

Executive Summary

In 2001, the OECD published the *Manual Measuring Capital* to provide guidance to the concepts and practice of capital measurement. Since then, a number of developments have taken place, and most notably the revision of the 1993 System of National Accounts. The revision entailed many issues with regard to non-financial assets that also affect the original Capital Manual. The present document is a revision of the 2001 Manual, to take account of new developments and to ensure consistency with the revised System of National Accounts.

In the past, in many statistical offices, the main purpose of measuring capital was to provide a basis for the calculation of consumption of fixed capital so that net measures could be derived in the national accounts. The measurement of consumption of fixed capital remains a key reason for capital measurement but two additional objectives have increasingly gained in importance: establishing balance sheets for economic sectors and measuring capital services for the analysis of production and productivity.

The main objective of the present *Manual* is to deal with these additional objectives and to present an integrated and consistent approach towards capital measurement that encompasses different measures of capital stocks (gross, net and productive stock) alongside with the relevant measures of economic flows (investment, depreciation and capital services).

Many of the measurement concepts in the *Manual* reflect a fundamental **dual nature of capital** which is both **storage of wealth** and a **source of capital services** in production. In other words, there is a value or wealth side to capital and there is a volume or quantitative side to it. Depending on analytical purpose, it is either the value side for example in the form of the net capital stock or the volume side in the form of the productive capital stock that are the appropriate measure.

While the wealth and the production side of capital are different aspects that help analysing different questions, they are not independent of each other. Quite to the contrary, there is a clear link between the value of an asset and its current and future productive capacity and consistency in capital measures means taking account of this link.

The distinction between the wealth and the production aspect starts at the level of the individual asset and the first part of the *Manual* explores how, for a single asset, its age-price profile and its age-efficiency profile hang together. The age-price profile encompasses all the information about an asset's price history as it ages and reflects depreciation, a charge against income. The age-efficiency profile contains information about an asset's productive capacity over time and provides the key to measuring capital services, the asset's contribution to production. For single homogenous assets, the two profiles are related but in general different.

In practice, cohorts of assets are considered for measurement, not single assets. Also, asset groups are never truly homogenous but combine similar types of assets. When dealing with cohorts, retirement distributions must be invoked because it is implausible that all capital goods of the same cohort retire at the same moment in time. Thus, it is not enough to reason in terms of a single asset but age-efficiency and age-price profiles have to be combined with retirement patterns to measure productive and wealth stocks and depreciation for cohorts of asset classes. An important result from the literature, dealt with at some length in the *Manual* is that, for a cohort of assets, the combined age-efficiency and retirement profile or the combined age-price and retirement profile often resemble a geometric pattern, i.e. a decline at a constant rate. While this may appear to be a technical point, it has major practical advantages for capital measurement. The ***Manual therefore recommends the use of geometric patterns for depreciation*** because they tend to be empirically supported, conceptually correct and easy to implement.

Consumption of fixed capital or ***depreciation*** remains a central variable in capital measurement and there is a long history of debate about its exact meaning and its measurement. With the increasing importance of high-tech capital goods that undergo rapid technical change, there has been renewed discussion about the measurement of depreciation. In particular, the question has arisen whether a measure of depreciation should incorporate expected real holding losses or not. Some authors have suggested so, arguing that this is the appropriate way of capturing expected obsolescence. Others have come to a different conclusion, and draw a distinction between value changes of an asset due to ageing (which they identify with depreciation) and value changes due to overall price changes of the group of capital goods. The *Manual* finds that there is no single “correct” way of dealing with expected price changes in the context of depreciation measurement but rather that different analytical questions about net income give rise to different prescriptions about how to measure depreciation. For implementation, the *Manual* sticks with the approach towards measuring consumption of fixed capital that excludes real holding losses from depreciation. This corresponds to the practice of statistical offices.

Along with the volume of capital services, a price of capital services has to be specified and the *Manual* explains how such prices or unit user costs are derived and measured. They comprise two major elements that constitute the cost of using capital in production: depreciation, and the real costs of financing or a required real return to capital. There are several ways of formulating these elements when it comes to measurement and they are presented in the text. Attention is paid to how the return to capital is measured, and the literature has suggested *ex-post* calculations based on observed measures of property income in the national accounts as well as *ex-ante* calculations based on information from financial markets. For many reasons, results are not identical but ***the general evidence appears to be one of robustness of capital service measures with regard to the specifications for the return to capital***. Whether or not the capital service price takes account of real revaluation of the asset, on the other hand, seems to play a more important role for the resulting estimates.

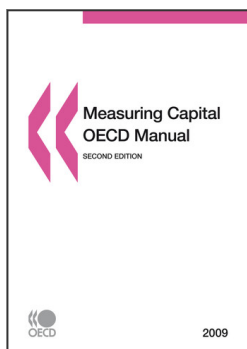
The System of National Accounts estimates the value of output from non-market producers by costs. Capital costs are measured as consumption of fixed capital only, leaving out the other main element, financing costs. Reasons for this are of a practical nature (which interest rate should be chosen?) but there are also conceptual arguments such as the reluctance to see GDP rise when interest rates for government debt increase. At

the same time, there are good conceptual and analytical reasons why the cost of capital should be measured as completely as possible for non-market producers. If not in the national accounts, then for analytical purposes it is therefore of interest to impute financing costs or a rate of return to government assets and the *Manual* describes several avenues towards doing so. In fact, for some non-market producers, households who own dwellings, such an imputation is already made in the national accounts and the *Manual* discusses how the information for owner-occupied housing can be used for other assets of non-market producers.

With regard to the **scope of assets** that are dealt with in the *Manual*, it covers predominantly fixed assets. However, three other types of assets are most relevant as sources of capital services: land (a largely non-produced asset), inventory (an asset that is not fixed) and natural resources other than land. These types of assets pose specific questions with regard to their measurement. In particular land is a quantitatively important asset that is notoriously difficult to measure. Consequently, the *Manual* devotes a special chapter to the measurement of land without making a claim of being exhaustive on the topic. Similarly, there is a special chapter on inventories. Natural resources other than land are also specifically dealt with but in less detail because reference is made to the International Handbook on Integrated Environmental and Economic Accounting (United Nations *et al.* 2003).

A significant number of pages in the *Manual* are allocated to the measurement of service lives, retirement functions and patterns of depreciation. Generally, **good empirical information on asset lives is sparse** and often dated. One of the annexes to the *Manual* brings together service lives as used in various countries.

The final part of the *Manual* is a mathematical description of the capital measurement process, taking into account the conventions specified in the national accounts. It is hoped that this systematic and consistent presentation facilitates implementation and programming routines.



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