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Chapter Author: Solomon Fabricant

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Chapter 5

Character of the Business Accounts

THE various figures collected in Chapter 4 may be used to measure capital consumption. But what assumptions would we implicitly make if we accepted those figures? How closely do they satisfy the definition of capital consumption in Chapter 2?

To answer these questions it is necessary to examine the character of the business accounts from which the available data are derived. The depreciation formulas in use, the influence of tax regulations on depletion charges, the accounting definition of maintenance and repairs—these and other details must be considered.

DEPRECIATION CHARGES

Present day depreciation practices cannot be determined by a perusal of accounting text-books. Volumes on principles of accounting treat most methods of recording depreciation, some of which may be extremely unusual. The best rather than the most common practice is emphasized. In terms of space the more abstruse (and less frequently applied) methods are predominant. For example, the annuity method of computing depreciation charges is usually discussed at greatest length, not because of its importance in practice, but because of its complexity. In fact, however, the method was not found in actual use by any company (see Table 13).

For prevailing methods of computing depreciation charges

we must turn to statements by business enterprises themselves. Few voluntary statements are made, and few of these are adequate in detail. However, information concerning depreciation policies has been requested by the New York Stock Exchange of corporations applying for security listing since about 1921. Similar information from corporations with securities registered on all stock exchanges is now required by the Securities and Exchange Commission. The latter body of information covers contemporary practices alone, beginning with 1934.

For practices of public utilities, most of which must follow prescribed uniform systems of accounts, we turn to the regulations of the various public service commissions. We consider first the depreciation practices of industrial companies.

DEPRECIATION ACCOUNTS OF INDUSTRIAL COMPANIES

Depreciation practices

Since our information is derived from corporations with listed securities, our sample may be biased to the extent that smaller corporations and unincorporated business enterprises tend to follow other practices. Because of the influence of the regulations governing income tax reports, however, it is fair to say that this divergence is probably not important.

Four aspects of the depreciation practices of industrial concerns demand investigation:

1) Method of proration over time
2) Estimation of the life of durable property
3) Prices involved
4) Relation of depreciation charges to other entries

1) Method of proration over time

We are concerned here with the various methods of distributing expenditures on durable instruments of production over the fiscal periods of their use and with the diverse effects of these methods. We wish to determine the kinds of secular and cyclical movement in depreciation charges that may result

from the application of these various methods. Will these allocations differ from those suitable for economic measures of capital consumption?

The methods of distributing costs of durable equipment and buildings, reported by 460 large industrial corporations, are tabulated in Table 13. The information was obtained from individual reports to the Securities and Exchange Commission made by industrial corporations on Form 10. Use was also made of a few published reports compiled by the Standard Statistics Corporation. Since most of the statements used originated in a sworn report made to a government regulatory body they may be considered reliable.

There is some diversity of accounting practice even within companies. Many companies classify their fixed assets and apply a different depreciation method to each group. Of the 460 concerns over 100 reported more than one method of handling expenditures on durable equipment.

The wide-spread prevalence of the straight line method of depreciating property, plant, and equipment, in which the cost of the property is distributed equally over its useful life,[1] is clearly shown by Table 13. Of 460 corporations 206 stated explicitly that they used the straight line formula (numbered among the 206 companies are those reporting the use of composite depreciation rates). Another 226 companies implied its use in their statements, which were to the effect that, for example, a 2 per cent depreciation rate was used on buildings and 10 per cent on machinery. It is the extensive and consistent use of the straight line method that explains the great stability of the depreciation charges in Table 1.

Other methods reported are similar to the straight line method in its lack of response to fluctuations in volume of

[1] This is the useful life to the holder. When the useful life depends on the duration of a lease, for example, a certain amount of realty improvements will pass to the landlord. These may have an economic value even though their value on the books of the lessee is reduced to zero. Theoretically this economic value should appear on the books of the landlord.

Table 13

Depreciation and Other Practices followed in Accounting for Expenditures on Durable Capital Goods

Industrial Corporations (*the figures indicate the number of corporations reporting each practice*)

Industrial group	TOTAL IN SAMPLE	DEPRECIATION BY STRAIGHT LINE METHOD			DEPRECIATION BY SERVICE OUTPUT METHOD	OTHER METHODS [1]	
		Implicitly indicated	Explicitly stated	Total			
Mining	27	10	12	22	7	3	(a:2, r:1)
Manufacturing	373	180	172	352	51	91	
Construction	7	4	3	7		1	(p:1)
Trade	41	26	13	39		6	(d:2, g:1, h:1, n:1, r:1)
Service	12	6	6	12			
Grand total	460	226	206	432	58	101	
Manufacturing subgroup							
Foods	41	20	18	38	3	4	(f:1, h:1, c:1, p:1)
Beverages	12	4	8	12		1	(g:1)
Tobacco	11	3	6	9	1	1	(o:1)
Textiles	27	10	17	27		3	(b:1, f:1, j:1)
Leather	6	2	3	5		5	(c:3, j:1, o:1)
Rubber	10	2	8	10	1	3	(k:1, o:2)
Lumber	5	2	2	4	1	1	(o:1)
Paper	12	6	5	11	3	1	(k:1)
Printing and publishing	7	4	3	7		1	(r:1)
Drugs	12	6	6	12		1	(g:1)
Petroleum	27	13	14	27	13	8	(a:3, j:3, k:1, o:1)

Chemicals	26	14	12	26	3	6	(a:1, f:1, g:1, j:1, q:2)
Stone, clay, and glass	16	6	9	15		4	(c:1, f:1, h:1, j:1)
Iron and steel	25	10	8	18	14	9	(c:1, e:1, f:1, g:1, h:2, k:2, p:1)
Nonferrous metals	15	5	8	13	1	4	(b:2, f:1, h:1)
Machinery	47	28	16	44	2	17	(b:6, c:2, g:1, l:6, o:2)
Automobiles and accessories	28	20	8	28	6	6	(c:5, i:1)
Misc. metals	32	17	15	32	1	11	(b:1, g:2, h:3, j:2, k:1, l:1, o:1)
Misc. manufacturing	14	8	6	14	2	5	(b:2, m:1, o:2)
Total manufacturing	373	180	172	352	51	91	

[1] Other methods:

Cost charged to current expenses in the case of

- a) Intangible development costs (mining) 6
- b) Patents, research, etc. 12
- c) Tools, dies, forms, etc. 13
- d) Leaseholds 2
- e) Other 1

- f) Flat sum in lieu of detailed estimate 6
- g) Maintenance basis 8
- h) Inventory basis 9
- i) Lapsing method 1
- j) Diminishing balance method 9
- k) Service output method plus constant sum 6
- l) Straight line method modified by percentage of normal activity 7
- m) Straight line method (10%) until reserve is 75% of cost; thereafter 20% on residue 1
- n) Fifty per cent written off utensils first year; thereafter no depreciation charge 1

No depreciation charge if

- o) Idle or outside property 11
- p) Fully depreciated property 3
- q) Offset by appreciation 2
- r) No explanation 3

Total 101

activity. These include the diminishing balance method[2] (reported by 9 concerns), and a method combining the straight line formula with the diminishing balance method (method 'm' among the miscellaneous methods in Table 13).[3] These methods tend to result in a downward secular trend in the depreciation charge on a capital good rather than the horizontal trend that results from the straight line method.

Only 58 corporations reported the use of the service-output method. This method leads to fluctuations in depreciation charges that are correlated with the movements in production or working hours. In so far as short term fluctuations are concerned it satisfies our definition of capital consumption as the value of durable goods used up in current production. Another 6 companies reported the service-output method in conjunction with a constant sum or a percentage of book value. The constant quantity is usually assumed to represent obsolescence going on with the passage of time regardless of wear and tear. Seven companies mentioned a similar method, a modified straight line method with some allowance for the percentage of actual activity to normal or average activity. Nineteen companies reported that depreciation was not charged on certain types of property, especially idle and outside property, and property held for disposal. This results in cyclical movements in depreciation charges similar to those resulting from the use of the service output method.

A flat sum for depreciation was reported by 6 enterprises. It may be assumed that depreciation charges determined in this manner will change from time to time; for a flat sum is inevitably arbitrary and dependent upon the changing purposes of the management.

The maintenance and inventory methods, as well as the

[2] This method, also called the fixed-percentage-of-declining-balance plan, involves the use of a uniform percentage of the declining net book value. The method is quite common in England.

[3] The lapsing method reported by one company is, to judge from other reports made by it elsewhere, simply the straight line method.

method of charging capital expenditures to current expense, seem to be confined chiefly to expenditures on certain types of durable capital goods, including research and development; drilling costs (in mining); tools, dies, and forms; furniture and fixtures. These methods will be discussed in later sections.

If we can judge from our sample, most industries use the various methods to approximately the same relative extent, with a few interesting exceptions. The more extensive use of the service-output method in the petroleum, iron and steel, paper and pulp, automobile, and mining groups is perhaps a result of the relative importance in these industries of mining operations in which depletion is charged on an output basis. In both the leather products and automobile groups the importance of dies and forms accounts for the prevalence of charging capital expenditures to current expenses. The cost of film negatives are depreciated very rapidly by motion picture companies. In one case noted 53 per cent of the cost was written off within 13 weeks of the date of release, 75 per cent within 26 weeks, 94 per cent within 52 weeks, and 100 per cent in 65 weeks.

Not one of the depreciation methods reported made any provision for the interest factor theoretically involved in the time distribution of costs of durable equipment.

2) Estimation of the life of durable property

When the straight line depreciation method or the service-output method or some variant of these is used, it is necessary to forecast the life of the property to be depreciated. Its life in years, in hours of working service, or in number of units of output must be estimated. The way in which these estimates are made will determine the extent to which business charges for depreciation represent obsolescence as well as expired physical life and wear and tear. Our concept of capital consumption allows for the using up of durable goods by obsoles-

cence. If we are to use business depreciation charges in measuring capital consumption we must determine whether they also include obsolescence.

Enterprises seldom allow a specific sum for obsolescence.[4] If no specific allowance of obsolescence is made, where do we find it in our records? A portion of obsolescence (that amount which is unanticipated) is represented by write-downs and losses on sales and retirements. 'Normal' obsolescence, however, is covered by the usual depreciation computations. Thus, some types of machine will last indefinitely if adequately maintained. Yet a limited life is ascribed to them—'normal' obsolescence is anticipated—and depreciation is charged to expense.

That obsolescence is taken into account is evident when we consider the different estimates of the life of capital goods, of which there are three: the economic life used in business calculations before investment is decided upon; the economic life used in the computation of depreciation charges; the so-called technical life.

The economic life assumed when deciding to buy machinery may often differ from that actually used later in depreciating it, as is suggested by answers to a question sent in 1928 to manufacturing concerns.[5] The question read:

"Has your company a policy against the purchase of new equipment unless the production savings will return the initial investment within a definite period? If so, what is the period?"

The periods reported by some 200 corporations are given herewith.

[4] An exception cited earlier is the service-output depreciation formula with allowance of a constant rate for obsolescence.

[5] L. P. Alford, Technical Changes in Manufacturing Industries, *Recent Economic Changes in the United States* (National Bureau of Economic Research, 1929), p. 139.

NUMBER OF YEARS DURING WHICH INITIAL INVESTMENT SHOULD BE RETURNED	NUMBER OF FIRMS REPORTING (PERCENTAGE OF TOTAL NUMBER)
Under 1.0	5.1
1.0–1.5	7.7
1.5–2.0	30.8
2.0–2.5	5.1
2.5–3.0	15.4
3.0–3.5	5.1
3.5–4.0	7.7
4.0–5.0	20.5
5.0–8.0	2.6
Total	100.0

The question and the answers are not unambiguous for our present purpose. The policies expressed relate to the minimum economic life anticipated rather than to the average life. Over 64 per cent of the companies anticipated a possible rate of obsolescence great enough to reduce the profitable life of their equipment to three years or less, 97 per cent to five years or less. This is considerably shorter than any reasonable technical life, and shorter than the average lives implied by the available depreciation rates.

Perhaps the major reason why the conservatively anticipated life is not generally used in computing depreciation charges is that this life is a minimum. It implicitly involves a kind of risk factor not closely related to the time during which the equipment will actually be used. That is, it is not really a forecast of the economic life of the machine so much as it is a forecast of the most profitable portion of its economic life.[6] Another reason is the restrictions, considered below, imposed by the Federal income and state tax regulations.[7]

[6] If this is a correct interpretation of the discrepancy between the life reported above and the life implied by the depreciation rate, then the straight line depreciation formula understates depreciation (including obsolescence) during the early life of a machine. Even the service-output formula does not correctly allocate expenditures on durable capital goods in this case.

[7] E. S. Freeman points out that the answers may be interpreted as referring to that portion of the profitable life in which the aggregate net receipts from the use of the machine (profit plus depreciation) are equal to its total original

The difference between economic and technical life is more closely relevant to the present discussion. Technical life is most conveniently defined as the life of a machine under stable conditions—that is, on the assumption that such factors as prices, demand, and invention remain constant. Economic life is the life of a machine under actual conditions. Technical life is then a special case of economic life. Figures collected by Ir. H. Vos are presented herewith. They indicate the range

TYPE OF EQUIPMENT	AVERAGE LIFE IN YEARS [8]	
	Technical	Economic
Steam boilers, etc.	18	8–15
Steam engines	22	10–12
Steam turbines	17	10–12
Water turbines	20	10–15
Internal combustion motors	15	8–12
Transformers	25	10–15
Electric motors	25	8–12

of discrepancy between the two. The economic life of the equipment listed ranged from less than one-half to about two-thirds of the technical life, the most common ratio being about two-thirds.[9]

It is clear, then, that depreciation charges include some al-

cost. A machine that is expected to return its cost in five years may be actually expected to last 8 years (assuming an expected rate of 15 per cent profit on the average investment and constant net receipts). However, on any reasonable assumption as to the expected rate of profit the statement in the text, to the effect that the period reported is shorter than any reasonable technical life, still holds.

[8] See Ir. H. Vos, Conjunctuurcyclus en Techniek, *De Socialistische Gids* (1932); pp. 856–64. The original sources are Reuter's *Handbuch der Rationalisierung* (1930), p. 904, and Abschreibungssatze für Anlagen in Maschinenfabriken (Verein Deutscher Maschinenbau-Anstalten, 1930). Mr. Vos's article is discussed by J. Tinbergen, Suggestions on Quantitive Business Cycle Theory, *Econometrica*, July 1935.

[9] The technical life as measured in the table is probably less than the technical life as defined in the text. Even engineers, in estimating 'technical life', make some allowance for inventions, changing cost of fuel, etc. This means that the technical life they compute is the life not under entirely stable conditions but under conditions where demand for the product of the equipment is stable. This may explain the rather low technical life ascribed to some of the equipment listed.

lowance for obsolescence. But it may be doubted that they include full allowance. Since obsolescence cannot be forecast with any large degree of accuracy, the Treasury Department allows deductions for normal obsolescence alone. These are, in effect, partial allowances for obsolescence in general.

The difficulties inherent in forecasting obsolescence are but part of the difficulties of estimating economic life. Even in the absence of obsolescence technical life is not easily estimated.

3) Prices underlying depreciation charges

The determination of the dates to which the prices underlying depreciation charges relate is important in getting at the meaning of business depreciation charges. Is there any discrepancy between the prices prevailing at the time depreciation is charged to cost and the prices implicitly used in computing the depreciation charge? Do they refer to different time periods? Is it the *current* value of durable goods used up that is charged to depreciation?

Information on this point is available in the records already cited. Of 125 corporations reporting the base used in computing depreciation charges (the figure to which depreciation rates are applied) 59 reported 'cost', 40 reported 'book value', and 26 reported appraised values or revalued bases. It may be assumed that 'book value' also means 'cost'. This would indicate that of 125 concerns 99 (80 per cent of those reporting) used cost. Even this large figure is probably an understatement since it is to be expected that a larger proportion of those not reporting the base used cost. There is probably a tendency to report the base more often if it differs from the usual cost base.[10]

[10] The evidence bearing on this point seems to contradict the data on revaluations of fixed assets, analyzed in Chapter 12. There it will be shown that revaluations of property, plant, and equipment were made by 157 out of 272 corporations during the decade 1925–34. The discrepancy may be explained chiefly by the limitation in scope and in amount of most of the revaluations. Often only certain portions of the plant and equipment were revalued (such as idle plant), and even when the entire account was changed, the extent of change was usually relatively small. For these reasons corporations reporting depreciation bases probably did so for those underlying

More important than the question of cost versus revaluation is the extent to which 'cost' is 'original cost'.[11] Is the 'cost' reported the cost to the company reporting, or the cost to its predecessor if the reporting company is a consolidation, reorganization, subsidiary, or other user of 'second-hand' goods? Little evidence on this point is available. Most of the costs reported are probably the original costs. But other possibilities must be kept in mind in interpreting the depreciation charges reported in business profit and loss statements.

4) Relation of depreciation charges to other entries

Depreciation is only one of the costs arising from the use of durable equipment. In considering depreciation practices and the figures derived from them, we must remember that the treatment accorded other costs is relevant to the interpretation of depreciation charges. Maintenance costs, for example, complement depreciation charges. The rate of maintenance determines to some extent the rate of physical depreciation. This was pointed out in commenting on the low rate of depreciation reported by public utilities (Ch. 4).

Also complementary to depreciation charges are certain capital adjustments. If all obsolescence is anticipated and if wear and tear are accurately forecast, charges for depreciation will tend to cover total capital change more fully than otherwise. In other words, certain types of capital change are accounted for either by capital consumption or by capital adjustment, depending upon the accuracy of forecast.

Depreciation charges will be affected, also, by capital adjust-

most of their fixed assets. This, of course, is what we would wish them to do, for the present purpose.

[11] More important because, as we shall see later, the Treasury Department does not permit write-ups or write-downs to affect depreciation charges, while revaluations arising out of sales may affect them. This applies chiefly to the depreciation reported for income tax purposes, which constitutes the bulk of our present data. The distinction does not hold to the same extent for depreciation reported in published reports of individual corporations. However, even in these reports, revaluations need not affect the depreciation charges made public. See the discussion in National Bureau *Bulletin 62*, p. 10.

ments made before the final retirement of capital goods. If capital assets are revalued upward or downward, depreciation charges may be raised or lowered correspondingly. This will occur most often when the revaluation is the result of a sale.

More will be said later concerning entries for maintenance, and capital charges or credits. Depreciation charges by themselves do not tell the whole story.

Accounting usage: recent changes

Minor changes in the accounting treatment of specific assets or groups of assets are being made continually. Since expenditures on durable equipment and structures may be handled in various ways, the choice among which is not always easy, these changes are to be expected. Thus, a drug company reported in its 1935 statement to the Securities and Exchange Commission that improvements and betterments of leased properties were transferred from the fixed asset accounts to deferred charges. In 1934 another concern (iron and steel) stopped capitalizing expenditures on development. Cost of furniture and fixtures, formerly charged to profit and loss and carried at a nominal value, was placed on a depreciation basis in 1935 by a third company (drugs).

Even when a depreciation practice is consistently maintained, its details may be changed. In 1925 composite rates of depreciation were substituted for specific rates by a steel corporation. Tool charges, depreciated on a straight line basis prior to 1930, are now amortized by a motor concern on the basis of production.

These minor changes are more or less erratic and, for all business as a whole, may be expected to offset one another. Any net drift in the direction of greater detail in the records may be assumed to be slow.

Uniform changes in accounting usage are also to be found, uniform because of the identity of the forces operating on individual enterprises and making for change in the accounting records. Some of these forces will be discussed in subsequent

sections of this chapter. Here we may mention briefly the post-War change in the attitude toward revaluation of fixed assets, and the change in the method of handling so-called intangible drilling costs in oil and other mining industries. On the whole, however, during the period under consideration accounting usage has remained fairly constant.[12] The major changes, involved in instituting depreciation accounting on a large scale, occurred before 1919.[13]

External influences upon the accounting records

Demands upon industrial accounting by stockholders, bankers, credit men's associations, stock exchanges, tax collectors, and security regulatory commissions have influenced the records greatly. For our present purpose, we may consider most of these effects to be part of the general body of accounting usage, already discussed.[14] To tax regulations, however, some detailed attention must be devoted. (It must be remembered that the bulk of our data on depreciation charges comes from tax re-

[12] In securing consistency of accounting practices from one year to another an important part has been played by the accounting profession. See, for example, the correspondence between the Special Committee on Cooperation with Stock Exchanges, of the American Institute of Accountants, and the Committee on Stock List of the New York Stock Exchange, 1932–34 (partly reproduced in George O. May, *op. cit.*, I, 112–44).

[13] The period with which we are concerned covers only the last sixteen years. The earlier development of depreciation accounting is therefore not entirely essential to an understanding of the available figures and is not undertaken here. A history of this development would be useful, however, in explaining why so few figures are available for earlier years, and in throwing light on the present day practices of small entrepreneurs and farmers. Much material for such a history may be found in the Census of Manufactures for 1890; in the reports of the U. S. Bureau of Corporations and of the Federal Trade Commission; and in various papers contributed to the *Accounting Review* and other periodicals. See also A. C. Littleton, *Accounting Evolution to 1900.* Some interesting notes on the development of depreciation accounting appear in George O. May, *op. cit.*

Prior to the Knoxville decision of the Supreme Court in 1909 there were several court decisions that denied the right to depreciation allowances in excess of current repairs.

[14] The possible future effects of the demands of the Securities and Exchange Commission for information on maintenance and repairs may be noted.

ports.) Two chief questions concern us here: (1) Are the depreciation charges reported for tax purposes different in any respect from those recorded on the books or published in the financial statements? (2) What limitations are imposed upon depreciation practice by the tax regulations?

1) Differences between 'tax' and 'book' depreciation

Examination of corporate reports and of statements made to the Securities and Exchange Commission suggest the range of the differences. Of 460 reports by industrial corporations, 76 explicitly mentioned the relation between book and tax depreciation. Forty-five companies stated that they were identical, 16 that book depreciation was less than depreciation deductible for tax purposes, and 9 that it was greater.[15] Six companies were less explicit, usually stating merely that the two items were 'different'. There is, therefore, some evidence that depreciation in the financial reports ('book depreciation') is ordinarily identical with that reported for tax purposes and that the exceptions counterbalance one another to some extent. Whether the counterbalancing is complete is, of course, in doubt since so few companies make any statement.[16]

There is some indirect evidence that depreciation reported in current financial statements declined more than did depreciation reported for tax purposes since 1930.[17] But the evi-

[15] The quantitative relations, for the few companies reporting them, are interesting. The ratios of book depreciation to tax depreciation reported were: 0.54, 0.59, 0.68, 0.69, 0.73, 0.75, 0.83, 1.77.

[16] Large individual differences between 'book' and 'tax' depreciation were noted by the Fderal Trade Commission in its investigation of electric power and light utilities. But only 'instances' are given by the Commission. The difference between these two computations for *all* companies in the electric industry is not available. (*Utility Corporations*, 70th Cong., 1st Sess., Senate Doc. 92, Part 72-A, 1935, Ch. VII, sec. 11.)

[17] According to a compilation by W. J. Vatter (Depreciation Methods of American Industrial Corporations, 1927–35, *Journal of Business*, April 1937), depreciation reported by 272 companies fell about 12 per cent between 1930 and 1932. The comparable figure for all industrial concerns (Table 1) is 13 per cent. When account is taken of the changing value of underlying assets (those of the 272 companies appear to have fallen 6 per cent and those of all

dence is not unambiguous, and in any case does not indicate a large divergence.

Other evidence that 'tax depreciation' tends to equal 'book depreciation' is derived from various scattered statements to the effect that depreciation rates were lowered in accordance with Treasury decisions, etc.

As a result of Treasury Department audits of tax returns, the figures published in annual reports (and those in the Treasury Department's compilation of *Statistics of Income*) are greater than the depreciation charges finally allowed by the Treasury Department, for the audits are usually made several years after publication. The discrepancies, however, are probably minor.[18]

On the whole we may conclude that business men tend to accept, in their published reports, the limitations imposed upon depreciation computations by the income tax regulations. What are the most important of these restrictions?

2) The influence of tax regulations on depreciation charges

The points of greatest interest concern limitations[19] on the

corporations 12 per cent), a real discrepancy is suggested, although a small one. However, it is difficult to determine how comparable the two sets of figures are. Some depletion is included in Mr. Vatter's sample, which would slightly exaggerate the difference. Another sample of Mr. Vatter's, in which gross rather than net book value is used, indicates a larger discrepancy between the change in book value and in depreciation. But it is impossible to compare this sample with *Statistics of Income,* since there net book values alone appear.

[18] These discrepancies are usually taken care of in the accounts by surplus adjustments.

[19] It is worth repeating that in an important sense the Treasury Department regulations are not merely modifications of the procedure of business men in estimating depreciation quotas. This procedure has come into existence partly because of the tax law requirements. The Federal Trade Commission in its early investigations discovered that a large proportion of the concerns whose records were examined (including even the largest) made no estimates of depreciation. This does not mean that Treasury regulations have not incorporated recognized accounting practices. However, to the extent that the practices accepted by the Treasury have differed from those previously followed by the *bulk* of business concerns the Treasury regulations have been a positive force in modifying the general run of accounting usage.

depreciation formula, the treatment of obsolescence, and restrictions on the depreciation base and on the rates of depreciation. We confine our attention to the Federal regulations; these are followed closely by the various states.

Depreciation formula. According to the regulations of the Bureau of Internal Revenue, "the capital sum to be replaced should be charged off over the useful life of the property, either in equal annual installments or in accordance with any other recognized trade practice, such as an apportionment of the capital sum over units of production. Whatever plan or method of apportionment is adopted must be reasonable and must have due regard to operating conditions during the taxable period." [20] The requirement is that depreciation should be charged "in accordance with a reasonably consistent plan (not necessarily at a uniform rate)".[21]

"The so-called 'reducing balance method', 'revaluation method', 'sinking fund method', and other similar methods have not been approved by the Bureau in their entirety for income tax purposes. The simplicity of the straight line method of determining depreciation makes it administratively desirable, and, generally, it appears that the straight line method approximates the actual depreciation as nearly as any of the other so-called scientific methods. However, in the case of assets used in the extraction of natural resource deposits and in certain other cases, the unit of production method [the service-output method] would appear to reflect more accurately the depreciation sustained. The Bureau, however, will neither approve nor disapprove the use of a particular method in advance of the audit of returns, but whatever plan or method is adopted by the taxpayer, if reasonable, will be accepted." [22] Here is one of the important reasons why the different depre-

[20] *Regulations 77, Income Tax, Revenue Act of 1932*, Art. 205.
[21] Bureau of Internal Revenue, *Bulletin 'F'*, Income Tax, Depreciation and Obsolescence, Revenue Act of 1928, revised January 1931 (Washington, 1931), p. 10.
[22] *Ibid.*, p. 13.

ciation practices shown in Table 13 are used with the relative frequency indicated.

Treatment of obsolescence. The Bureau of Internal Revenue distinguishes between two principal forms of obsolescence: "the first, a sudden loss of useful value brought about by some radical change, and the second, a more gradual reduction of usefulness due to the accumulated effect of small improvements or changes introduced from time to time in the art or industry generally, no one of which improvements or changes in itself is sufficient to result in complete loss of usefulness of the particular property".[23] The second form, called 'normal obsolescence', is deductible for tax purposes as part of depreciation. The mere acceptance of depreciation rates that differ from those implied in the estimates of 'technical life' indicates the general recognition of this type of obsolescence, and the difference measures its importance.

The first type of obsolescence is not deductible until after it has become definitely evident. "No amount may be charged off in any year merely because, in the opinion of the taxpayer, property may become obsolete a number of years later." "Obsolescence of the first type rarely can be predicted prior to its occurrence." [24] A sudden loss of useful value brought about by some radical change cannot be deducted at the time it becomes evident. It must be distributed equally over the period between the time it becomes apparent and the time the property becomes obsolete, that is, is scrapped or otherwise disposed of. Obsolescence of this type cannot be allowed "retrospectively in the light of subsequent events or happenings not anticipated during the period for which the obsolescence is claimed".[25]

An interesting case of obsolescence that has influenced the figures under review is that which occurred at the close of the World War. Special provision was made in the Revenue Acts

[23] *Ibid.*, p. 10.
[24] *Ibid.*, pp. 10–11.
[25] *Ibid.*, p. 11.

of 1918 and 1921 for "amortization of war-time facilities" (including the writing down of these facilities to post-War price levels). Some part of the relatively high levels in the depreciation charges of the early post-War years may be ascribed to this provision.[26]

"All depreciable assets purchased or constructed after April 6, 1917, for use in 'production of articles contributing to the prosecution of the war' were subject to amortization. The period of amortization was from January 1, 1918, to date of actual or probable cessation of use as a war facility—in no case after March 3, 1924. The total deduction under the amortization allowance was the amount by which cost less depreciation to January 1, 1918, and less any cash allowance for amortization under any contract, exceeded either sale price or abandonment value (in the case of assets sold or abandoned) or value to the going business on a post-War basis (where property was continued in use for peacetime purposes), whichever was the greater. Value to the going concern was defined as being no less than scrap value and no higher than the estimated post-War cost of replacement less depreciation. Previous to January 1, 1918, no deduction in excess of ordinary depreciation on such war facilities was allowable.

"The essential design was to permit the taxpayer to write down fixed assets from the high levels of war-time costs to reduced and more stable post-War cost levels. In other words, in this special connection the legitimacy of taking into account in depreciation (or amortization) allowances for sweeping changes in price levels was recognized, at least indirectly." [27]

Depreciation base. "Replacement value of property cannot be substituted for the cost or other allowable basis of the property

[26] A minimum estimate of these amortization charges is provided in a report of the Treasury Department. Up to April 30, 1925 aggregate amortization allowances of $500,000 and over that were allowed by the appraisal section of the Bureau of Internal Revenue amounted to 426 million dollars (74th Cong., 1st Sess., Senate Report No. 944, Part 2, pp. 159–63, 1935).

This is small in comparison with total depreciation charges allowed during the same six years. However, this sum was probably concentrated in the reports for 1918–19.

[27] *Accountants' Handbook*, 2nd ed., p. 642 (ed. by W. A. Paton; Ronald Press, 1933).

. . . . . In no case may the deduction for obsolescence be extended to include shrinkage in value due to other causes, as, for instance, a general drop in the price of commodities." [28] The basis of the allowable depreciation (and 'normal obsolescence') charge is adjusted cost, with the exceptions listed below.[29] Adjustment is made for expenditures, receipts, losses, or other items properly chargeable to capital account, including taxes and other carrying charges on unimproved and unproductive real property (unless already deducted as expenses in computing net income).

The chief exceptions to adjusted cost are as follows:

(a) Fair market value as of March 1, 1913, if more than adjusted cost or other basis.

(b) Same as in hands of transferor, grantor, donor, or affiliated corporation, adjusted for gain or loss recognized upon such transfer.

The essential result of these regulations is that the depreciation charges in Table 1 are based on cost or value on March 1, 1913. There is only one exception, previously noted, that arising from the writing down of war-time facilities.

Rate of depreciation. "Past experience . . . . coupled with informed opinion as to the present condition of the property, and current developments within the industry and the particular business, furnish a reliable guide for the determination of the useful life of the property. Such a determination would reflect all the peculiar circumstances of the operation of the property, such as the purpose for which it is used, the conditions under which it is used, the policy as to repairs, renewals, and improvements, and the climatic and other local conditions." [30]

"The reasonableness of any claim for depreciation shall be determined upon the conditions known to exist at the end of the period for which the return is made. If it develops that the useful

[28] *Bulletin 'F'*, pp. 4, 11.

[29] Sections 113 and 114 of the 1934 Revenue Act.

[30] *Bulletin 'F'*, p. 11.

life of the property will be longer or shorter than the useful life as originally estimated under all the then known facts, the portion of the cost or other basis of the property not already provided for through depreciation allowable determined in accordance with the useful life of the property as originally estimated, should be spread over the remaining useful life of the property as reestimated in the light of the subsequent facts, and depreciation deductions taken accordingly. Where the cost or other basis of the property has been recovered through depreciation allowances, no further deduction for depreciation shall be allowed." [31]

To simplify the administration of the income tax laws the Bureau of Internal Revenue issued a report, in 1931,[32] giving average or representative rates of depreciation for various classes of property in different industrial fields. This is summarized in the *Accountants' Handbook*,[33] as follows:

"The purpose is to determine flexible standards of depreciation, not to establish rates from which no deviation will be permitted. It is planned to set up average rates which will be accepted by the Commissioner without substantiation or adjustment, and to require substantiation in proportion to the departure of the rates used from such average rates. No reasonable rate will be prohibited and within a certain range of the average little by way of supporting evidence will be called for. Results available from studies being made indicate that a variation of one-fifth in either direction from the average will usually cover normal variation both in opinion and as to conditions of use. Thus, with a five-year average life variations of from four to six years would be permissible; for a ten-year average useful life the variation would range from eight to twelve years; and so on. Within such a range the only substantiation required for the consistent use of any rate selected will be a statement of the general conditions which, in the taxpayer's opinion, result in a deterioration of his assets at a rate greater or smaller than the average in his industry. On the other hand, when rates outside the normal range are used it will

[31] *Regulations 77*, Art. 205.
[32] *Depreciation Studies—Preliminary Report of the Bureau of Internal Revenue.*
[33] 2d ed., p. 641.

be necessary to furnish a specific and convincing statement of the abnormal conditions which make such rates reasonable."

"The allowances should be computed and recorded with express reference to specific items, units, or groups of property, each item or unit being considered separately or specifically included in a group with others to which the same factors apply." [34] Composite rates of depreciation applied to an entire property as a whole are not ordinarily approved by the Bureau, chiefly because of administrative difficulties.[35] However, average rates applied to groups of assets of similar expected life or groups of assets reasonably classified are accepted when supported by evidence. In practice it would be impossible for the Bureau to examine the thousands of rates that would be submitted if no grouping were permitted.

One reason why depreciation as computed for tax purposes may tend to be high is that "a taxpayer is not permitted under the law to take advantage in later years of his prior failure to take any depreciation allowance or of his action in taking an allowance plainly inadequate under the known facts in prior years." [36] While this provision is intended to apply to attempts at tax evasion, it may induce high rates of depreciation to avoid the possibility that taxpayers may not later be compensated for undercharging.

In 1934 the Treasury instituted an important change in policy that may affect the available figures on depreciation charges for the years following.

"In a report dated September 3, 1933, the Subcommittee of the House of Representatives Ways and Means Committee stated that deductions for depreciation claimed in income-tax returns were in many instances excessive. The Subcommittee recommended an arbitrary reduction of 25 per cent in the depreciation deductions allowable under the Revenue Act of 1932 and to be claimed by taxpayers for the years 1934, 1935, and 1936. Upon information

[34] *Regulations 77, Income Tax, Revenue Act of 1932*, Art. 209.
[35] *Bulletin 'F'*, pp. 14–15.
[36] *Ibid.*, p. 15.

by the Treasury that the problem of depreciation could be handled more equitably by administrative action, the recommendation was withdrawn.

"On February 28, 1934, Treasury Decision 4422 was promulgated, amending article 205 of *Regulations 77* and *74* and article 165 of *Regulations 69, 65,* and *62*. The amended articles require that 'The deduction for depreciation in respect of any depreciable property for any taxable year shall be limited to such ratable amount as may reasonably be considered necessary to recover during the remaining useful life of the property the unrecovered cost or other basis. The burden of proof will rest upon the taxpayer to sustain the deduction claimed.' Subsequent to promulgation of this decision the Bureau issued to its employees in Washington and the field mimeographed instructions.

"Insufficient time has elapsed to measure the effect of administering provisions of Treasury Decision 4422. From March 15 to July 15, 1934, a total of $248,831,643.59 of claimed depreciation had been disallowed, resulting in increased taxable income of $242,424,222.77, and recommended deficiency assessments of $29,689,304.47. Agreements to the recommended taxes so developed have been and are being secured in many cases, but final settlement of the depreciation issue in other cases may depend upon litigation." [37]

According to a strict interpretation of the law, there has been no change in policy. Nevertheless, in view of the motive underlying the Treasury decision, the change is real, especially since the Department had aimed at liberality in passing depreciation charges. The amount involved, about a quarter of

[37] Commissioner of Internal Revenue, *Annual Report, Fiscal Year Ended June 30, 1934* pp. 9–10. In the annual report for the fiscal year ended June 30, 1935 (p. 9), there appears the following statement:

"Depreciation deductions claimed by taxpayers were closely examined during the year. As a result of this attention there was disallowed during the 6-month period from Jan. 1 to June 30, 1935, inclusive, $144,040,964 in depreciation deductions taken by taxpayers. For the full fiscal year the total amount disallowed is estimated to be $288,081,928."

And in the report for the fiscal year ended June 30, 1936 (p. 16):

"Depreciation deductions claimed by taxpayers on returns filed were closely examined during the fiscal year. As a result of this attention there were disallowed during the fiscal year ended June 30, 1936, $221,551,488 in depreciation deductions taken by taxpayers."

a billion dollars in each of the last three fiscal years, is large. A substantial drop in depreciation charges in future years may result (although reported charges may rise because of other factors). It may take some time, however, before published figures are affected, since they are compiled from unaudited reports.

Internal influences upon accounting records

When the interests of those in control of the records differ from the interests of those using the records, some reaction upon the accounts is to be expected. Difference in interests of management, stockholders, bankers, and competitors may impress its mark upon the data at our disposal. This division of interests is not, of course, new. Its effects on the records have been noted by early economists, and the profession of public accountancy has been influenced considerably by it.[38]

Little that is definite can be said about the influence of internal factors. On the whole, depreciation charges tend to be modified, if at all, in such a manner as to make more steady the computed annual net profits. Thereby cyclical fluctuations tend to be introduced into depreciation computations. We have already noted some of the ways in which this occurs.[39] The possibility of internal influences must be remembered in considering the depreciation charges derived from the public statements published by individual companies. Owing to the supervision of the tax authorities, the data derived from tax reports are less subject to these influences.[40]

DEPRECIATION ACCOUNTS OF PUBLIC UTILITIES

Much of what was said above concerning depreciation practices of industrial business enterprises applies also to the accounts

[38] See the notes on the development of the accounting profession in relation to the growth of the corporate form of organization in Bishop C. Hunt's *The Development of the Business Corporation in England, 1800–1867* (Harvard University Press, 1936) pp. 97, 140–3.

[39] See Table 13 and the accompanying discussion.

[40] See the discussion, above, of the data compiled by W. J. Vatter.

of public utilities. Differences in emphasis, however, require attention. In order to interpret properly the available figures on depreciation charged by public utilities it is necessary to keep in mind the following points:

1) State regulation of public utility rates has affected the treatment of depreciation through prescription of records by regulatory bodies, through court decisions, and through companies' efforts to minimize book profits.

2) Estimates of depreciation computed as flat percentages of gross revenues are common in certain public utility fields.

3) Certain public utility properties are not depreciated but are handled entirely on a maintenance accounting basis.

Influence of regulation

It is difficult to think of public utility accounting usage apart from the most prominent force that has molded it, rate regulation. For example, among utilities engaged in interstate commerce, depreciation accounting is essentially the result of the mandatory requirements of the Interstate Commerce Commission. The beginning dates of depreciation accounting prescribed by the Commission are given herewith.[41]

[41] While provision for depreciation of certain property groups is mandatory the depreciation rates themselves are not prescribed. The rates actually in use show great variation from one railroad to another, not easily explainable entirely by differences in operating conditions. This is illustrated by the accompanying figures.

Rates of Depreciation on Equipment, Steam Railways, 1935
Number of companies classified according to depreciation rate

DEPRECIATION RATE	STEAM LOCOMOTIVES	FREIGHT TRAIN CARS	PASSENGER TRAIN CARS
Under 2	1	..	1
2.00– 2.49	1	2	13
2.50– 2.99	46	22	49
3.00– 3.49	47	41	26
3.50– 3.99	19	39	10
4.00– 4.49	7	16	9
4.50– 4.99	2	8	1
5.00– 5.49	4	2	5
5.50– 5.99	5	3	2
6.00– 6.49	1	1	..

Depreciation accounting required by the Interstate Commerce Commission [42]

	BEGINNING
Steam railways—equipment	July 1, 1907
Electric railways—equipment	July 1, 1914 [43]
Sleeping-car companies—equipment	July 1, 1910
Sleeping-car companies—buildings, appurtenances and ground	July 1, 1912
Express companies—cars	July 1, 1908
Express companies—depreciable fixed property	July 1, 1914
Carriers by water—vessels and other floating equipment	July 1, 1912
Telephone companies—all depreciable property	January 1, 1913
Telegraph and cable companies—all depreciable property	January 1, 1914
Pipe-line companies—all depreciable property	January 1, 1911

The accounts of intrastate public utilities, particularly privately owned electric light, heat and power, and gas companies,[44] are regulated or authorized to be regulated by commissions in 36 of the 48 states as well as in the District of Columbia. The exceptions are the less important states. The depreciation accounts specifically are regulated by commissions in 22 of the 37 governmental units. These include the most important

(*footnote* 41 *concluded*)

DEPRECIATION RATE	STEAM LOCOMOTIVES	FREIGHT TRAIN CARS	PASSENGER TRAIN CARS
6.50– 6.99	..	4	1
7.00– 7.99	1	..	2
8.00– 8.99	1	1	2
9.00– 9.99	..	..	1
10.00–10.99	..	..	1
11.00–11.99	..	..	..
12.00–12.99	..	..	1
13.00–13.99	1	..	..
Weighted average	3.25	3.40	2.84

SOURCE: *Statistics of Railways, 1935*, p. S-80.

Data for earlier years and other property items are available in a Digest of Depreciation Charges compiled, by the Bureau of Railway Economics, from railway reports to the Interstate Commerce Commission, for 1928 (1929) and 1932 (June 1933).

42 SOURCE: 177 I.C.C. 360–1.

43 Prior thereto, mandatory only if required by the state.

44 Municipally owned utilities are considered with other government capital in Ch. 7.

states.[45] The emphasis of state regulation has been on the retirement and maintenance method of recording capital consumption, in contrast to the I.C.C. emphasis on straight line depreciation charges. The uniform system of accounts developed by the National Association of Railroad and Utilities Commissioners and adopted by many states provides for flexibility in the charge for retirements, the burden of retirement losses to be distributed "with due regard for amount of earnings available for this purpose in each year".[46]

The influence of the profits position of an industry upon its treatment of capital consumption is suggested by the different attitudes of steam railways and of telephone companies toward the use of depreciation accounts. The reluctance of the railways to accept depreciation accounting is in decided contrast to the attitude of the telephone companies.[47]

Depreciation computed as a percentage of gross revenue

In certain of the public utility fields depreciation charges are not computed on the basis of a detailed analysis of the property account. Instead they are taken as equal to a more or less arbitrary or empirically determined percentage of gross revenue. This is the case, notably, in the gas industries and to some extent among street railways.[48] Since gross earnings fluctuate closely with the physical volume of output (rates are fairly constant) this procedure corresponds to a service-output method. We may therefore expect to find depreciation charges in these groups fluctuating with output. Sometimes the service-output method is used explicitly, although the per unit de-

[45] SOURCE: Bonbright Utility Regulation Chart, Bonbright & Co., Revision of 1930, corrected by Moody's (see *Public Utilities 1934*, pp. a60–63).

In 1937 accounts were regulated in 38 states and the District of Columbia, and depreciation accounts in 36 states and the District of Columbia (Moody's *Public Utilities 1937*, p. a92).

[46] See L. R. Nash, Depreciation Accounting Methods for Public Utilities, *Proceedings* of the International Congress on Accounting, 1929.

[47] Cf. 177 I.C.C. 383 (1931); see also Robert Schultz, *Depreciation and the American Railroads* (1934).

[48] *Accountants Handbook*, 2d ed., pp. 710–11, 713.

preciation charge selected may still be roughly approximative.

Often the entire amount of maintenance, which among public utilities includes depreciation as a subgroup, is roughly computed as a percentage of gross revenue. The American Gas Association states: "between 5 and 6 per cent of revenue from gross sales is used arbitrarily by gas companies, for maintenance, in their bookkeeping and it would be impossible to obtain more accurate figures for maintenance expenditures because of the peculiar accounting practice of the industry".[49]

Prevalence of maintenance accounting

The dates marking the requirement of depreciation accounting by the Interstate Commerce Commission do not necessarily indicate the beginning of depreciation accounts in the records of the several utilities. But in fact prior to these dates depreciation was seldom computed, as is indicated by the growth of the depreciation reserve of steam railways. While the aggregate property account of railways doubled between 1910 and 1927, the depreciation reserve increased more than ten-fold.

When depreciation accounts are not required, utility companies seldom compute depreciation. This explains why accrued depreciation on ways and structures of steam railways is only a small percentage of gross investment in ways and structures. On December 31, 1934 this percentage was 0.68, less than 1 per cent. For equipment the corresponding percentage was 43.8.[50]

When depreciation accounts are not kept, capital consumption is reflected by other accounts—the maintenance accounts other than depreciation. The complementary character of these two sets of accounts is revealed by the records. Thus, there is a negative correlation between the ratio of depreciation to gross revenue and the ratio of maintenance to gross

[49] Letter to the Federal Employment Stabilization Board.

[50] I.C.C., *Statistics of Railways in the United States*, year ended December 31, 1934, pp. S–88–89.

revenue among electric light and power companies (see Table 16).

DEPLETION CHARGES

Before the passing of the income tax law the practice, so widespread as to be almost general, was to make no allowance for depletion. Net income of mining companies was computed without any deductions for exhaustion, and dividends always included some return of capital. In Great Britain, where a deduction for depletion is not permitted in determining taxable income, this practice is still followed. Even more than is true of depreciation estimates, the method of accounting for depletion is a product of the income tax laws. In this section, therefore, it is unnecessary to treat tax regulations as a modifying factor. We shall consider the usage as described in corporate statements; the contemporary status of the tax regulations as exemplified in the 1934 income tax law; and finally, changes in usage and in the several tax laws during the last few years.

CORPORATE DEPLETION PRACTICES

Of 460 corporation reports [51] examined, 75 mention the treatment accorded depletion of exhaustible resources. These are summarized in Table 14.

Four out of nine of the metal mining companies reported that they made no charge for depletion, "in accordance with common accounting practice in the industry".[52] In most of the mining companies, however, some sort of charge is made.

The depletion base is cost, 1913 value, or 'discovery' value.[53] Table 15 reveals the relative importance of the various bases in certain subgroups of the mining industry. Cost and 1913

[51] Chiefly reports to the Securities and Exchange Commission (Forms 10 and 10-K), 1934 and 1935. Some companies reported more than one method of handling depletion.

[52] This or a similar phrase appears in the accountants' certificate of some of the companies.

[53] Discovery value is fair market value at discovery, or within 30 days thereafter; see below.

Table 14

Depletion Practices *(the figures indicate the number of corporations reporting each practice)*

INDUSTRIAL GROUP	NUMBER REPORTING	DEPLETION DETERMINED BY NUMBER OF UNITS OF OUTPUT	OTHER DEPLETION METHODS		RELATION OF BOOK DEPLETION TO TAX DEPLETION	
Mining						
Coal	6	6			Tax basis: percentage of income	1
Oil and gas	4	2	Depletion ignored	1		
			Percentage of gross income or cost, whichever greater	1		
Metals	9	4	Depletion ignored	4	Depletion only on tax returns	3
			Government requirements	1	Same	1
					Less	1
Misc. mining	1		Depletion ignored (not carried on books)	1		
Leather	1	1				
Paper	6	6			Same	1
Petroleum	18	16	Depletion ignored (new leases charged to expenses)	1	Same	2
			Government requirements	1		
Chemicals	8	7	Government requirements	2	Same	1
			Percentage of gross	1	Less	1
			Depletion ignored (not on books)	1		
Stone, clay, and glass	8	8			Same	1
Iron and steel	8	8				
Nonferrous metal	5	5	Depletion of ore ignored	1	Same	2
Automobiles and accessories	1	1				
Grand total	75	64		15		14

Table 15

Basis for Determining Depletion

(percentage of total depletion allowed, by basis of determination) [1]

GROUP	PERIOD COVERED	BASIS			Total
		Cost	March 1, 1913 value	Discovery value	
Gold-silver	1928	8.5	64.4	27.1	100.0
Copper	1928	18.3	76.6	5.1	100.0
Lead-zinc	1928	18.0	46.0	36.0	100.0
Iron	1928	0.5	98.5	1.0	100.0
Coal	1926	28.2	71.0	0.8	100.0
Sulphur	1922–28	0.0	25.7	74.3	100.0
Weighted total		12.7	78.6	8.7	100.0

[1] Compiled from data published in *Depletion of Mines,* Hearings before the Joint Committee on Internal Revenue Taxation, 71st Cong., 3rd Sess., December 9–12, 1930, Appendix.

value together account for over 90 per cent of the depletion charges reported by these groups. As we shall see, a depletion base is not used in the percentage-of-gross method of calculating depletion.

According to Table 14 the per unit of output method of calculating depletion is used by 85 per cent of the companies reporting. The depletion base (cost, 1913 value, or discovery value) is divided by the number of units of mineral estimated to be in the mine or well, and this per unit value is then multiplied by the number of units extracted during the fiscal period, to yield the depletion charge. No allowance is made for price changes,[54] for interest charges, or for changing difficulties of extraction.

The depletion charge so measured may be expected to vary almost entirely with the volume of output. Exceptions may arise, however, owing to changes in the estimate of recoverable

[54] Price changes are allowed to influence the reported depletion charges of one company. The depletion charge is computed on the basis of a value that is derived from the average price of the appropriate metals during the preceding ten years.

minerals[55] or to changes in the value base following sale or revaluation.

Publicly reported depletion charges are not necessarily identical with those reported for tax purposes. Several companies stated that while depletion was not charged against their income in the published statements, it was deducted for tax purposes. Of the 14 reporting on this point, however, 8 mentioned that no difference existed. Examination of the tax regulations will therefore throw additional light on the computations underlying the figures at our disposal.

A change in the treatment of intangible drilling costs, noted below, occurred during the period under review. Instead of being charged to current expense, these costs were capitalized and then depleted over a period of years. It is difficult, however, to assess the importance of this change.

TAX REGULATIONS CONCERNING DEPLETION CHARGES: THE 1934 LAW

The peculiarities of the depletion data based on the regulations according to the 1934 law may be outlined as follows:[56]

1) There are three methods of computing depletion:

a) Without reference to discovery value or percentage depletion. The basis is the adjusted basis provided in Sec. 113, (b) (see *infra*). Excluded from the basis are the cost or value of the land for purposes other than mineral production; the amount recoverable through depreciation; and the residual value at the end of operations. Method of computing depletion: basis as above, dividing by number of units of mineral remaining, and multiplying the depletion unit so determined by the number of units of mineral sold within the year.

[55] According to a Treasury Department tabulation, such changes (called 'dilution' or 'concentration', depending on the direction taken by the revision) have been applied, in accordance with the regulations, in about 125 cases in the lead-zinc group. No dilution was applied in the copper, iron, or sulphur groups, and in only one case in the silver-gold. In the coal group, 'concentration' was applied in "approximately one per cent of coal cases". See *Depletion of Mines, op. cit.*

[56] *Regulations 86,* Art. 23 (m).

b) On the basis of discovery value. Covers only mines, other than metal, coal, or sulphur, discovered after February 28, 1913. Oil and gas wells are not 'mines'. Basis is the fair market value at date of discovery or within 30 days thereafter, if not acquired as the result of purchase of a proven tract or lease, and if the fair market value is materially disproportionate to cost. Method of computation: discovery value, plus capital additions, minus aggregate of depletion deductions that would have previously been allowable without the application of any net income limitation; dividing remainder by number of units of mineral remaining; and multiplying the depletion unit so determined by the number of units of mineral sold within the year.

Discoveries exclude merely the interrupted extension of a continuing commercial vein or deposit already known to exist. The discovered minerals must be of sufficient value and quantity so that they can be separately mined and marketed at a profit. The fair market value must be determined regardless of later discoveries or developments or subsequent inprovements in methods of extraction and treatment of the mineral product.

The estimate of the number of recoverable units may be revised; but this will not affect the basis for depletion.

c) On the basis of a percentage of gross income. Methods of computation include: (1) Oil and gas wells: 27½ per cent of gross income during the year, but not to exceed 50 per cent of the net income computed without allowance for depletion; except that the allowance is not to be less than it would be if computed without reference to this method. (2) Coal, metal, and sulphur mines: 5 per cent for coal, 15 per cent for metal, 23 per cent for sulphur, of gross income; not to exceed 50 per cent of net income.

Gross income from the property is the amount received from the sale of the crude mineral product, before transportation, at a price not to exceed the representative market or field price, or from the sale of the derived product, before transportation, at a price not to exceed the representative price of the mineral from which the product was derived (except such slight processes as cleaning and crushing).

2) Capital additions. All expenditures in excess of net receipts from minerals sold shall be charged to capital account recoverable through depletion while the mine is in the development

stage. But general overhead expense, taxes, and depreciation of drilling equipment are not capital items even during development.

In the case of oil and gas wells, the taxpayer has the option of charging to capital or to expense: (a) Intangible drilling and development costs—including drilling, clearing of ground, construction of derricks, tanks, pipe lines. In general, this option applies only to expenditures for those items which in themselves do not have a salvage value; labor, fuel, repairs, supplies, etc., are not considered to have a salvage value even though they are used in connection with the installation of physical property that has a salvage value.[57] (b) Non-productive wells, when completed.

Recovery of optional items, if capitalized: (a) Returnable through depletion—amounts capitalized so far as they do not represent physical property. The expenditures for clearing ground, draining, road making, surveying, geological work, excavation, grading, and the drilling, shooting and cleaning of wells, are considered not to be represented by physical property. (b) Returnable through depreciation—amounts representing physical property, such as expenditures on wages and fuel, used in the installation of casing and equipment and in the construction of derricks and other physical structures.

Options made in initial report are binding for all subsequent years. Initial report is that of 1924, or amended report filed in 1927.

On the basis of the above regulations, it is to be expected that depletion charges will sometimes fluctuate more than physical output. This is a consequence of the percentage-of-gross method, and of the limitations imposed by the net income provision.[58] It is also to be expected that aggregate depletion charges will sometimes exceed original cost of acquisition to those deducting the allowance.[59] Further, the shift to

[57] See the discussion below.

[58] Depletion charges in 1934 and 1935 must have been affected somewhat by the elimination of consolidated reports, owing to the net income provision in the law.

[59] This reflects the desire, on the part of the legislators, to "consider the mining industry as an industry rather than as a collection of discrete entre-

capitalization of drilling costs may be expected to affect the trend of total depletion charges.

DEVELOPMENT OF THE TAX REGULATIONS CONCERNING DEPLETION CHARGES

The 1934 Act represents the recent regulations governing the depletion allowance. But there has been almost continuous change in the law during the last two decades. While our present figures begin in 1925, depletion charges are available (in combination with depreciation charges) since 1919,[60] and developments during the entire period should therefore be reviewed.

In the Corporation Excise Tax Act of 1909 no reference was made to depletion. The Supreme Court held that the depreciation charges allowed in the Act did not include depletion.[61] The 1913 Act permitted deduction of depletion of natural deposits not to exceed "5% of the gross value at the mine of the output for the year". In the 1916 Act, specific reference was made to oil and gas wells. For the 5 per cent deduction an allowance measured by the market value at the mine of the product mined and sold during the year was substituted. The

preneurs" (Carl Shoup, The Distinction between 'Net' and 'Gross' in Income Taxation, *Studies in Income and Wealth*, Vol. I).

The extent to which the percentage depletion provision has caused aggregate depletion charges to exceed cost is suggested by certain figures quoted by the Secretary of the Treasury (letter to the President, May 29, 1937, reported in the *New York Times*, June 2, 1937). "In 1936, one mining company deducted nearly $3,000,000 under this provision, although it had already completely recovered the cost of its property. . . . The revenue that we lost thereby was $818,000. Similar annual losses of revenue in the case of a few other typical companies are: $584,000; $557,000; $512,000; $272,000; $267,000; $202,000; and $152,000. The estimated annual loss of revenue due to this source alone is about $75,000,000." The estimated tax loss is presumably computed on the basis of an excess profits tax. But even if allowance is made for the profits tax, the amount of excess depletion implied by the above figures may run into several hundred million dollars, a large fraction of reported depletion.

[60] Table III, Appendix B.

[61] J. Klein, *Federal Income Taxation* (1929), p. 686.

aggregate allowance was limited to original cost or the value on March 1, 1913.

The discovery provision, applicable to mines, and oil and gas wells, was first introduced in the 1918 Act. For mines and oil and gas wells acquired prior to March 1, 1913, the basis was value on that date. If purchased as proven tracts or leases after March 1, 1913, the basis was cost (including cost of development). If discovered after March 1, 1913, the basis was discovery value. The discovery provision did not apply to timber tracts.[62] Limitations on the depletion allowance were introduced in the 1921 Act. Depletion computed on a discovery basis could not exceed net income computed before a deduction for depletion. If it did, the cost or March 1, 1913 value was to be used as the basis.[63] A further limitation, to 50 per cent of net income before depletion, was imposed by the 1924 Act. The provision concerning the use of cost or March 1, 1913 value, when depletion exceeded net income before depletion, remained. The total amount recoverable was now limited in amount: it could not exceed cost, 1913 value, or discovery value.[64]

The 1926 Act replaced the discovery provision, for oil and gas wells, by an allowance equal to 27½ per cent of gross income, limited to 50 per cent of net income before deducting depletion.[65] This change was made also for coal, metal, and sulphur mines in the 1932 Act, the respective percentages being 5, 15, and 23. (If the method was to be used the decision had to be made in 1933, to be followed without change in 1934 and later years.) The total amount recoverable by the percentage-of-gross method was not limited in any way.[66]

The effects of these changes upon the data at our command may be summarized briefly: (1) as the depletion provisions increased in liberality, an upward trend in depletion charges

[62] *Regulations 45 (1920 ed.)*, Art. 201–37.
[63] *Regulations 62 (1922 ed.)* Art. 201–37.
[64] *Regulations 65*, Art. 201–39.
[65] *Regulations 69.*
[66] *Regulations 77.*

may be expected for this reason alone; [67] (2) irregular changes may also be expected whenever the law was modified.

PROVISION FOR ACCIDENTAL LOSS

LOSS AND PROVISION FOR LOSS

The value of property accidentally destroyed need not equal the deduction made for the loss if there is an insurance reserve on the books of either the enterprise concerned or its insurance company. We may look upon such destruction as equivalent to the retirement of fully or partly depreciated equipment, the amount of 'depreciation' being equal to that portion of the loss incurred that has been covered by the accumulated insurance premiums or their equivalent. In other words, the current charge for loss from accidents is related to the amount paid as insurance premiums, rather than to the amount received as benefits. Any large discrepancy between reserves and losses are, on this basis of accounting, items of capital adjustment. This procedure is equivalent to a form of 'depreciation' accounting.

Losses arising from accident may also be recorded on a 'retirement' basis, just as are wear and tear of capital goods in certain industries. Insurance reserves may not be set up at all, on the assumption that there is a tendency for losses to be fairly evenly distributed in time. But the factors making for accident are not entirely independent of one another, or if they are they may by chance be bunched together at a single moment. When there is a conflagration insurance reserves must be tapped. They may even be exhausted, as from the San Francisco fire, necessitating charges to capital. For this reason we have se-

[67] The percentages-of-gross used in the law are derived from empirical averages and are supposed to yield allowances equal to those that would be permitted had percentages of capital values been used; see Carl Shoup, *op. cit.*, footnote 56. But it is clear that the changes in the law resulted in greater depletion charges than would be estimated by the continuous use of the older methods because the amounts based on these older methods constitute lower limits ("the allowance is not to be less than it would be if computed without reference to this method"—Sec. 114b (3), 1934 law).

lected provision for loss, rather than amount of loss, as our measure of capital consumed by accident.

Provision for loss is not measured by insurance premiums. The difference between the two represents the cost, to insurance companies, of doing business. This is somewhat analogous to the cost of bookkeeping involved in depreciation accounting. The latter is treated as a current cost apart from the capital account; we treat expenses of insurance companies similarly. It is therefore necessary to exclude the latter.

The figure we desire would seem to be approximated by the sum of the net change in insurance reserves during the year plus losses paid. But the only available figures on reserves are 'surplus to policy-holders' reported in insurance company statements.[68] Changes in this surplus arise from:

1) Smoothing of losses from year to year
2) Building up of reserves by individual insurance companies, reserves that would be unnecessary if all reserves were pooled
3) Loss or gain on investments
4) Corporate savings (excess or deficit of earnings over dividends)
5) Change in the basis of valuation of investments

Only the first item (plus losses paid) may really be taken to represent the amount set aside. These, however, are overshadowed by the others, especially the last item.[69] It was therefore necessary for us to assume, in the preceding chapter, that provision for losses is equal to premiums less current expenses of insurance companies.

PRICES UNDERLYING MEASURES OF LOSS BY ACCIDENT

It has been fairly well established in the courts that the values covered by insurance contracts are current values, not original

[68] See the Spectator Company's *Insurance Yearbook, Fire and Marine* (1935 issue), p. xxxiv.

[69] Changes in the basis of valuation have been spectacular. Book values as of December 31, 1932 and 1933 were on a 'convention' basis; values for other years were on a market basis. Cf. the summary in the *Insurance Yearbook, Fire and Marine* (1936 issue), pp. xlii–xlv.

cost values.[70] Not only is depreciation deducted, but obsolescence as well as changes in price levels are considered relevant. Provision for loss, therefore, covers current values, except for any discrepancies introduced by the tendency of insurance coverage to lag behind changes in price levels, original cost rather than current value being insured.

If current values are used in providing for loss by accident, there will be a discrepancy between benefit receipts and ordinary book values of property destroyed. This discrepancy will represent undeducted obsolescence and, perhaps to a greater degree, changes in price levels. But we have defined capital consumption as the *current* value of durable goods used up. The values in Table 4 are therefore suited to our purpose.

MAINTENANCE AND REPAIRS

DEFINITION OF MAINTENANCE AND REPAIRS

The definition of maintenance is highly variable. It may include all or only a fraction of indirect labor, material, and other factory costs. Only regularly recurring costs such as arise from cleaning, adjusting, and oiling may be included. Or maintenance may be defined more broadly to include also costs of replacing parts of units. Finally, even major overhauling costs may be covered by maintenance charges. On the other hand, recurring costs such as those of sweeping the floor of a plant may be excluded. Or maintenance may not be preserved as a separate category, being combined with other indirect costs. Of some 350 large industrial corporations reporting to the Securities and Exchange Commission about 40 stated either that they could not determine their maintenance costs as a separate quantity without an unreasonable expenditure of time and effort, or reported only part of their maintenance

[70] Cf. J. C. Bonbright and David Katz, Valuation of Property to Measure Fire-Insurance Losses, 29 *Columbia Law Review*, 857–900 (1929). Reprinted in J. C. Bonbright, *The Valuation of Property* (1937), Ch. XV.

In marine insurance, however, use is made of 'valued' policies, in which the property insured is explicitly valued.

costs.[71] Of those reporting the costs many probably did so on a post-mortem basis, only in response to the Commission's demand. If this is the status of the records of large listed corporations, it may be assumed that fewer small concerns are able to state their maintenance costs.

While the accountant wishes to avoid unnecessary refinement of his records, two of his important objectives are to avoid excessive irregularity (in time) of charges for maintenance, and to make the accounts show the cost of the existing property units, not of units that have been replaced. But actual usage may not attain these objectives. Thus, when maintenance charges are not segregated they are charged immediately to current expense: expenditures on maintenance that happen to accumulate in one fiscal period are not spread over several fiscal periods.

When separate accounts are kept for maintenance costs, their inclusiveness and treatment will depend on the general system used in accounting for fixed assets. If depreciation is ignored, as on ways and structures of steam railways, maintenance charges will be practically all-inclusive. In industries in which portions of equipment usually become obsolete quickly, this equipment may be written off rapidly, being kept on the books as deferred charges for short periods only. For example, the rapid writing off of forms, patterns, and dies in the automobile industry helps to explain the large ratio of maintenance and repairs (including credits to deferred charges) to depreciation charges characteristic of this industry (Table 8).

Regulation by outside forces also affects the nature of the maintenance accounts. The accounting system required by the Interstate Commerce Commission, for example, imposes uniformity of scope and of practice. And the regulations of the Treasury Department define maintenance explicitly, as follows:

[71] These 40 corporations were not, of course, included in the sample from which maintenance charges by industrial concerns were estimated (Table 7).

"The cost of incidental repairs which neither materially add to the value of the property nor appreciably prolong its life, but keep it in an ordinarily efficient operating condition, may be deducted as expense, provided the plant or property account is not increased by the amount of such expenditures. Repairs in the nature of replacements, to the extent that they arrest deterioration and appreciably prolong the life of the property, should be charged against the depreciation reserve if such account is kept." [72]

The Securities and Exchange Commission's requirement that maintenance charges be reported may also be expected to influence our future records. However, the Commission has not yet defined maintenance charges.

RELATION OF MAINTENANCE CHARGES TO OTHER CHARGES FOR CAPITAL CONSUMPTION

Maintenance and depreciation charges are complementary as well as supplementary. Fixed capital may be accounted for by either maintenance or depreciation as well as by both. This relation between maintenance and depreciation charges may be illustrated by the figures for individual corporations within the electric light and power field. (Restriction to one industry makes for homogeneity with respect to other elements.) The records of 29 corporations were examined (Table 16). The correlation coefficient for 1929, —0.413, while not very high, is greater than could be expected from chance alone.[73] The probability of a correlation coefficient greater than this arising from chance alone is approximately .02.

The Treasury Department has tended to follow railway accounting practice with respect to maintenance. Thus, "where the way and structures, i.e., roadway property, or any other

[72] *Regulations 77*, Art. 124.

[73] Both maintenance and depreciation are expressed as percentages of the same item—operating revenue. Any purely chance elements—heterogeneity despite restriction to one industry—therefore make for a spurious correlation between the two ratios. But this is a positive correlation, not the negative correlation we find.

Table 16

Relation between Maintenance Charges and Depreciation Charges

Electric Light and Power Industry, 1929

(double-frequency distribution; each corporation counts as one item)

DEPRECIATION AS A PERCENTAGE OF OPERATING REVENUES	MAINTENANCE AS A PERCENTAGE OF OPERATING REVENUES								
	1.50 to 2.49	2.50 to 3.49	3.50 to 4.49	4.50 to 5.49	5.50 to 6.49	6.50 to 7.49	7.50 to 8.49	8.50 to 9.49	9.50 to 10.49
0.50 to 1.49	..	..	..	..	..	..	..	1	..
1.50 to 2.49	..	..	..	..	..	..	1	..	..
2.50 to 3.49	..	..	..	..	..	..	..	..	..
3.50 to 4.49	..	..	..	..	2	2	..	..	..
4.50 to 5.49	..	..	..	..	1	2	..	..	..
5.50 to 6.49	..	..	..	..	..	..	1	..	..
6.50 to 7.49	..	..	1	1	2	1	1	..	1
7.50 to 8.49	..	..	..	2	..	..	1	..	1
8.50 to 9.49	..	..	..	..	..	..	..	..	..
9.50 to 10.49	..	..	..	..	..	2	..	..	..
10.50 to 11.49	..	..	1	..	..	2	..	..	..
11.50 to 12.49	..	..	..	1	..	1	..	..	..
12.50 to 13.49	..	..	..	..	..	..	..	..	..
13.50 to 14.49	1	..	..	..	..	..	..	..	..

property is kept in efficient operating condition by renewals and replacements which are allowed to be charged as expense, then deductions for depreciation shall not be allowed, since such renewals and replacements offset depreciation." [74]

There are other relations between depreciation and maintenance. The forecast of probable physical life involves inevitably the assumption of a certain rate of maintenance. The life of a machine is a function of the care taken of it. Further, the appropriateness of the allocation of depreciation charges over time depends on the concomitant allocation of main-

[74] Bureau of Internal Revenue, *Bulletin 'F'*, p. 23. "However, in isolated cases where the service life of the property is measured by the exhaustion of the source of traffic, such as timber, coal, etc., an allowance will be made for such depreciation as the facts justify."

tenance charges. As pointed out earlier in this chapter, allocations of depreciation charges, unsatisfactory by themselves, may be rendered satisfactory by the prevailing method of handling repairs and maintenance. Capital consumption is not measured by one item alone. Even maintenance in its most inclusive sense, as used in accounting for steam railroad ways and structures, is not a complete measure of consumption of the capital resident in these fixed assets. Retirements as well as the charge for maintenance must be considered.

Still another relation is found, that between maintenance charges and charges to reserves for depreciation. In a period of depression the difficult choice between these two entries may be resolved in favor of the latter. Expenditures that, in a period of prosperity, would be charged to maintenance (and thereby to expense), may, under less favorable circumstances, be charged to depreciation reserves (that is, capitalized). This bias may help to explain any tendency of reported maintenance charges to fluctuate.

PRICES IMPLICIT IN MAINTENANCE CHARGES

When expenditures upon maintenance are charged immediately to current expenses they are expressed in current prices, the prices that satisfy our concept of capital consumption. No question of a difference between original cost and reproduction cost arises.[75]

When expenditures on maintenance are budgeted and charged (through a deferred charge account) to periods other than those in which they are made, discrepancies between original and current prices may appear. However, most maintenance charges are not run through deferred charge accounts.

TIME ALLOCATION OF MAINTENANCE AND REPAIRS

If actual expenditures on maintenance equaled theoretically correct maintenance charges one would cancel the other in the

[75] The fixed property account will be influenced, however. The book values will represent costs of the original equipment or structures, not actual cost of the physical elements of the existing property.

measurement of net capital change: additions to durable goods (expenditures on maintenance) would equal the amount of durable goods used up (charges for maintenance). Current measures of net income, savings, and capital would be unaffected. If the theoretically correct charge for maintenance differs from actual expenditures on maintenance, inclusion in gross capital formation and in capital consumption is necessary. Owing to lack of better information, however, the figures accepted as measuring additions to durable goods, in the form of maintenance, and those accepted as measuring durable goods used up, in the form of required maintenance, are taken to be identical. Inclusion of maintenance in capital formation and consumption is still advisable when maintenance bulks large: the possibility of a discrepancy is emphasized and caution in interpretation is suggested.

Suspicion of a discrepancy between this charge and the actual expenditure upon maintenance arises even before we explicitly define what we mean by the theoretically correct maintenance charge (this is undertaken in Ch. 11). By any definition, so long as it does not identify the amount of the correct charge with the amount of the actual expenditure, such a discrepancy will exist. The factors affecting actual expenditures on maintenance are such that the identification of these two quantities is doubtful. The need for meeting nonpostponable charges in depression and the usual failure of the financial statement to reveal undermaintenance are two factors that make for this discrepancy.

The discrepancies in time allocation may be not only cyclical in character; they may be related also to secular movements. Actual expenditures on maintenance may lag behind the growth in fixed assets, as has been true for the steam railways.

CAPITAL EXPENDITURES CHARGED TO INCOME

As we have seen, the income tax law specifically permits the option of capitalizing or of charging to current operations

expenditures upon 'intangible' drilling costs of oil and gas wells. It is less definite with respect to other mines. However, development expenditures of oil and gas wells constituted almost three-quarters of total mining development costs in 1919.[76]

The proportion of the development costs that are capitalized to those that are written off immediately has changed. Thus, in determining the total cost of producing crude petroleum for 1927–30, the United States Tariff Commission included as a cost either intangible development charges or amortization of capitalized development, depending on the practices of the companies.[77] In continuing the series for 1931–33 the Petroleum Administrative Board of the Department of the Interior consistently used amortization of intangible developments for fields west of the Mississippi, regardless of actual accounting practices.[78] Individual company reports mention the substitution of the policy of capitalizing development costs (and writing them off as depletion or depreciation) for the former policy of charging development costs directly to current expense. The reason given by most companies, as well as by the Petroleum Board, is the same, namely, the proration of flush fields. The more direct effects of the depression upon profits must also be accorded some weight. In the earlier years of the period under consideration, the movement was in the reverse direction, though not as strongly. As a consequence of the recent changes the practice of charging capital costs directly to current expense declined in importance.

If capital expenditures that are charged to income moved with output, the resulting figures would be suitable for use in economic measures of capital consumption; for they would be

[76] *Census of Mines and Quarries, 1919*, p. 47. Development costs of timber properties may be either capitalized or charged to operations (*Regulations 74*, Art. 251 and 257), but no figures bearing on this item are available.

[77] Crude Petroleum and Its Liquid Refined Products, *Report No. 30, Second Series* (1932), pp. 155, 157.

[78] *Preliminary Report on a Survey of Crude Petroleum* (1934), p. 2.

expressed in current prices, and they would represent durable goods used up in current production. To the extent that they fluctuate differently than production, they are but approximations to economic measures of capital consumption.

ENTRIES ARISING FROM RETIREMENT OF FIXED ASSETS

The importance of retirements and abandonments will vary among industries, depending upon the accounting treatment of durable capital goods. When the maintenance basis is used chiefly, as in the case of steam railroad ways and structures, the charge upon retirement may be equal to the entire book value or to a large fraction of it, and will usually be a current charge on income account. From the economic point of view these charges belong in a first approximation to current capital consumption since they are taken, by business men, to represent durable goods used up in current production. Difficulties of pricing and timing still remain, but these must be taken care of, so far as possible, by modifications made to adapt the first approximation to a final economic measure of capital consumption.

When depreciation reserves are built up, the retirement charge will be equal to the difference (if any) between book value and accrued depreciation, and will sometimes be a charge on capital account, a capital adjustment. More often in depreciation accounting the entire amount of the retirement, regardless of the existence of any undepreciated portion, will be charged to the depreciation reserves. The entry will thus represent neither an income nor a capital charge (that is, neither capital consumption nor capital adjustment) but simply a cancellation of two balance sheet items of opposite sign.

The charging of retirements to the depreciation reserves is justified by the use of composite rates of depreciation in which

errors of estimate are presumed to balance out.[79] A weighted average rate is computed and applied to the total property account, or several composite rates are used, one for each of several groups of assets. Of 392 corporations reporting to the S. E. C. 22 specifically mentioned the use of composite rates of depreciation. The undepreciated value of property retired is charged to the depreciation reserve rather than to expense, on the assumption that there exists an equivalent amount of other property fully depreciated but still rendering service.

If we may judge from statements on depreciation practices,

[79] Errors of estimate arise from variation in the lives of apparently homogeneous capital goods. That there is great variation in the lives of capital goods is indicated by figures derived from data collected by Robley Winfrey and Edwin B. Kurtz (Life Characteristics of Physical Property [Iowa Engineering Experiment Station, *Bulletin 103*, 1931]; see also Edwin B. Kurtz, *Life Expectancy of Physical Property Based on Mortality Laws* [Ronald, 1930]; and Robley Winfrey, Statistical Analyses of Industrial Property Retirements [Iowa Engineering Experiment Station, *Bulletin 125*, 1935]). Measures of variation based on these data are presented herewith. (The measure of

RELATIVE VARIATION *(percentage)*	GROUPS OF PROPERTY *(number)*
0–10.0	4
10.1–20.0	18
20.1–30.0	21
30.1–40.0	14
40.1–50.0	4
50.1–60.0	2
60.1–70.0	2
Total number	65

variation, half the interquartile range as a percentage of the median, tells us the range on each side of the median, as a percentage of the latter, within which half the cases fall.) The relative variation is rather large for most groups. Much of it is due to difference in environment and operating conditions, as well as to differing rates of use. But the relation between these specific conditions and the life of a piece of equipment is often not clearly known; one important reason is the changing character of capital goods arising from technological progress. Even if known, the individual business enterprise would find it difficult to forecast operating conditions accurately in every instance. Often 'standard' rates of depreciation are used, without modification for specific conditions. When standard rates are not available, the estimates of life are made by business concerns independently of one another. Depreciation charges will therefore vary from one concern to another not because of differences in the character of their assets, or even because of differences in the specific operating conditions of each company, but because of differences in the estimate of life.

retirements are usually charged to depreciation reserves even when composite rates are not used. This is presumably on a theory similar to the one underlying the use of composite rates, namely, that there are some fully depreciated items that are still rendering service. Of 14 companies reporting their practice as to retirements, 9 charged loss on retirements to depreciation and 3 to current operating costs or profit and loss; 1 charged major items to surplus and minor items to profit and loss, and 1 charged retirement losses to a contingency reserve. One of the 14 companies reported a change in its policy: prior to 1934 it charged retirements to current costs; after January 1, 1934 it charged them to the depreciation reserve.

Regulations permit charging certain retirements to current expenses for tax purposes, if so desired.

"When, through some change in business conditions, the usefulness in the business of some or all of the capital assets is suddenly terminated, so that the taxpayer discontinues the business or discards such assets permanently from use in such business, he may claim as a loss for the year in which he takes such action the difference between the adjusted basis and the salvage value of the property. This exception to the rule requiring a sale or other disposition of property in order to establish a loss requires proof of some unforeseen cause by reason of which the property has been prematurely discarded, as, for example, where an increase in the cost or change in the manufacture of any product makes it necessary to abandon such manufacture, to which special machinery is exclusively devoted, or where new legislation directly or indirectly makes the continued profitable use of the property impossible. This exception does not extend to a case where the useful life of property terminates solely as a result of those gradual processes for which depreciation allowances are authorized . . . The exception applies to buildings only when they are permanently abandoned or permanently devoted to a radically different use, and to machinery only when its use as such is permanently abandoned." [80]

From an economic point of view this kind of charge is really one on capital account. It represents unforeseen obsolescence and is therefore a capital adjustment.

[80] *Regulations 77*, Art. 173.