PROBLEMS OF MEASURING CAPITAL IN LESS DEVELOPED COUNTRIES

BY MICHAEL WARD

Institute of Development Studies, University of Sussex, England

The general problems of distinguishing between theoretical concepts and practical measures concerning capital are considered and the difference between various stock and flow measures of capital and their respective uses is defined. The qualifications and limitations to these measures in the interpretation of output changes are also discussed. Attention is concentrated on the initial, basic problem of how to measure gross capital stock and the special difficulties involved in using the perpetual inventory simulation method and census procedures in less developed countries to derive such estimates are broadly defined. Some of the special problems encountered in an attempt to undertake an inventory of industrial capital assets in Lesotho are also referred to and the paper concludes by expressing the view that there are at present far more important issues demanding higher statistical priority in less developed countries than the evaluation of capital stocks.

1. INTRODUCTION

1.1 *Economic Theory and Statistical Pragmatism*

In many areas of economic analysis there exist observed discrepancies between theoretical concepts and empirical measurements. Partly, this arises because certain economic concepts, by their very nature, cannot be easily identified and precisely defined in recognized quantifiable units and partly, it arises because immense practical problems are often involved in measuring such concepts. For a statistical exercise to be of any practical value it is essential that the measured observations correspond as closely as possible to the economic phenomena that need to be explained. It is rarely sufficient to describe what is to be measured; it is invariably necessary to determine exactly how the measured concept is going to be used.

Whilst assumptions are necessary in processing data it should be recognized that when they come to determine to a large extent the results needed, then the information obtained is no longer derived from the basis of observation but merely reflects the implication of certain inferences or preconceived notions and judgements. It is also still largely true unfortunately that the choice of methods actually adopted in practice tends to be conditioned by the availability of data. This has frequently led to the use of only approximate measures which do not properly reflect the reality they are attempting to describe.

The solution to the measurement question requires the resolution of theoretical controversies and the formulation of an agreed set of precise definitions. In the area of capital theory not only do the empiricists and theoreticians disagree on

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important fundamental issues but also the theoreticians themselves—perhaps because they are essentially considering different things—cannot agree.

1.2 *Definitions of Capital*

Broadly defined, the concept of capital relates to the stock of domestic reproducible tangible assets that exist in a country. In principle it is a volume measure, referring specifically to the actual physical goods available for use directly or indirectly in economic activity on repeated occasions. But for practical and conceptual measurement reasons (since very detailed specifications of real capital are only rarely available) this volume measure is always calculated in "value" terms at constant base year prices. It should not be confused with the concept of capital most relevant to the financial operations of sectors and the analysis of the flow of funds within an economy. This difference is essentially a distinction between the economist's view of capital—a concept to be utilized in the assessment of physical production possibilities—and the businessman's or accountant's view that emphasises the role of capital as the financial resources which enables the possibility of production.

Inherent in the broad definition of capital are the notions of durability and the potential to contribute to future production, i.e. to yield future income benefits. But even this broad definition of capital normally excludes other important elements of national wealth (such as assets like land, sub-soil deposits of minerals and standing timber) which are also durable and contribute to future income. But although these assets are tangible, they are not reproducible and thus they are not regarded as forming part of the stock of real capital.

On the other hand, the stocks of inventories (materials and supplies, work in progress and finished products and goods owned by, and usually in the possession of, industries) are tangible and reproducible and they contribute to present and future output value. But they are not (for the most part) durable. Their role in the production process is also generally quite different and thus they represent a rather special category of capital. Their existence poses, however, several definitional boundary problems, particularly with respect to the conventional statistical classifications of work done on plant, machinery and equipment and construction projects but this particular technical question is not dealt with in this paper.

1.3 *Capital and Capital Stock; General Concepts and Problems*

The concept of capital in economics is both general and imprecise. Its theoretical role, particularly in the production process, remains shrouded in a veil of mystery and mysticism—reflecting to a certain extent the ideological controversy and confusion concerning its precise nature. But, in part, the problem of measuring capital also arises because the same term is frequently used to describe different functions.

The economists' use of various capital concepts and the statisticians' consequent interest in the technical problems of capital measurement arise from their combined concern to examine and explain many fundamental questions and issues not unique to the poorer countries.

These issues either presuppose or explicitly assume a different meaning to capital and each problem therefore attaches a different interpretation to the role of capital. As an initial general guide, it is suggested that the appropriate concepts

and measures to be used in attempting to resolve each of these respective questions are as follows:

Objectives and Problems (At the level of the national economy and sectors)	*Capital Concept/Measure Requirement*
1. Growth accounting and explanations of economic development in terms of the different contributions of the various factors of production.	Capital services; production factor value at constant base year prices.
2. The determination of a potential output trend in an attempt to measure cyclical fluctuations and quantify demand pressures.	Gross capital stock available valued at a given reference year's average prices.
3. The determination of factor income shares in output.	Capital services valued in base year prices.
4. Factor inputs and long-term projections.	Gross capital stocks and projected capital services.
5. The role of technical progress.	Capital services valued in base year prices.
6. Choice of techniques.	Gross capital stock: capital services and the value of the discounted future income flow of current capital stock at present year prices.
7. Forecasting and future demand for capital goods.	Gross capital stock and capital services at the same base year prices.
8. Sector and national balance sheets integrated to a system of national accounts, i.e. the relationship between stocks at the beginning and end of a period and those flows occurring within that period.	Net capital stock at current replacement cost.
9. Alternative cost evaluations; marginal rates of substitution	Additions to gross capital stock.
10. Manpower utilization and labour productivity; the relationship of capital to labour.	Gross capital stock and capital services.

2. Capital Estimates in Less Developed Countries

2.1 *Development Planning*

Information relating to the amount and composition of real capital in less developed countries is useful primarily in the construction of medium and long term economic planning models to identify possible development paths, i.e. production possibilities. This implies obtaining information about the quantity and quality of production plant and equipment and some knowledge of the possible relationships between factor inputs and outputs. In the short term, by

contrast, investment activity is assumed not to influence to any significant extent current production potential, and governments mainly have to overcome the problem of utilizing existing production possibilities that have already been previously determined by the quantity and quality of capital and investment activity in a prior period. Knowledge of the general relationship between the volume of real capital and total production capacity, however, would be significant for short-term planning.

2.2 *Capital and Output; Limitations to Use of Data*

But, from a purely practical viewpoint, there is no simple method whereby it is possible to relate precisely how much additional capital will be required in a given sector to raise the level of production by a specific amount. And even if it were possible to state exactly how much extra capital was needed (in real value terms) there would be no means of identifying what sort of physical capital was really required.

Two further factors arise in trying to determine any relationships between output and capital. The first relates to capital utilization; the second to technical progress.

In compiling the total value for the available stock of capital used in production it is assumed that each portion, i.e. standard unit value of capital, contributes equally—in terms of the time it is utilized—to output. But even when a plant is operated at "full" capacity it is well known that some capital is used for only part of the time (because of the need to maintain a "balance" or harmony in overall production) during any given production period whilst other equipment is perhaps continuously employed round the clock. In other industries, because of problems of labour working, or the difficulties of implementing shift systems, or the time specificity of demand (e.g. as in the services sector) the concept of "full" capacity may simply mean in practice, operating the available plant for only 8 to 12 hours a day. In attempting to define the relationship between capital and output, therefore, there arises a need to make the important distinction between the value of the actual inputs of capital into production, i.e. real capital service. Unfortunately, existing data on capacity utilization tend to be sparse, specific and largely unrepresentative of capital component use in different production processes taken as a whole.

The second problem arises because the "same" capital goods rarely remain identical in a technical sense over time. When new units of an existing capital good are introduced into production they often incorporate modifications and improvements which have been found necessary or desirable as a result of previous service use. Not only this, but the structure of the production process itself is modified with the experience of operation. In an era of rapid general technological progress, significant international marketing structure changes or innovative technical developments in a particular industry, the basic nature and identity of an item (although, perhaps, changing little in its superficial physical appearance) and the way it is produced may alter substantially. Moreover, when a certain piece of capital undergoes a major overhaul and refit (new spare parts, modifications) or an expensive maintenance service, or even routine repair, its "normal" working life can be considerably extended. In some cases, it may even emerge as a better (in

the sense that it incorporates perhaps a lighter or more efficient motor for example) piece of equipment. It will certainly be a different piece of capital. If the modification introduced enables the capital to be used to produce new or slightly different final goods, then the concept of any continuity in the identity of the capital service it generates is essentially destroyed. It also tends to undermine the value of making any capital-output ratio comparisons between industries over time.

The analysis of any results of empirical exercises which presume to relate identified factor inputs to actual or potential production cannot escape the combined dangers of irrelevance and ambiguity in both concepts and meanings. The use of a conventional production function model in the determination of output based on "real" inputs and product, although often incorporating several "explanatory" variables, essentially represents only a linear one-dimensional approach to the problem. It may assume away the most significant explanations and characteristics of performance in the process of aggregation and averaging of the dependent variables. At best, the interpretation of the results really has appropriate meaning only in an historical context. In the evaluation of the approximate order of magnitude of the investment requirements associated with a particular growth hypothesis, it is necessary to understand that the figures merely reflect a given state of the arts, an existing or average combination of factors of production and capital "mix" itself, i.e. the data yielded reflect a situation where the technical coefficients of production (which reflect a wide range of production techniques that have been built up over the past) are assumed to have remained unchanged over time in aggregate.

Nevertheless, in any long term projections of economic growth or measurement of production potential, economists and policy makers still regard it as an essential prerequisite to try and undertake an overall analysis of investment requirements, despite the known difficulties of verifying empirically the precise relationship between capital and output over any given period of time. This is because any projected investment programme, however imprecisely determined, has important implications for such strategic variables as present and future consumption, savings and the balance of payments.

3. Types of Capital Measurement

3.1 *Stock and Flow Measures of Capital*

In any analysis of the role of capital in economic activity, it is necessary to draw attention to the need to distinguish between a stock concept of real capital (capital as wealth—a measure of the total available capacity to contribute to output at a particular time) and a flow definition of capital input (capital as a factor of production which varies over time). In terms of explaining economic growth and the respective roles of capital and labour in production in different industries of the economy, primary interest should be concentrated on the problem of measuring the flow of capital services which contributes to current output. But, in the majority of historical investigations, it has been the value of the identified total capital stock that has been estimated in empirical studies. This choice has probably been made mainly on the grounds of convenience rather than of principle. This, combined with an inadequate specification and identification of

the particular economic hypothesis and model chosen, has tended to reduce the value of several empirical exercises.

3.1.1 Stock Measures

(a) *Gross capital stock* represents the total volume of the existing physical assets available in a country; it reflects the original new cost of capital revalued to a suitable reference year's replacement cost prices. Complications occur in the treatment of sales of second-hand capital goods; the evaluation of accidents, scrappings and retirements, and the classification of specific repairs and maintenance expenditures.

(b) *Net capital stock* represents the cumulated "depreciated" value of the existing gross stock of capital. It makes allowance for the fact that some of the services of capital have expired. Capital stock values depreciate with increasing age because, as they grow older, capital goods have progressively fewer years of unexpired life in which to contribute to future production and thus generate income. It is loosely related to a balance sheet definition of capital which represents the notional remaining income-generating capacity of the existing capital stock (since it implicitly reflects the vintage composition of that stock and the number of years of productive life still assumed to be left in it). But it relates more to historical cost and past use rather than to future benefits and potential capacity and if accountants' depreciation allowances are used then these will merely reflect their method of spreading anticipated capital replacement costs (by identical assets) at unchanged prices over the lifetime of existing assets.

3.1.2 Flow Measures

(a) *Capital factor input* relates to the estimated real production factor value of capital and is designed to reflect the actual use of the capital stock. It is derived from the gross capital stock figures by making suitable adjustments for changes in the efficiency of capital and estimated capacity utilization of assets.

(b) *Capital consumption* is a proxy measure of the annual capital service utilized (and used up) each year of the asset's lifetime. It provides an indication of the relative importance of different types of capital of various vintages to the annual production process since it takes into account both the lifetime and the original value of the asset. The physical use of assets is rarely directly observable (and hence measurable) because it is primarily the services of the fixed assets that are used up and not the capital itself.

(c) *Potential capital services* refer to the annual value of the capital inputs inherent in the different vintages of capital which comprise the present total stock available for future productive purposes. It reflects the potential income flows to be derived from assets with different expected lifetimes. A rate of discount must be selected which sets the present value of capital equal to the discounted value of the expected future yields from the equipment installed.

4. The Statistical Measurement of Gross Capital Stock

The primary intention of this paper is to concentrate specifically on the methods of obtaining estimates of the *Gross Capital Stock*. Such series can be derived in four main ways:

4.1 *The Perpetual Inventory/Chronological Investment Method*

Capital stocks can be regarded as an aggregate of flow items relating to the historical pattern of physical investment, i.e. as cumulated past capital formation adjusted for permanent breakdowns, demolitions and normal retirements. Such series also have to be revalued at some chosen base year prices. In principle this widely adopted technique represents no more than a form of simulation model, usually of varying degrees of sophistication. It is generally referred to as the "perpetual inventory method" or "chronological investment method" of estimating gross capital stock. The adoption of this procedure depends very heavily on the availability of good annual fixed investment data extending back over a long period of time and classified by industry, sector and asset. The required length of each of these time series is conditioned by the length of life of different categories of capital objects. Even in less developed countries this could mean as much as 120 years in the case of structures and perhaps about half that period for certain equipment. Relevant capital lifetime data and good representative price series for different groups of capital goods extending back over long time periods are also essential data. But like all simulation models, the inherent accuracy and validity of this technique depends entirely on the nature, value and relevance of the basic premises and assumptions incorporated into the model's formulation. For the greatest precision and reliability it is desirable to sub-divide the gross fixed capital formation estimates into as many different industries and capital objects as possible because then more specific and appropriate survival curves and price deflation series can be applied to the investment figures. It is sometimes possible to check such derived estimates of real volume against more direct methods of estimation of certain groups of capital stocks obtained from specific surveys.

4.2 *Comprehensive Census of Physical Assets*

The direct method of obtaining gross capital stock figures is to carry out a complete census of physical assets to estimate their current worth and age. In most countries, let alone less developed ones, this would be a mammoth statistical task and an extremely expensive venture. Even if such surveys were confined simply to the manufacturing sector and were conducted on a sample basis, the practical data collection problem would still be immense. The benchmark data must then be regularly updated using annual gross fixed capital formation series adjusted for actual (not accounting) discards of capital. This procedure does not in any way circumvent the major problem of selecting a common and uniform valuation basis for the process of cumulation. In any given stock of capital at a particular time there will be items of equipment that have been acquired at different times in the past and at different prices. Accountants, although readily able to provide records of depreciated historical cost values (determined either by internal, financial or industrial convention or the existing—but often variable—company tax laws in operation at the time) for the capital equipment employed in their enterprises, are generally unable (or unwilling) to estimate the real current market value of a particular asset or some other commonly defined economic value. Essentially, enumerators must estimate what it would have cost in the base period to produce or acquire such capital goods new.

4.3 *Survey of Book Values*

Other methods of capital stock assessment tend to be similar but are often only partial and incomplete measures. The most common method, viz. to conduct a census or sample survey of reported book values of fixed and circulating assets at a given date, is limited in both scope and coverage. it does not really represent a real gross capital stock valuation but a "net" one. It is of limited current use mainly because the overall evaluation is drawn up on different bases and assumptions. Without the subsequent revaluation of the data into the prices of the given base year (an exercise fraught with both conceptual and practical complexities) the information has little significance for economic analysis.

4.4 *Survey of Insured Values*

Another basis of valuation which uses census methods is to compile insurance statistics relating to fixed assets values. These tend to generate capital values on a hypothetical replacement cost basis but frequently a depreciation element is included. In addition such valuations are often only available for the more important pieces of equipment and for buildings. At the present moment, insurance values will be especially affected by inflation. It is extremely difficult to derive a suitable price deflator for insured values in a period of rapidly rising prices because anticipated price increases are sometimes taken into account when attempting to revalue capital while, at the same time, other firms don't update their insurance valuations.

Other methods of stock measurement do exist but they are not comprehensive. For example, a composite index of reproducible tangible assets based on certain identifiable physical characteristics of capital, e.g. acreage of improved land, number of buildings, number of machines, etc. could be compiled. It would have to use appropriate weights such as relative cubic capacity, horsepower rating, tractive effort, yields, speed, electricity power use, heat units, etc. but it could relate to specific assets belonging to certain industrial sectors, e.g. locomotives. As such it would provide a suitable check on other estimates and constitute a basis for interpolating and extrapolating capital series.

Another method of estimating the net value of resources allocated to capital would be to cumulate—in much the same way as with investment expenditure in a perpetual inventory model—the annual net savings of units. In practice, this information would not only be ambiguous but also even more difficult to obtain than data relating to investment outlays.

5. The Perpetual Inventory Method of Estimation

5.1 *Scope*

In most countries (other than Japan and the centrally planned economies) that compile gross capital stock figures the majority of the estimates are indirectly calculated according to the perpetual inventory method on the grounds of cost and convenience. Normally there is a ready availability of gross fixed capital formation figures. The coverage of the gross capital stock estimates both in principle and in practice is determined by what is included in the gross fixed capital formation

estimates. The bases of calculation of these estimates are known to vary between countries. There are also other problems of a more general conceptual nature concerning the average length of life of equipment and the distribution of capital retirements around the average.

5.2 *Length of Life Assumptions*

An important potential source of error in perpetual inventory estimates arises from the need to make assumptions about the average length of life of different types of capital asset. There are three basic issues involved:

(i) The average age of each asset must be determined.
(ii) Survival functions for similar or the same groups of assets have to be estimated; i.e. the distribution of retirements has to be calculated.
(iii) The survival function for a particular type of asset has to be examined to ascertain what *parts* of the original asset are normally retired and replaced after different periods of time.

Related to these three distinct issues are the questions of durability and quality change which must be dealt with separately in any proposed model.

It is not the intention of this paper to deal with any of these specific issues as there are more fundamental reasons why this method of enquiry cannot be adopted in less developed countries to estimate the gross capital stock.

5.3 *Problems of Derivation in a Less Developed Country*

What clearly emerges from the above procedures and methodology is that most developing nations have insufficient capital formation data and inadequate price information to compile a perpetual inventory model of their capital stocks. The capital formation figures are usually neither sufficiently detailed by asset, sector and industry nor sufficiently comprehensive to enable a proper and meaningful analysis to be undertaken. And, much more important, such series rarely extend back far enough for a complete inventory to be compiled.

Frequently, gross fixed capital formation series are derived on a commodity flow basis using a broad economic end-use classification of imported goods combined with estimates of the value of local equipment production and the domestic construction of buildings, power lines, etc. The amount of private sector investment is usually obtained only in total as a residual (though sometimes with approximate breakdowns for the various categories of assets) by deducting known public sector capital formation in different assets from the total GFCF estimates calculated on this basis. This means that a detailed breakdown of assets according to the industry acquiring them (which may not always correspond exactly with the industry which eventually uses the assets concerned) is not possible. But this is necessary to make reasonably realistic assumptions about both the average length of life of the equipment installed and the pattern of retirements. Furthermore, it is probably in relation to specific industries that measures of output and capital will be most meaningful and useful to a less developed country.

It is usually possible to obtain estimates of average asset lives by examining the tax regulations relating to the depreciation of capital but here a number of other important problems tend to arise.

(a) In general, the implied lengths of lives of different assets according to the official tax depreciation laws are much shorter than the assets' actual working lives.
(b) The tax depreciation laws may have been transferred "en bloc" from a "colonial" administration's own statutes. It may therefore bear very little relation to the actual asset life in an overseas developing country where there are often significant differences in the ecological and economic conditions of production.
(c) The tax depreciation laws in LDCs are often devised with the objective of stimulating a rapid growth in investment rather than to reflect firms' needs for replacement capital.
(d) The tax depreciation allowances may be far too general and not permit any distinctions to be made between the uses of different (or the same) machinery, etc. in different industries.
(e) In the case of some assets, variations are permitted for different geographical regions.
(f) The tax depreciation allowances tend to be used as a tool of budgetary economic policy (e.g. to squeeze corporate cash flows) and they may be subject to variation.

Companies' own provisions for depreciation in their financial sets of accounts will sometimes be very different from those formally provided for under the existing official tax legislation. This may be for reasons of internal accounting, continuity, reserves policy, intra-firm transfers, particularly to foreign branches, tax evasion, etc.

In "well established" developing countries there is frequently, by definition, a substantial volume of capital that has been in existence for a century or more. This applies particularly to buildings and structures such as the transportation infra-structure. But capital formation figures rarely go back that far. It is perhaps possible to assume that these assets were primarily constructed by the then "colonial" administration (although this was not always the case) and that therefore the capital outlays involved must have been recorded somewhere in the official public records of annual capital expenditures. But even if such information could be obtained it must be recognized that there is probably a significant overlap between recurrent public works expenditure and new investment expenditure.

The problems of compiling relevant long period price indexes to deflate any derived current price historical cost data in this situation are almost overwhelming, especially if the country concerned normally imports most of its capital from different sources and these trading transactions have been subject to currency fluctuations.

Given that investment data are scarce and fairly unreliable or totally non-existent before a quite recent period it is perhaps pertinent to ask whether this really matters. It could possibly be argued that the relationship between capital and output was relatively static in the pre-Independence colonial period in many LDCs and, therefore, investment (and hence capital) could be estimated on the basis of production. Whilst this may be true at an overall macro-economic level (though some would undoubtedly criticize such an assumption and object that it begs the question) it probably does not apply to different industries (and specific-

ally modern enclaves) in these countries. But, equally important, the production figures required generally do not extend far enough back. It could also be argued that much of the investment undertaken before, say, Independence, was fairly insignificant and possibly mainly in public structures. Even if it is of a highly durable character, such capital is bound to represent an increasingly smaller proportion of the total stock in existence and so errors in its compilation will become less and less important in assessing the real volume of present capital. In many developing countries, however, the character of investment changed after Independence and for any industrial or sectoral analysis of development and economic growth it would be wrong to ignore such prior capital formation.

Theoretically, especially with the more precise commodity definitions associated with the BTN, it would be possible to deflate the different asset value series calculated by applying an average unit value index to each asset imported. But, even assuming that comprehensive trade data relating to both quantities and values exist, most trade classifications are generally insufficient to avoid the conceptual problems posed by changes in the composition and quality of the equipment imported. In the case of structures it would be necessary to derive a series of construction cost index numbers for each type of building, road, dam, etc. suitably adjusted for productivity improvements.

6. Censuses and Surveys

6.1 *Secondary Data Sources: Scope and Limitations*

The inherent difficulties and seemingly overwhelming complications involved in trying to estimate gross capital stocks using the perpetual inventory method in LDCs leads most investigators to think in terms of conducting a special survey of capital assets. The danger here, however, is that because of severe cost constraints, the enquiry never proceeds beyond the collection of the data that are reasonably easy to obtain and this usually means information relating to asset values recorded in financial books of account. Such surveys have tended to be conducted in association with more general censuses of industrial production and, thus, usually they have been confined to only one (admittedly important) area of economic activity. Agricultural operations, transport and communications, services, and an important area of government activity are generally excluded. Furthermore, the usefulness of aggregate capital asset book values which have been adjusted for cumulated historically permitted depreciation allowances are very questionable.

Sometimes it is possible to obtain better information than that incorporated in the "published" books of account of registered companies by examining their "schedules of fixed assets" which they are often required to submit to the tax assessment authorities. These usually give the depreciated value of each asset at the beginning of the year, the depreciation rate used and the equivalent current allowance claimed in value terms, and the book value at the end of the year, appropriately adjusted for the accumulated depreciation that has occurred to date. Since the schedule has normally to be compiled for each asset and not just a broad group of assets it provides a means of deriving the original historical cost of

an asset, its vintage and (if the depreciation rate can be taken as a reasonable guide) its expected future life. Unfortunately, the method falls down, in that it is not possible to obtain any information relating to assets which are currently still actively employed in the production process but which have already been fully depreciated. Secondly, it is not possible to obtain figures for assets like buildings on which, often, no tax depreciation provision is allowed. Thirdly, it restricts the scope of enquiry to those institutions which are statutorily required to submit tax returns or register their firms; public corporations, government enterprises, non-profit making organisations and other economic units (such as small businesses) engaged in similar productive economic activities are usually excluded.

6.2 *Primary Direct Data: Practical Problems of Implementing Surveys*

If, because of the difficulties of using secondary data sources, it is decided to conduct a direct survey and collect primary data, then the enquiry inevitably runs into the problems of costs. It is necessary to draw up working definitions so that respondents can understand the objectives of the survey and the nature of the information required and so they can actually provide answers to the questions posed. The difficulty is that value questions will be interpreted in an accounting context and will generally raise all sorts of problems of interpretation if specific questions are put relating to "replacement cost" by similar machines, "current market value", "expected lifetime", "scrap value" etc. Accounting conventions and practices vary widely in LDCs where the most important producing units will almost invariably be branches or subsidiaries of international corporations with their headquarters based in different countries where different company and tax laws operate. Not only this, but many of these companies adopt special forms of affiliated operation, branch or subsidiary accounting for their overseas units with the primary purpose of maximizing their *overall* potential tax gains and minimizing their possible asset losses. The heterogeneous character of business accounting methods and the varied methods of asset valuation tend to undermine comparability and make it difficult to establish a common basis for both cumulation and revaluation purposes.

The only feasible alternative in LDCs, it seems, is to conduct a comprehensive survey of the physical assets employing especially trained enumerators and evaluators who will be able to estimate current capital values, age and expected lifetimes of different machines, structures, etc. Such a proposition has usually to be ruled out on the grounds of cost and skilled manpower requirements even in countries which possess comparatively few capital assets.

6.3 *The Lesotho Survey: Special Difficulties*

In June 1974 official approval was given to conduct a small scale survey of firms in Lesotho to ascertain the value of the total industrial capital stock in the country. Additional arrangements were made to cover the public sector enterprise activities. A small grant (of approximately $450) was awarded by the university to cover the expenses incurred in travelling between firms and a handful of selected 3rd and 4th year economics, accounting and statistics degree students were organised to conduct most of the initial enquiries and interviews as part of their

formal programme of studies. Unfortunately, because of circumstances beyond any individual's control, it was not possible to complete this study, but the investigation proceeded far enough for some useful feed-back to be obtained concerning the problems of carrying out this sort of enquiry.

Lesotho is one of the officially classified "least developed" countries in the world, and, as such, it has not acquired a very substantial capital asset structure. Although the general and conceptual problems of capital stock estimation apply equally to large and small countries alike, it was hoped that the practical problem of data collection by direct survey in Lesotho would not be too immense. The precise location of the majority of survey units was known and transportation firms and trading stores were to be excluded in this initial study (thereby avoiding, it was anticipated, some of the bigger headaches). This left the surveyors with the task of interviewing an estimated 112 different sized firms listed in the statistical office register. Still omitted, however, were several important mission-run private non-profit making enterprises in printing and publishing, trade and furniture manufacturing, but these were going to be dealt with separately at a later stage.

It should perhaps be mentioned at the outset that the perpetual inventory method of evaluating capital stock was initially considered but rejected because the official capital formation series for the industrial sector seemed totally inadequate and was only available for a period of about ten years. Import data relating to estimated quarterly acquisitions of machinery and equipment on the basis of broad SITC sections was also available for a slightly longer period but were still regarded as inadequate and probably incomplete because of the methods used to compile trade statistics data in the country. Lesotho is a land-locked country in Southern Africa and it belongs to a common customs union which embraces South Africa, Botswana and Swaziland. It has no effective formal customs checks and controls and most import data are provided directly by means of questionnaires completed by the companies themselves. Tariff rates and sales taxes (Lesotho also belongs to a common currency area and shares implicitly the indirect tax structure imposed by South Africa) are variable and this presents a further major problem in determining suitable price deflators for plant and machinery to reflect changes in the real volume of capital.

The first problem encountered in the survey was that it was suspected that the survey frame, the list of registered enterprises, was incomplete. In some respects, it did not properly define the appropriate ISIC actively pursued by a firm. This is a common problem, not unique to developing countries, but to compile a total inventory of the industrial capital stock in a country it is clearly necessary to have complete coverage.

Secondly, it was found that some of the firms originally excluded actually carried out production activities. This applied particularly to the case of trading firms which milled grain as well as engaging in a number of other raw material processing activities. They also generated electricity and constructed roads, dams, wells and buildings. It was also discovered that some bus operators built their own buses using imported lorry and bus chassis and undertook their own major repairs, including the machining of parts.

Thirdly, the accountants and operators of enterprises, when specifically questioned on values, invariably referred either to their latest set of accounts or to

their last tax return. The questionnaire (copies of which were circulated to members of the Chamber of Commerce and to the relevant interested government departments before the survey for information and comment) contained space for the enumeration of every capital asset. Details relating to historical cost, year of purchase, new or second hand acquisitions depreciation rate, current market value, replacement cost and insured value were requested for each asset. Most balance sheets could only show—for the broadest groups of assets—the current cumulated depreciated value and annual depreciation rate (which was an almost uniform 25 per cent for all plant and equipment and vehicles). Buildings were generally insured but not, in many instances, the associated plant and machinery (or production stocks) and it was felt that some of the insurance values were probably out of date at the time of the survey. The interpretation of "replacement cost" was widely questioned and not easily understood. In a few cases it was even thought to be irrelevant and in most cases it had not been seriously considered except in relation to the need to provide for a conventional depreciation allowance to "renew" an asset when it wore out. Many of the reported values (insurance, replacement, etc.) had been determined at a head office level in South Africa.

Fourthly, because of the often small-scale nature of the enterprises, the distinction between intermediate purchases—chargeable as current expenditure to the profit and loss or manufacturing accounts—and what normally constitutes a capital outlay was blurred. What some small firms regarded as capital, e.g. small tools, office equipment, etc., would not normally be incorporated into estimates of the capital stock but it must be admitted that the conventional national accounting demarcation lines, *as they apply to the less developed countries*, where the small firm predominates, are perhaps somewhat arbitrary. On the other hand it seemed likely that, because of the physical and economic nature of the country, significant own account maintenance and repair expenditures (particularly to structures) might have been recorded as current outlays rather than capital expenditures.

Finally, whilst initially giving their enthusiastic support to the study on the grounds that it would help government to identify the specific industrial investment requirements necessary to set Lesotho firmly on the path of more rapid development (and perhaps lead to encouraging changes in policy) their interest cooled rapidly when the Minister for Commerce, Industries and Tourism announced his intention to nationalize the assets of all the European trading stores in the country. The survey, with its various requests for different asset valuations and backing from the government (although an entirely independent enquiry) was regarded by individual operators with considerable suspicion and obvious distrust. This underlines a possible drawback of first obtaining government support and approval for an investigation before going ahead with the detailed organization of the survey.

Even though capital stock estimates are useful for planning purposes because they can be used for evaluating future sectoral income flows in project appraisals and for determining future production potential and investment programmes in different sectors, the problems and costs involved in carrying out a comprehensive gross capital stock survey are thought to be excessive in relation to the returns. There seem to be far more important practical issues relating to the problems of

poverty, income maintenance and distribution, regional imbalances and employment (all of which it should perhaps be admitted are not unrelated to the question of capital stock distribution) demanding a higher statistical priority. Furthermore, from a practical economic viewpoint, there appear to be many exogenous factors operating in the international economic environment (over which the low income countries have very little control) which have a greater influence over the pattern of autonomous or pre-determined growth than any domestic policy induced development programme based on identifiable relationships between labour and capital.