means of production of non-market services automatically means less unit weight on total output volume. Thus enhanced productivity in the non-market sector means less consumption (measured in volume terms) of non-market products compared to total consumption. On the other hand, it means better outcome with less expense if we match national accounts data with social indicators.

In the case of output indicators, the results for value added and productivity are partially shown in other sectors. That is, when other sectors use non-market production at zero prices they get productivity gains and increase

their value added. This has to be borne in mind when we interpret the results of national accounts at the level of total economy or at the level of factors of production. Outcome quality indicators for output are designed to increase non-market value added, but will just lead to double accounting because the gained value added is not restricted for other industries when they use non-market products at zero prices.

From the data point of view, using volume measures in non-market production will mean market-like structures in the data collected from non-market institutions. This means, in practice, a detailed list of services from every unit and these data would form the basis for volume measures at the aggregated levels needed in national accounts. The problem in the compiling of non-market production volume is mainly connected with appropriately classified product and cost data.

References

- Aulin-Ahmavaara, P. (2003): The SNA93 Values as a Consistent Framework for Productivity Measurement: Unsolved Issues. *Review of Income and Wealth*, Vol. 49, pp. 117-133.
- Aulin-Ahmavaara, P. (2004): Moving Human Capital Inside the Production Boundary. *Review of Income and Wealth*, Vol. 50, pp. 213-228.
- Atkinson Review (2005): Final Report - Measurement of Government Output and Productivity for the National Accounts, Palgrave MacMillan. Crown.
- Consumer price index manual (2004): Theory and practice. International Labour Office.
- Diewert, W.E. (1983): The Theory of the Output Price Index and the Measurement of Real Output Change. In Diewert and Montmarquette, pp. 1049-1113.
- Diewert, W.E. (2008): What Is To Be Done for Better Productivity Measurement. *International Productivity Monitor*, Number 16, Spring 2008, pp. 40-52. CSLS.
- Diewert, W.E. and A.O. Nakamura (2003): Index Number Concepts, Measures and Decomposition of productivity Growth. *Journal of Productivity Analysis*, Vol. 19, pp. 127-159. Springer.
- European System of Accounts (1995).
- Eurostat (2008): The European Classification of Economic Activities.
- Hicks, J.R. (1942): *The Social Framework: An Introduction to Economics*. Oxford.
- Jorgenson, D.W. and B.M. Fraumeni (1992): Investment in Education and U.S. Economic Growth. *Scandinavian Journal of Economics*, Vol. 94 Supplement pp. 51-70. Blackwell Publishing.
- Jorgenson, D.W. and J.S. Landefeld (2004): Blueprint for Expanded and Integrated U.S. Accounts: Review, Assessment, and Next Steps. Conference on Research in Income and Wealth. New Architecture for the U.S. National Accounts. Washington, D.C. April 16-17, 2004.
- Maurice, R. (ed.) (1968): *National Income Statistics: Sources and Methods*. HMSO.
- OECD (2007): OECD Handbook 'Measuring Education and Health Volume Output', draft. Workshop on measuring Education and Health Volume. Paris. June 6-7, 2007.
- OECD (2001): *Measuring Productivity*. OECD Manual. Measurement of Aggregate and Industry-Level Productivity Growth. OECD.
- OECD and Eurostat (2005): *Methodological Guide For Developing Producer Price Indices For Services*. OECD, Eurostat.
- Smedes, M. (2007): *Service Producer Price Indexes in the Australian National Accounts*. Voorburg Group on Services. Australian Bureau of Statistics. Seoul, Korea. September 2007.
- System of National Accounts (1993).

Triplett, J. (2004): "Handbook on Hedonic Indexes and Quality Adjustments in Price Indexes: Special Application to Information Technology Products", *OECD Science, Technology and Industry Working Papers*, 2004/9, OECD Publishing.

United Nations (2000): *Classifications of Expenditure According to Purpose*.

Vanoli, A. (2005): *A History of National Accounting*. IOS press.

Weitzman, M.L. (1976): On the Welfare Significance of National Product in a Dynamic Economy. *Quarterly Journal of Economics*, VOL. 90, Issue 1, No 364, pp. 156-162. MIT Press.

APPENDIX. Collisions of practices when making output indices for government institutions

The difficult task in developing output indicators for government agencies is distinguishing product classes from impact goals and organisational structures. However, these features are not the key to seeing what is produced for individual and collective use. A new kind of approach is needed to understand non-market institutions as producer units. The difficulties arise from policy goals e.g. government budgets, which are the reasons behind non-market production. One could say that at present government money in the world is spread across organisations and used in production processes with no recorded outputs but high claimed contributions to wellbeing. This is seen in every level of non-market institutions.

The development of a usable product classification forces government agencies to indicate what they are doing to meet the targeted impacts or outcomes. This seems to be a very hard task for some agencies because there is no culture of viewing non-market production as 'real' production. This also forces agencies to evaluate what output is expected to be the most vital for achieving policy goals and, on the other hand, what services are the most expensive, and are they the same as the important ones.

The simplest cases are permits, licences and stray ahead decisions which are fairly homogeneous and often actually written in legislation and measured direct. The differences between these products are easily deduced from, say, complete lists of variables of different permits. The most difficult to identify is consultancy type of work where a government institution offers knowledge to other institutions. This has led to the measurement of 'consultancy' hours as output when, after investigation, there is evidence of a transaction and an agency provides labour force and contributions to outside customers. At the volume level this is near the volume of a market organisation that rents labour at hourly basis. This, of course, means that different types of labour force should be classified, which is seen as a difficult task. Not surprisingly, because in non-market institutions knowledge is often seen as a real person rather than as a knowledge resource that organisations can trade in with outsiders.

The problem in summing single volume measures to total volume is in finding weighting data. As we have adopted the method of using cost weights to different outputs, more detailed cost data are needed. This would require every government agency to change its bookkeeping practices and ways of thinking about government economy. We are not just keen to monitor expenditure but, like all good national accountants, also mutually interested in the cost of production. This means that the concept of unit cost must also be introduced to public production. In practice, this would require the development of 'pricing' methods for non-market service producers.

Conventionally, cost data have been organised by division and department, and actual production costs are monitored at aggregate levels. Because of this, extensive revisions would be needed to bookkeeping systems to make them capable of monitoring costs by usable levels of desired product classifications. In addition, detailed ad hoc research of costs would still be needed to ensure the inclusion of all features of service production.

In numerous cases government agencies purchase parts of their production processes from each other. For example, an agency could use another institution's databases, (political) advisory services and various 'administrative and support services'. Usually they are used free-of-charge within the government and are funded independently. In national accounts they are classified as general government services. This forms a bias if we want to use cost data for weights. The only easy solution to this would be to favour the present development where support services are 'bought' within the government and therefore become visible in cost data.

One specific problem of output measures for non-market producers is a situation where part of the production is classified as market production or as the sale of non-market products. Prices can always be used to ascertain volume change for the market production part, but how could volume changes be calculated for the part of the production that is classified as non-market production? Is it the same as, or different from, that of the market production share? This is a typical situation for non-market units that supply permits and licences to other sectors. Some licences may exceed production costs and some are heavily subsidised by budget funding. The non-market part in this situation is the subsidised part of the permits and licences.

More problems arise if we investigate the contents of certain licences. As an example a permit may cover a routine inspection or similar. Rectifying of problems detected in these would not be covered by the licence fee but would need other acts of government intervention. Then the number of licences is not the proper measure of at least the non-market (government subsidised) part of production. In all cases the measurement tends to progress from general level to detailed level because of complicated production decisions.