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# Business Plant and Equipment

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THE tables in the national income volumes of the Department of Commerce which present annual estimates of private domestic investment in producers' durable commodities and new construction have become indispensable source material for all students of real capital formation in this country. The papers contributed for this Conference have shed new light on a number of conceptual and statistical problems in this field. My observations will be primarily directed toward estimates of gross investment in business plant and equipment. Capital consumption and the relation between gross and net real investment in the national accounts will also be considered.

## NID VERSUS SEC-COMMERCE STATISTICS OF BUSINESS INVESTMENT IN PRODUCTIVE FACILITIES

For quite some time, the tabulations of the National Income Division on gross private real investment have in a sense been competing for the user's attention with a second official source, the annual and quarterly estimates of the Securities and Exchange Commission and the Department of Commerce on plant and equipment expenditures by nonagricultural business. Here as elsewhere, the coexistence of two official statistical sources, which cover roughly the same ground but differ so greatly in underlying definitions that "adjustments to secure comparability cannot be made in a fully satisfactory way,"<sup>1</sup> has not been an unmixed blessing. Since, however, this coexistence without reconciliation must be expected to continue for some time, it might not be amiss to summarize briefly the comparative merits and limitations of either source for the purpose of analyzing real investment by business.

Neither of the two sources yields estimates of total business capital investment without some processing of the material. To the SEC-Commerce series, estimates of plant and equipment expenditure by agricul-

Note: Views expressed in this paper are those of the author, and do not necessarily reflect those of the Machinery and Allied Products Institute.

<sup>1</sup> *National Income Supplement, 1954, Survey of Current Business*, Dept. of Commerce, p. 127.

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ture must be added. The NID equipment expenditure series covers both farm and nonfarm equipment, but admittedly includes some equipment purchased by (private) nonbusiness groups—professions, and so forth. Although such purchases of producers' durables probably represent only a "fringe" component of the total, their segregation would be desirable. Business plant construction is included in the SEC-Commerce data, but without segregation. On the basis of the NID material, total new business construction can be approximated by combining in the tabulation of construction activity (Table 31 in the *National Income Supplement, 1954*) the subgroups in which private business predominates. Since some subgroups, such as hotels, are grouped under "miscellaneous" together with others that are probably not "business," further refinement in the breakdown of this table is desirable. An advantage of the SEC-Commerce data lies of course in the fact that they are subdivided into industry groups, whereas the NID data provide such information only for construction. Further, aggregates of business capital formation derived for recent years from the NID tables are less homogeneous than the SEC-Commerce totals. In the former, the equipment component represents predominantly commodity flows (values of actual producers' sales, adjusted to approximate final costs to users), whereas the data on business construction, except farm and public utility construction, are based on contract awards, although with some adjustment to allow for the normal time lag between contract award and start of actual building. However, SEC-Commerce figures are based, for plant as well as equipment, on direct estimates of actual outlays as reported by business.

For some purposes, such as comparing forecasts of business capital expenditures with actual outlays, the SEC-Commerce tables are, and will continue to be, the appropriate reference. On the other hand, the NID material will inevitably be preferred as a basis for analyses involving developments in the past. The equipment series extends back to 1929, the construction series to 1920 (or, with less complete classification, to 1915), without much change in basic sources and methods throughout. For equipment at least, extension further back is possible in a relatively satisfactory manner by linking the data to William H. Shaw's long-range series of domestic expenditures on producers' durables, which are reasonably comparable with the NID material since they, too, were derived by commodity-flow estimates. The SEC-Commerce series goes back to 1945 only (apart from an isolated special tabulation for the year 1939). Attempts to carry the series further back by means of estimates from other compilations are bound to yield a seriously non-homogeneous series, with post-1945 figures based on company reports

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and pre-1945 data relying wholly or largely on commodity flow estimates.

### BUSINESS CAPITAL OUTLAYS CHARGED TO CURRENT EXPENSE

Business customarily charges to current expense purchases of small, short-lived types of equipment, expenditures for oil and gas well drilling, and outlays for research and development, although in important respects they represent capital investment. The conceptual and statistical problems connected with expenditures for oil and gas well drilling are extensively dealt with by Joseph Lerner. The following remarks are confined to the questions of principle involved in the treatment of expenditures for short-lived tools, and for research and development.

It has been the practice of the NID ever since 1947 to treat as capital investment the outlays on all productive real assets having an average service life of at least one year,<sup>2</sup> and to raise capital consumption allowances by the estimated depreciation of equipment which business presumably does not capitalize. Capital outlays charged to current expense are shown as a separate exhibit which is a vital statistical aid to all whose definition of "fixed capital" excludes items with an average life of, say, one or two years. For some time the NID seems to have considered accepting the business practice for their own accounts, and Kenneth D. Ross in his present paper recommends that they should do so. According to him, the present NID procedure involves double counting: "Since business customarily charges these items to expense, they are reflected in prices and so are diffused throughout the outlay aggregate" (page 281). This reasoning is perhaps open to question. Since the expenditures involved are true costs of production, they would be reflected in prices in any case, even if it were business practice to capitalize them. In that event customers would be currently charged less for direct costs of fabrication, but more for annual amortization of business capital. If a similar treatment by the NID would not involve any double counting, and Ross' reasoning implies that it would not, it is difficult to see why the present practice should lead to double counting now. The real duplication problem, which will be touched upon later, does not originate in the difference between capitalized and expensed purchases of facilities, but in the fact that part of the purchased facilities, whether capitalized or expensed, represents replacements and therefore, in a sense, intermediate products. Leaving this question aside for the moment, something may be said for the NID position that for

<sup>2</sup> This is another difference between the NID series on capital formation and the SEC-Commerce data. The latter include only capital investment which business reports as such.

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their specific analytical purposes, once their economic definition of capital was adopted, the accounting habits of business could not be regarded as a final criterion in the matter.<sup>3</sup>

For research and development outlays, the NID follows what it rightly assumes to be the prevailing business practice in keeping them, when privately financed, out of the capital accounts. Certain considerations can, however, be adduced in support of the suggestion to include research and development costs in the national investment accounts, with appropriate per-contra entries on the income (charges-against-gross-product) side.<sup>4</sup> To the extent that these expenditures "pay," they have at least as strong a claim to be regarded as investment in the nation's productive potential as have the outlays for small tools, dies, etc., which the Division does capitalize. If the expenditure totals can be reduced by an estimated allowance for the normal amount of unsuccessful experimentation, the balance may without any artificiality be thought of as a net addition to an intangible but nevertheless real stock of durable means of production. A further consideration relates to the problem of formal consistency in the network of national accounts. Under the present setup, two classes of expensed business outlays that are intrinsically similar in their quasi-capital-forming nature, are treated differently. Moreover research and development outlays financed by government *are* included in the national accounts, and do form part of gross national product. It is certainly undesirable that a difference in the financial source should on the expenditure side lead to so fundamentally different a treatment of outlays which in all other respects belong to the same category.

The difficulty of obtaining acceptable estimates of private research and development expenditures for the pre-World War II period may be a factor in the NID's reluctance to attempt the reclassification. This would be understandable, for if the change were to be made, it would certainly be desirable to carry it through the whole time span covered by the NID series, that is, back to 1929. There is some chance that in the course of the new comprehensive study by the National Science

<sup>3</sup> With respect to this first group (small tools, etc.) the whole question is now of less quantitative significance than it was a few years ago. In the process of a recent revision of the category "capital outlays charged to current expense," a number of formerly included items were eliminated because they are now regarded as wholly or partly intermediate products. As a result of this revision, which has been extended all the way back to 1929, the new series of expenditures coming under this category runs consistently and substantially below the old series.

<sup>4</sup> This treatment of research and development outlays has been advocated by John W. Kendrick in "National Productivity and Its Long-Term Projection" (*Long-Range Economic Projection, Studies in Income and Wealth, Volume Seventeen*, Princeton University Press for National Bureau of Economic Research, 1954, p. 80).

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Foundation on research and development, historical information reaching back into the thirties will be gathered, although probably not with the broad coverage attempted for recent years. Should satisfactory data on private research and development expenditures after 1929 become available, the NID might want to reconsider its treatment of these expenditures. If it is then decided to include them in the estimates of capital formation, it would be preferable to show them separately so that it would still be possible to derive figures on business investment in tangible capital.

### ALLOCATION PROBLEMS

Two major allocation problems are involved in the NID derivation of expenditures on producers' durable goods. One of them, whose solution affects both the total of these expenditures and total gross national product, is the allocation of "mixed" commodities to the three classes (finished) consumers' goods, (finished) producers' goods, and unfinished commodities. This does not give rise to any question of principle, and there is no reason to doubt the NID's statement that the recent revision in this area—transfer of a number of items from finished producers' durable goods into the intermediate class—represents an appreciable improvement. The second main problem, whose solution affects total equipment expenditures but leaves total gross product unchanged, is the allocation of durable goods used by both consumers and business, to consumers' and producers' goods, respectively. Quantitatively, the most important question here is the percentage of newly produced passenger cars to be allocated to business use. Of the annual totals of new passenger cars (after a deduction for governmental purchases) the NID allocates 70 per cent to consumers and 30 per cent to business for each year outside the war period, 1942-1945. Questions about these percentages have sometimes been raised, and staff members of the NID have agreed in conversation that no stable, inflexible percentage allocation of automobiles can be very satisfactory. In 1946, when passenger cars were still hard to get, the percentage going to business was probably higher than in later years, when the supply was again plentiful. Given the enormous volume of passenger car output in the last few years, even a moderate change in the allocation percentages would be of some importance for the statistics of gross capital formation. Thus, in 1953, total gross private investment in producers' durable goods would have been reduced by about 3 per cent if 25 per cent rather than 30 per cent of new passenger cars had been allocated to business. It is hoped, therefore, that the NID will soon find ways to refine its annual estimates of this distribution.

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The problem of allocating passenger cars emphasizes the desirability, in national income statistics, of harmonizing the treatment of producers' and consumers' durable goods by treating even the latter—all of them, and not only residential structures—as investment goods. It has often been said that in principle this treatment is appropriate for all goods that yield their services in “installments” spread over several accounting periods, whether the services contribute to consumer satisfaction directly or indirectly (as do those of producers' commodities) is not the decisive criterion here. In the case of passenger automobiles, we have now the particular anomaly that outlays for an identical type of durable commodity, having identical (average) durability, are treated as investment when incurred by one group of users and as current expenditure when incurred by another group. Thanks largely to Raymond W. Goldsmith's new study of savings, we may now be closer to the day when it will be possible to overcome the obstacles which have so far prevented the NID from accounting for consumers' durable goods as investments.

### GROSS AND NET REAL INVESTMENT IN THE SYSTEM OF NATIONAL ACCOUNTS

Ever since 1947, gross capital formation (comprising both expansion and replacement) has been integrated into the double-entry framework of the NID accounts. Now there exists a fairly general consensus that the inclusion of replacement expenditures is not fully reconcilable with the general rule of non-duplication on which this framework is built. Hagen and Budd as well as Ross have stressed the point in their papers, and the NID itself has stated it more than once.<sup>5</sup> The duplication is due to the fact that the value of the replacement investment, which is included in the gross capital formation series and thus forms one component of gross national product, is at the same time reflected in the valuation of another component, namely, current output of final consumers' goods and services, the prices of which include allowances to offset the current consumption of fixed capital. In one respect this statement needs qualification. Although as a general rule business nowadays includes depreciation allowances in the supply price of its output, this does not in all cases secure their inclusion in actual market prices. In times of deficient demand, business may be unable to recover in the sales values the current consumption of its fixed capital. In general, however, it is legitimate to assume that the depreciation

<sup>5</sup> At least as early as 1951; cf. *National Income Supplement, 1951*, pp. 23, 27. More recently, in virtually unchanged paragraphs, in *National Income Supplement, 1954*, pp. 31, 43.

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allowances charged by business are being "earned," and to the extent that this is true, gross national product as built up in Table 2 (pages 162, 163 of the 1954 *Supplement*) is not a strictly nonduplicative total as defined in Part II (*ibid.*, page 30).

Those who, for this or other reasons, regard net national product as a more meaningful concept, will be particularly interested in the NID's capital consumption data. Two questions have been in the focus for some time: (1) Should the business component of the NID series of capital consumption allowances be based on independently derived estimates rather than, as it now largely is, on depreciation charges in the financial records of corporations? (2) Should the estimates for capital consumption in nonfarm business be valued at current prices rather than, as now, at original cost? For most (though perhaps not for all) purposes, independent estimates, valued at current prices and based on a time distribution of capital consumption more realistic than the traditional straight-line pattern, would have much to commend them. On this point the majority of expert opinion seems now agreed. Important spadework in deriving such estimates has already been done, both by the NID itself and by other research groups. Whether it is feasible at the present time to integrate such estimates into the national accounts is difficult for an outsider to judge.

### THE PROBLEM OF THE "IMPROVEMENT FACTOR" IN EVALUATING REPLACEMENT DEMAND

One fact that seems to have contributed to the NID's hesitancy in undertaking this final step is the still unsettled and controversial state of the "improvement factor" problem. While an extensive discussion of this problem is beyond the scope of this paper, one general observation may be permitted.

The concepts "replacement demand" and "maintaining capital intact" are among the most elusive in all economics, but this much is clear: they inevitably mean different things to the businessman on one hand, and to the theorist or the statistician working on national income problems on the other hand. To the businessman, "maintaining capital intact" means, and can only mean, maintaining intact the ability of the capital to yield quasi-rents, that is, to produce net profits. Whether its capacity to produce a specified amount of physical output has been kept intact is not a usable criterion for him. In a competitive business economy, an entrepreneur who would merely "replace" in the physical-capacity sense, who would fail to keep pace with the general rate of increase in productivity, would soon find himself left without any net earnings whatever. The businessman who replaces a machine installed



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fifteen years earlier by one which in the physical-capacity sense is as efficient as the discarded machine was when new, has in the majority of cases *not* maintained his capital "intact" in the one and only sense that is relevant for him. If the discarded machine in its own time enabled him to earn a normal rate of profit, the chances are that its mere equivalent in (initial) technical efficiency would now yield at most a small fraction of that rate. This consideration necessarily determines, first of all, the businessman's valuation of the productive capacities that are currently—though invisibly—disappearing by "wear and tear." He may be perfectly aware of the fact that, in terms of physical productivity, \$100 reinvested today normally do more than merely replace disappearing capacities which were installed ten years ago and whose installation value, after correction for changes in the general price level, amounts to \$100. But this fact is not a valid reason for him to evaluate the current disappearance of these capacities, or the financial provision required to offset the disappearance, at less than \$100. In terms of ability to yield quasi-rents, this much and not a cent less is now required to replace these outgoing capacities by something equivalent. As for those remaining in place, their gradually accruing obsolescence exposes them to ever-increasing competition from technically superior assets installed elsewhere, and thus reduces, year by year, the quasi-rents they can yield while still in service. Hence, by all rules of correct accounting, the businessman must enter allowances for this mounting obsolescence against income on an accrual basis.

The approach of the tax legislator and the Internal Revenue agent to the problem of capital recovery in a competitive and dynamic economy is based, or at least ought to be based, on exactly the same considerations. For the economist in a national income division, however, it is perfectly natural and legitimate to see the whole matter in a different light. To him, the nation's real fixed capital is an instrument in producing a flow of physical output. The capital has been kept intact if the flow it is capable of producing, or the money value of this flow at constant prices, has not declined.<sup>6</sup> Whether the ability of the capital goods to yield quasi-rents to their owners has remained unimpaired is a question which he has a right to consider irrelevant for his analytical purposes. So he may well find that business depreciation charges which include allowances for the obsolescence accruing on existing productive facilities, overstate what in his conceptual frame of reference is the true replacement demand. Likewise, he may well feel that he would be over-

<sup>6</sup> This is true so long as the national economy is viewed as a closed system. It may not be fully true when its competitiveness with foreign economies is taken into account.

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estimating current replacement expenditures and underestimating current expansion outlays if in evaluating the offset for the currently disappearing capacities he failed to make a downward adjustment allowing for productivity gains achieved since installation of these capacities.

We are here confronted with a difference in viewpoints which is rooted in a fundamental and legitimate difference in purposes, which means that it is inevitable. Its inevitability lends some further support to the suggestion that the NID should make every possible effort to place its estimates of capital consumption in industry on an independent basis. Depreciation charges reported by business, even assuming that in all other respects they are acceptable for national-income purposes, cannot be expected to reflect the impact of productivity gains in the way desired by those who wish to allow for this impact in the system of national accounts.