Abstract

Public sector productivity in Sweden was the subject of a series of studies in the 1980s. Under the 1989 budgetary reform, the annual reports of all central government agencies are required to include an account of results that includes information on productivity. A new series of public productivity measurements in being published in 1994.

A common problem in productivity measurements is the treatment of changes in quality. A method is needed that takes such changes into account. Quality changes have to be measured so that productivity data can be adjusted accordingly. This paper presents a theoretical foundation for the quality adjustment of productivity measurements in the public sector.

The problem of quality adjustment has been addressed in connection with price indexes (Griliches 1971 b; Fischer & Shell 1972). This approach, known as the "characteristics approach" or "hedonic price indexes", assumes that differences in commodity quality are reflected in market prices. Commodity characteristics, and hence quality, have been treated most explicitly by Lancaster (1991).

Consumers are not interested in goods as such but in characteristics or properties of the commodities. Each commodity contains certain amounts of various characteristics. Consumer preferences are expressed in terms of characteristics rather than of commodities.

The consumer's budget restriction is expressed in commodities and is thus defined in commodity space or, since we are dealing here with non-market commodities, in product space (P-space). Utility is defined in characteristics space (C-space). The relation between products and C-space is defined by the *consumption technology* which expresses the quality of available products. A linear relation is assumed between the amounts of products and characteristics.

Starting from this theoretical foundation, an increase in product quality is shown to induce both a substitution and an income effect, similar to the impact of a price fall in traditional consumer theory. In P-space it also induces a shift of the indifference curves. When quality increases, a higher utility is obtainable with an unchanged budget restriction. To be able to adjust productivity measurements for quality change, it is thus necessary to consider how the increase in quality affects income.

A quality increase is defined as an increase in one or more of the coefficients of the consumption technology. Each characteristic has an imputed price, defined by the product prices and the coefficients. A price decrease that gives the same income effect as the quality increase can then be defined:

*Price decrease = quality increase * imputed price of the characteristic*

The income effect (*dy*) is derived from this and the change in quality adjusted productivity is defined as:

$$Iq = (1-dy/y)\ \frac{(v_1q_{1\,t+1} + v_2q_{2\,t+1})}{(v_1q_{1t} + v_2q_{2t})}$$

where q_{ij} = quantities of products in periods t and t+1, and
v_i = weights of the products.

When dealing with market commodities, prices are used as weights. With non-market products, weights generally consist of unit costs. The unit costs then have to be used in the calculation of income effects of a quality increase. The income effect accordingly represents the potential reduction in the cost of producing public products, given the political aim of keeping product utility unchanged.

Using this approach and a system for monitoring quality changes in the public sector, productivity measurement is brought closer to the measurement of effectiveness.