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Tangible Assets of Public Utilities

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A Regulation and Public Utility Value

A unique economic characteristic of public utilities is the regulation of their operations, pricing policies, revenues, and income by governmental agencies. Since this institutional element of regulation is the core of the thesis to be developed in this paper, utility regulation is described briefly and some terms are defined.

By and large, utilities provide essential services. By and large, they are a heavily capitalized group of industries, as evidenced by the high ratio of plant to revenue, ranging from 3-1 to 7-1; for ordinary industrial and commercial concerns the ratios are well below 1-1. Most if not all utilities are industries of decreasing unit cost within wide ranges of capacity. With certain exceptions utilities sell services rather than tangible commodities; hence production for inventory to meet peak loads is precluded. As the services rendered are deemed necessary, utilities are normally required to serve all on demand.

Competition in the utility industries is both wasteful and ineffective in setting stable prices because the resultant duplication of relatively large amounts of plant and the consequent inability to take advantage of decreasing unit costs have led alternately to 'price wars' and to excessively high prices. This violent fluctuation of utility prices, together with the general inability to store the service, made it very difficult for enterprises whose cost of utilities services was a significant portion of the total cost of production to price their products intelligently and for any long period in advance. Consequently, it was found socially desirable to fix utility rates, i.e., prices, by governmental authority.

In time, the regulatory formula developed into what has come to be known as the 'fair return on fair value' rule.[1] That

[1] The argument that 'fair value' has in many cases been supplanted by 'original cost' is trivial for our purpose, since this paper considers 'original cost' as one possible definition of 'fair value'. Whether it should be the sole definition is another matter.

rule, very briefly, is this: a utility may charge such prices as will in the aggregate return to it all reasonable operating expenses, including taxes and depreciation, and in addition a 'fair return on the fair value' of its property used in rendering the service. Thus 'fair return' is synonymous in general with income, or the return on capital. We shall come to the meanings and implications of 'fair return', and of course 'fair value', presently.

Since gross revenues should reflect only reasonable costs of operation, commissions have exercised supervision over operating expenses.[2] Once reasonable operating costs are determined, the next step is to determine the 'fair return on fair value'. The sum of reasonable operating costs and the 'fair return' is the gross revenue the utility is entitled to earn.

Since utilities do not as a rule sell homogeneous products, this gross revenue could be obtained by various combinations of price or rate schedules.[3] The next regulatory step is to devise a series of rate schedules it is *expected* will bring in a gross revenue equal to operating cost plus a fair return. Usually there is no provision for an extra assessment against customers if the rates do not bring in that revenue, or for a refund to customers if the rates bring in more.

Commissions usually have other powers and duties, chiefly to regulate proposed security issues, supervise the adequacy of service, and to decide when new firms may enter the area. Regulatory commissions, both state and federal, control accounting practices, spelling out in uniform systems the theory and procedures for keeping all corporate accounts.

Not all states have regulatory commissions, and not all commissions regulate all industries that are recognized as utilities. Some commissions have no jurisdiction over municipally-owned utilities, and some have no control over cooperatives.

[2] Usually a utility is not prohibited from incurring whatever expenses it cares to; however, the excess of such actual expenses over those found to be reasonable is not reflected in determining the gross revenues to be collected from customers.

[3] A rate schedule is a supply price formula, quantity being the usual and often the only independent variable.

But by and large, and for the more important utilities, control is exercised throughout the country: intrastate operations are regulated by state commissions, interstate operations by federal commissions.[4]

B THESIS

At the close of 'On the Measurement of National Wealth', Mr. Kuznets stated that one purpose of his paper was to discourage attempts at global estimates of national wealth and to suggest studies of separate groups of wealth instruments and claims. He continued:

"The purposes of such studies would be to establish more adequately the significant classifications within the complex of wealth instruments or claims; to explore the various difficulties that would arise in the evaluation of the different groups, *and to point a way to measurement of national wealth that would be directed from the beginning at the significant classifications in the field.*" (italics mine)

I should like, for purposes of this paper, to adopt this quotation as a text; it is peculiarly applicable to public utilities.

In attempting to explore the problems that arise in connection with evaluating public utilities, the institutional aspect of public utility regulation must always be remembered. Prices of public utilities are set not in the market, but by means of a quasi-judicial, quasi-legislative organ—the utility regulatory commission.

The proposition I wish to explore is that this institutional factor of regulation has established the legal-regulatory concept of 'fair value' as the most significant element in determining the economic value of public utility assets.

To the extent that utility income is based on utility 'fair value', and in accordance with the definition that wealth re-

[4] The scope of state utility regulatory powers is well outlined in Moody's *Public Utility Manual, 1948,* pp. a59-62. The jurisdiction of the Federal Communications Commission, the Federal Power Commission, the Interstate Commerce Commission, the Maritime Commission, and the Civil Aeronautics Board are generally similar but on an interstate basis.

flects income-producing capacity, utility economic value is a function of utility 'fair value'. In other words, the adoption of a unique regulatory definition of value, i.e., 'fair value', and the effective use of 'fair value' as a tool in determining utility income, have created the situation where, in principle at least, 'value' tends to be identical with 'fair value'. To the extent that actual income is different from the prescribed regulatory income, value will differ from 'fair value'. In any event, utility value will approach or tend to equal 'fair value', and approach it more closely as regulation becomes more continuous and effective.

For purposes of this paper it seems unnecessary to consider what economic definition of fair value regulation *should* adopt. That is another subject. As long as there is an effective basis upon which income is or *tends* to be determined, and as long as we identify wealth with its power to yield income, we must accept, as a logical proposition, that this basis is just as effective in determining wealth.

The thesis I should like to explore then is essentially that utility value is or tends to be what utility commissions and the courts make it. I do not believe this is avoiding the problem. The problem as I see it is: Given the institutional factors that tend to determine utility income, what is public utility value?

The concept of public utility 'fair value' was developed after casting about among the various economic definitions and methods of determining value. The choice resulted from meeting and failing to solve many problems of methodology. The concepts (for there are more than one) finally adopted are a rough compromise between the economic and administrative elements involved; rough because into the choice went considerations other than those of economics and public administration.

However, only by giving full weight to this prime economic factor of 'utility prices and income by regulation' can we, in Mr. Kuznets' words, "point a way to measurement of national wealth that would be directed . . . at the *significant classifications in the field.*" (italics mine)

C Fair Rate of Return

Before plunging into the question of the valuation of public utility assets, it is well, for several reasons, to discuss briefly the regulatory concept of 'fair rate of return'. First, it is closely allied to the rate at which income can, in general, be capitalized to determine value; second, it gives useful information on how public utility value is *used* in determining utility income.[5] It thus provides the link between wealth and income for the utility sector of the economy.

To set up some means of measuring 'fair return', early thought in regulation defined 'fair return' as the product of 'fair *rate* of return' and 'fair value'. The classic definition of what constitutes a 'fair rate of return' was given by Justice Butler:

"A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investment in other business undertakings which are attended by corresponding risks and uncertainties." [6]

Despite this link between 'fair rate of return' and 'uncertainty', for quite a few years the determination of 'fair rate of return' was a matter of 'expert testimony', supported by little else than 'experience in the field of finance' and a 'feel for the market'. While in many instances that approach is still used, more recently and especially since 1938, the concept of the 'cost of capital' has been developed to measure the 'fair rate of return'.

5 We should always know what questions we intend to answer before we begin collecting data. In other words, the first problem is not how to go about formally measuring wealth or value, but to decide what we intend to do with the results. In the field of public utilities value is used to determine income.

6 *Bluefield Water Works & Improvement Co.* v. *Public Service Commission of West Virginia,* 262 U.S. 678, 692, 43 Sup. Ct. 675.

Justice Butler apparently considered 'risk' and 'uncertainty' synonymous, as do many today who refer to 'business risk' as the element that gives rise to profits. The Knightian distinction between the two will be followed in this article.

Let us define 'capital structure' as the series of ratios of each type of capital, or capital component (i.e., bonds, stocks, preferred stock, etc.), to total capital. The cost rate of total capital may then be defined as the weighted average of the cost rates of the capital components, the weights being the capital structure ratios of the respective components. The cost rates of the individual components are expressed in terms of yields on bonds and 'adjusted' earnings-price ratios for equity, etc., the adjustments being made in order to reflect cost of financing, underpricing, etc.

Since the cost rates of the individual types of capital are in many cases functions of the capital structure,[7] a relation between the cost rate of total capital (or cost of capital) and the capital structure can often be established. Minimizing that function with respect to the cost of capital, one can then determine what has been termed the 'optimum' or minimum cost capital structure and, from this capital structure, the cost rates of the individual capital components and the over-all cost of capital.[8]

When a company's own securities are traded on the market, some indication of the levels of the capitalization rates for the various types of capital can be obtained directly. In addition, or in lieu of such data, the behavior of the various capitalization rates, both as to level and as concerns the relationship to

[7] For example, it seems evident that as the proportion of gross income required to cover fixed interest charges increases, the uncertainty of the equity investment will increase, and hence the cost rate of equity money as well.

[8] A controversy is brewing over what cost of capital really means. One school holds that if a past or historical cost rate base is used, the contemporaneous past cost of capital must be used in finding the fair rate of return. It is contended further that a current cost of capital fair rate of return can be used only with a current cost rate base.

Opponents say the above is not correct; the requirement that a past cost rate base must go with a past cost of capital is a plea for semantic and not necessarily economic consistency. In view of the conclusions reached later in this paper, that capitalization of income is not a feasible method for evaluating utility assets, the attributes of a proper capitalization rate need not concern us further here. However, the sharp differences of opinion over what such a capitalization rate should be indicate the difficulties inherent in the capitalization of income approach to valuation.

the capital structure, may be determined from the market behavior of the securities of 'comparable' utilities.[9]

While this statistical approach to the cost of capital eliminates in large measure reliance on unfettered expert opinion, it must be used circumspectly and in the light of generally sound principles of finance.

'Fair rate of return', either because of more precise analysis or because of decreasing interest rates (probably for both reasons), has fallen from typical values of 7-8 percent in the middle 1920's to 5-6 percent.

D 'Fair Value' as a Measure of Public Utility Assets

It may not be amiss at this point to emphasize a basic definition: wealth is significant because and to the extent that it yields income. In fact, 'things' become wealth only if they produce income. Income is not the result of wealth; the existence or expectation of income is a prerequisite to the existence of wealth. Consequently, the theoretically correct value must be determined in terms of expected income flow, discounted at a 'proper' capitalization rate.[10] This then leads to the conclusion that the generally correct method of valuation is to capitalize expected income. Yet we know of at least three other widely used approaches to valuation, and it has been suggested that each can in certain cases be considered an approximation to the capitalization method; the reason for the substitution is the practical difficulty of the direct capitalization approach.[11]

9 The determination of comparability may in some cases be rather difficult, the standards of comparability being at times a matter of subjective judgment. It is perhaps enough to say at this point that the 'battle' of utility rate regulation has shifted in large measure from the 'value' to the 'fair rate of return' front.

10 This concept is perfectly general and applicable to the economy as a whole, but requires refinement for certain sectors; otherwise a large portion of government-owned 'things' would be defined as free goods.

11 I venture to suggest that the practical difficulty consists in large measure in the fact that the capitalization rate is as complex a problem, theoretically, as valuation, and a problem that has been lost sight of in the search for 'pure interest'.

In general the four chief methods of valuation are: capitalization of income, current market price, cost of reproduction, and original cost. We pay our respects to the forefather of the 'fair value' doctrine in public utility regulation, the case of Smyth vs. Ames:

"And in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property . . . are all matters for consideration. . . . We do not say that there may not be other matters to be regarded in estimating the value of the property . . ." (169 US 466,546).

Even without the catch-all at the end, Justice Harlan included the four measures of value, even noting the claims approach (to valuation). And in stating that these "are all matters for consideration" he let utility regulation loose in an economic labyrinth. The field of public utility valuation for regulatory purposes has been preempted by the cost of reproduction and original cost; at present the latter is leading.

I do not intend to discuss which of these four methods is 'best' for rate-regulatory purposes, regardless whether 'best' is defined in legal, economic, and/or administrative terms. Nevertheless, it seems desirable to consider to what extent each method is applicable to public utilities, and how these methods have been applied by regulatory bodies in determining 'fair value'. Even if we were to decide on principle to accept 'fair value' as an estimate of economic value, it is still desirable to know, in some detail, just what 'fair value' is and is not. Such knowledge may help to show how 'fair values' of public utilities can be fitted together with values of other groups of wealth instruments in computing over-all wealth estimates.

1 *Capitalization of Income*

If the desideratum is to ascertain whether a given utility income constitutes a 'fair return' on 'fair value', it is obviously improper to determine the latter by capitalizing the income

at the fair rate of return. Such a procedure involves circular reasoning, and would lead to the conclusion that *every* income is a fair return. For regulatory purposes therefore, capitalization of income provides no basis for valuation. However, this method may have use in 'discovering' value. Since it may have a purpose, it is worth while to discuss it as a general method.

One might well approach this method by considering the variables entering into the capitalization of income; expected incomes, specified as to distribution in time as well as to amounts, and the capitalization rate.

Several difficulties of determining those variables with any degree of accuracy are apparent. Since by the very nature of things the incomes are *expected* incomes, they must be estimated, i.e., they are forecasts. And since they are subjective estimates, is it justifiable to use such an elusive basis for valuation without inquiring why people think as they do, and what correction factors should be applied to those 'thoughts'? It has been suggested that the distribution of estimated incomes in future time is even more elusive.

The second variable entering into this method is the capitalization rate. Mr. Kuznets points out that if the determination of the future income distribution has been made in the light of all possible risks, the capitalization rate equals the pure interest rate. He qualifies this by saying that since at best such a forecast will not reflect all 'risks' but only the more obvious ones, a more realistic assumption is that the capitalization rate should reflect a risk element that would vary as between different categories of wealth. I agree in general; however, such a forecast could at best reflect only risks, not uncertainties. The capitalization rate must therefore, as a theoretical proposition and not merely as a practical or 'realistic' matter, be higher than 'pure interest', the differential varying as between categories of wealth. In fact, for many purposes these very categories might well be defined in terms of this uncertainty differential.

As concerns expected incomes, I venture to suggest that as a practical matter the 'future income distributions' actually used in determining offer and bid prices of securities, for example,

are very short run estimates. Moreover, they are corrected continuously in the market—by sales or decisions not to sell. The opportunity for this type of successive correction is facilitated by the fact that the assets themselves need not be sold—only the claims. While theoretically, value as ascertained by capitalized income comprehends *all* future income, the day to day values as evidenced by actual sales are not capitalizations of all future incomes—perhaps only next year's expected income. The market simply does not have all income data; at best it has only short run estimates of income, and they set prices.

If then only short run earnings are determinative, we need find only short run capitalization rates. To reflect reality, the problem can be telescoped in time from a long run, rather vague matter, very difficult to express quantitatively, into a short run problem which might lend itself to quantitative analysis. Dropping the requirement of long range estimates of the future income distribution and of a long term weighted capitalization rate makes it considerably easier, both theoretically and practically, to utilize capitalization of income as a valuation tool.

It has been suggested to me that capitalization of income is not only theoretically correct but also provides a practical and effective method of 'discovering' public utility value. The argument runs as follows: the income statements of utilities are more reliable than their balance sheets; reported income is the result of the application, faulty and imperfect as it may be, of the regulatory concept of value; even though regulation is imperfect and discontinuous, and hence reported income may exceed what might be deemed reasonable after a full rate case, the income was received and is a *fact,* and therefore becomes the subject of valuation; one should deal with actual income, and consider the results of regulatory valuation 'as is', not what might be if regulation were precise and continuous, or different from what it is; and since value depends upon income, utility value should be determined by capitalizing income.

This suggestion has merit and might be the basis for a sam-

pling approach to valuation. For example, assume that only Companies a, b, c, and d of Industry A have securities outstanding in the hands of the public and that the securities are actively traded. Expected earnings for Companies a, b, c, and d could be estimated and related to representative market prices of the corresponding claims, to yield an estimate of the industry-wide capitalization rate. This rate could then be applied to estimated earnings of Industry A to obtain its value. However, several qualifications are obvious. The above procedure could apply only to sectors of the economy where the speculative effect in setting the market price of securities is either negligible or can be corrected for; and to portions of the economy homogeneous enough to lend themselves to a sampling procedure.

While the capitalization of income approach to valuation offers some intriguing possibilities, close scrutiny reveals difficulties in both theory and practice. First, it is obvious that it is not current or reported income that can be capitalized to determine value, but rather future, expected income. We thus lose the alleged factual benchmark for our capitalization. Only if we first establish that actual income will persist can we capitalize it to determine value.

Second, the very suggestion of the use of the capitalization method is founded in large measure on the practical fact that regulation is neither continuous nor exact. Commissions estimate what a given set of prices will return in the way of income. If their estimate is correct, the income will be the 'fair return' on a previously determined 'fair value' and we would not need to capitalize income to discover this fair value. How can it be logically proposed that a method based on an estimate of future incomes be used to correct a situation arising from inability to estimate future incomes? That seems to come very close to circular reasoning.

Third, what of the capitalization rate to be used? Theoretically the capitalization rate reflects all the uncertainties inherent in the potential earnings situation of the enterprise. Presumably this capitalization rate would contain elements

reflecting the discontinuous character of regulation as well as the possible error in estimating the net income effect of a prescribed series of utility rates and charges. We seem to be faced again with the task of estimating a probability distribution with relation to future income—the very situation that gave rise to the suggestion of using the capitalization method of valuation.

The determination of an 'appropriate' capitalization rate raises problems. Obviously, an industry-wide capitalization rate would have to be some sort of weighted average. The uncertainty inherent in a small independent telephone company is quite different from that in say the New York Telephone Company. What weights would one use in computing the capitalization rate for the telephone industry in the United States? Conceptually, the capitalization rate reflects the uncertainty status of a given enterprise, and the problem of determining that rate for any given enterprise as of a specific time is fraught with so many difficulties, both theoretical and practical, as to make the extension of the concept and its statistical determination a highly uncertain procedure. It is one thing to say that an investment in the telephone business is more (or less) uncertain than an investment in the electric business; it is quite another to set up an objective, theoretically sound and practically feasible mechanism for determining the difference. The writer is unaware of any discussion (to say nothing of agreement) on the subject and has had little opportunity to give it much thought. Until the theoretical and practical details of an industry-wide capitalization rate have been worked out valuation by capitalizing income might well be held in abeyance on that score alone.

In general, assume that a regulatory body sets 'fair value', the 'fair rate of return', and prescribes a set of utility rates it is estimated will yield the 'fair return'. Then either because of an error in the estimate of what these utility rates would yield in the way of net income or because demand has changed, the actual return exceeded the fair return. Capitalizing the actual return at the 'fair rate of return' will yield a value higher than

the previously determined 'fair value'. On the general basis that 'value depends on income' it could presumably be said that the real value is in fact higher than the 'fair value'. This seems like ascribing value to imperfections in regulation. Perhaps proponents of the capitalization method would argue that it makes no difference how the income got to be larger than the fair return; the larger the income, the larger the value.

If it could be assumed that this larger income would persist, one could logically claim an increment in value. But that would be assuming nonexistent or completely ineffective regulation. A second, more reasonable and realistic, assumption would be that this 'extra' income would persist for a time, say until the next rate case. Then if it were possible to estimate how long the larger income would persist, one could still place a value on it. In the second case, value would fluctuate about 'fair value', and tend to approach it as regulation became more precise and continuous. In any event 'fair value' can be viewed as the limiting value of a tendency or long term trend. For purposes of national wealth estimates such a figure has merit.

Thus for a comprehensive determination of wealth it would seem that one must look to valuation methods other than the capitalization of income.

2 *Current Market Price*

Current market price and current reproduction cost are very much alike in principle. Both base their claim to being indicators of value on the proposition that when people buy or assemble wealth they do so in order to obtain income.

Of course utilities are not bought and sold on the market. In fact, even the claims to the tangible and intangible assets that are traded represent only small fractions of the total outstanding claims. In view of the infrequent (and for utilities practically nonexistent) sale of utilities as such on the market, there is no need to more than mention the theoretical objections to the 'current market price' approach to valuation on an asset basis; elaborate discussions are readily found:

1) Difficulty of defining 'current market price' as at a given time—market prices presupposing a continuous market;
2) Small volume of transactions. Here a distinction should be made between the asset and claim approaches, primarily due to speculative factors that find easier play in the latter case.

It was the nonexistence of a free competitive market for utility properties that eliminated this measure of value in evaluating utilities for regulatory purposes. Commissions soon found that such transactions simply did not exist. However, the market price method has some validity in connection with the claims approach; of that more later.

3 *Current Cost of Reproduction*

In the early days of regulation current reproduction cost of utilities was determined by making a detailed inventory of all plant and property, and valuing it at prices as of a given date. Not only was the plant priced as of that date; it was assumed to have been built on that date—with the result that all sorts of intangibles, hypothetical consulting fees, the tearing up of streets that had not been torn up, etc. went into the reproduction cost of plant. Nonreproducible assets (primarily land) were valued at estimated market prices, i.e., at current market prices of comparable assets. For example, land was valued on the basis of recent transactions in near-by, similarly situated parcels. In the case of gas-producing properties, where the 'land' is not comparable except with other 'utility producing' land, such a procedure amounts to capitalizing earnings to determine value to determine earnings; obviously circular reasoning. In these cases original cost was used as the next best measure. Since utilities were being valued as going concerns, a 'going concern value' was included in the cost of reproduction. This 'going concern value' was measured in several ways. In some instances it was found by capitalizing the difference between the earnings in the early years of the utility's life and what were considered 'reasonable' earnings. In other instances it was ascertained by the theoretical cost of training an operat-

ing force and developing a market. This 'intangible' was abandoned rather early. In any event, I leave this item to those who will discuss the valuation of intangibles.

The next step in the cost of reproduction procedure was to estimate accrued capital consumption or, as it is termed in utility parlance, accrued depreciation. This accrued depreciation was determined by 'field inspection'. 'Experts' inspected the property and determined its 'percent condition', the complement of its accrued depreciation. They drilled test holes in telephone poles, seriously inspected the corrosion in cast-iron pipes, and ran a judicious eye over buildings and other plant. For each piece of property they decided its 'percent condition'. For example, a pole deemed 10 percent depreciated was assigned a 90 percent condition. The weighted percent condition was applied to the reproduction cost of the plant; to that was added working capital and going concern value; the sum was called 'fair value'.

While practically this method of ascertaining accrued capital consumption was subject to many peculiar interpretations, theoretically at least it had the possibility of providing a reasonable estimate.

In time this 'inventory and inspection' method of determining current cost of reproduction changed over to a procedure of adjusting original, or book costs, by means of price indexes.[12] The accuracy and acceptability of the results depended of course on the validity of the indexes used. A rather indiscriminate use of indexes in 1933 led to an apparent rejection of this method by the United States Supreme Court, and the method fell into disrepute.[13] Recently it has been revived and is being

12 The ICC made the most comprehensive industry-wide valuation of all railroads in the country. It began as a split inventory method: roads were valued at cost of reproduction in 1914 prices for all plant in existence in 1914, plus all additions since 1914 at cost. The ICC has since adjusted this valuation by means of indexes to a cost of reproduction as of January 1, 1940, and in later cases further adjusted that. Depreciation was on both a book and inspection basis. For rate making purposes the ICC has used a compromise value between original and reproduction cost.

13 *West* v. *Chesapeake & Potomac Telephone Co.*, 295 US 662 (1935). Actually the Court rejected the inept use of indexes.

used with much greater skill, primarily by the telephone industry.

However, this recent use of indexes to adjust original cost has been accompanied by a crude and theoretically erroneous method of determining accrued capital consumption. The ratio of current reproduction cost to original cost is applied to the original cost depreciation reserve, and the product is assumed to be a proper capital consumption deduction from current reproduction cost.[14] This is an inappropriate method of deflating an original cost depreciation reserve in order to determine a reserve applicable to the cost of reproduction. While the original cost is multiplied by the deflating index to get the cost of reproduction, the annual accruals must in addition be weighted by the number of years between the date of installation and of valuation. So much for the actual procedures used in the past to establish regulatory value by determining cost of reproduction.

Do the general conditions under which cost of reproduction reflects economic value exist in the case of public utilities? It seems clear that theoretically, cost of reproduction approaches value only under conditions of competition and where access to the field is open to any newcomer. In the case of public utilities neither condition applies. First, instead of the classical condition of competition, i.e., a large number of producers each of whom considers price as given, uninfluenced by his own actions, we have exactly the reverse situation. Secondly, access to the field is so restricted that competition is practically nonexistent. In the few instances where it does exist, regulation tends to eliminate it.[15] Hence, expected marginal returns determine whether an existing plant shall be 'reproduced', i.e., replaced. An existing utility will not install a new, lower

[14] This is the reverse of the equally erroneous procedure applied by the ICC in 1938 in Ex. Parte No. 115, where the ratio of cost of reproduction minus depreciation to cost of reproduction new was applied to original cost to reflect accrued depreciation on an original cost basis.

[15] The merger of Western Union and Postal Telegraph in the national telegraph field, and the combination of the Keystone and Bell Telephone Companies in Philadelphia are two recent examples.

'cost of production' plant unless the total return on the new plant exceeds the annual costs of the new plant plus the amortization of the old plant.[16]

Mr. Kuznets points out also a condition under which cost of reproduction has an upward bias: when additions to assets can be made more readily than withdrawals, especially if total demand remains constant. This situation is specially true of public utilities. Utility assets are, on the whole, long-lived; hence depreciation charges, usually the sole means of withdrawing utility capital, are a very slow means of such withdrawal. In most instances, increases in utility plant must be substantial.[17] Also in view of the regulatory requirement of serving all upon demand, additions must be made promptly. On the other hand, withdrawals of any substantial amounts of utility plant are permitted rather rarely.[18] The conditions for an upward bias when the cost of reproduction is used as a measure of value seem specially present in the utility sector of the economy.[19]

Another theoretical difficulty with the use of current cost of reproduction as an estimate of value arises in connection with the determination and measurement of accrued capital consumption, discussed briefly in Section 5.

16 In view of regulation, the problem arises whether in the interest of stimulating the use of the most economical plant the utility should be allowed to include such amortization in operating expense or whether the advent of a more economical plant constitutes the maturation of an uncertainty, and as such has been 'paid' for, in a past rate of return in excess of pure interest.

17 This is not true for all types of assets for all utilities; e.g., a bus company can add one bus, a railroad one locomotive. On the other hand, because of the relative economy of large units, the addition of a generator by an electric utility may mean an investment of $5,000,000.

18 Witness Western Union's difficulty in obtaining permission to curtail service in certain communities.

19 With at least three possible qualifications: Total demand is not constant for all utilities; while some are growing, some are static, others even declining. Moreover, some industries such as bus and air transport, and to a degree rail transportation, can contract capital readily because certain separable units are short-lived. The third possible qualification hinges on the definition of capital consumption. If a decrease in demand and certain regulatory requirements can be deemed to lead to consumption of capital, the upward bias may be minimized.

4 *Original Cost*

Historically, and because the other two methods were inapplicable, reproduction and original cost soon preempted public utility regulatory valuation.

Since the advent of accounting control by regulatory commissions and the adherence to uniform systems of accounting (uniform at least for a given industry), original cost has taken on a specificity in principle that was entirely lacking in the cost of reproduction approach. As long as these systems of accounting are used, original cost is not only uniquely defined but has the administrative advantage of being readily ascertainable for a large proportion of utilities. For utility regulatory purposes it has the advantage of being a fact and not subject to adustments based on opinion. Also, it avoids the time-consuming element of elaborate inventories. These advantages have made original cost attractive for regulatory purposes.

Theoretically, original cost has little to recommend it. It reflects past decisions, which for the normal run of economic activity are so much water over the dam. Moreover, since the original cost of assets as of a given time is the sum of the actual dollar cost of each, identical items can have different original costs. However, if it is desired to adjust original cost so as to obtain values for given years at current year prices, or to obtain a series of values at a given year's prices, original cost is a good starting point for adjustments by means of a deflating technique, using appropriate indexes.

As concerns utilities, capital consumption in connection with original or book cost is reflected in what is called a 'depreciation reserve'. To this reserve is credited an amount equal to the 'annual depreciation expense', presumably an estimate of annual capital consumption. Retirements are debited to this reserve, and corresponding credits are entered in the appropriate asset account, also at original cost. The depreciation reserve hence purports to be a measure of accrued capital consumption, not a reserve for replacements. This reserve can be deflated to reflect the effect of price changes; hence it can be

restated for a series of years at current prices, or at constant prices of any given year. Whether such adjustments yield a good estimate of capital consumption will be discussed presently.

Whatever its specific virtues, if any, original cost is often the sole basis upon which accounting data pertinent to valuation are available for most utility industries. It is also the basis upon which many business judgments are made.

But most significant from the viewpoint of *finding* utility wealth, original or book cost is the most important single factor upon which the majority of regulatory commissions determine regulatory value. A good many commissions treat, in principle and/or practice, original or book cost synonymously with regulatory value.

The writer is aware of many criticisms leveled at original cost not only as an appropriate regulatory measure of 'fair value' but also as a proper basis for estimating economic value for purposes of national wealth estimates. The objections in the former group may or may not be well taken; in any event they are outside the scope of this paper. A criticism falling in the latter category is worth discussing briefly. It has been said that a utility with an allowable income of say $600,000 per year is obviously worth more than one with an income of $500,000, even though they may have the same original cost, and a method that indicates equal values is faulty. But *why* would these two utilities have different allowable incomes? Presumably the uncertainty attached to each is different; and hence the capitalization rate would be different. Thus even the implied remedy, capitalization of income, might well show the same value for different incomes. If we assume identical companies, why should the allowable income be different? The hidden assumption in this objection is that the capitalization rate is the same, and as such begs the entire question.

5 *Measurement of Capital Consumption*

Our primary concern here is less with current or annual capital consumption than with establishing the accrued or total capi-

tal consumption that exists in the assets to be valued. The flow of capital consumption and the sum total of that flow as between two dates are, however, intimately related.

To narrow the discussion to the subject at hand, i.e., public utilities, and to consider the general aspects of the problem, a little background in the depreciation accounting procedure of utilities may be of interest. In the earlier days of utility accounting for capital consumption the basic approach was 'retirement accounting'. A retirement reserve was built up by charges to operating expense to a level thought sufficient to take care of (accounting-wise) the retirement of the largest volume of plant that would be retired at one time. Neither the reserve nor the charges were related, in theory or practice, to depreciation. The charges were arbitrary and solely within the discretion of management, the amount often being dictated by business conditions. When business was good, the charges were high; when business was poor, they were reduced or omitted.

The telephone industry was a notable exception. Quite early it adopted depreciation accounting on the straight line basis. The general trend to depreciation accounting, especially to a straight line basis, has been strong. Depreciation accounting presupposes annual charges, which presumably approximate the annual accrual of depreciation, to operating expense. This annual accrual may be on a straight line, an interest, a unit of output, or various other bases. The annual charges are credited to the depreciation reserve (a balance sheet account). Retirements constitute debits to the reserve.

As the scope and thoroughness of regulation increased, both the depreciation expense and the reserve became the subject of careful scrutiny. In time the reserve began to take on the character of a measure of the accrued depreciation or accrued capital consumption that was to be deducted from original cost to determine the net cost of plant. This change in the interpretation of the reserve was strongly objected to by certain utilities which claimed that a reserve equal say to 30 percent of book plant was consistent with a claim that the plant was in 95

percent condition, i.e., only 5 percent depreciated, because, through maintenance, the plant was kept in nearly perfect operating condition.

The gap between the reserve and accrued depreciation began to narrow about 1935. Today both commissions and utilities generally accept the depreciation reserve as a proper deduction from original cost in determining net original cost. While it is not the purpose here to consider the various formulas used by different utilities to determine depreciation expense and reserve, it may be well to recognize that most commissions now prescribe straight line depreciation, and a large proportion of utilities now keep their books on this basis. Table 1 shows the trend in this direction for the electric utility industry and also indicates the methods used. The Bell System Companies, which in the aggregate provide over 80 percent of the telephone service in the United States, have used straight line depreciation for many years. Other utility industries are in the process of changing over, and as a result, industry data reflect a combination of methods, making analysis difficult.

In any consideration of capital consumption, one must always keep in mind that it can be defined in various ways, depending upon the purpose of the estimates. Without going into all the ramifications, several variations are pertinent here.[20] A concept useful for ascertaining net income for an accounting period is not directly applicable for establishing the total change in capital over time or for measuring the total accumulated capital consumption to be deducted from the gross current cost of capital assets.

For example, the complete consumption of an automobile tire is a consumption of capital. However, if a tire is used up in less than the usual accounting period, one year, its cost may never appear in any capital account, but merely be handled via the operating expense, 'maintenance'. If it is desired to reflect in estimates of capital consumption such items as the consumption of a tire, we must obviously recast the usual busi-

[20] For an admirable discussion see *Capital Consumption and Adjustment* by Solomon Fabricant (NBER, 1938).

Table 1
Changing Character of Electric Utility Depreciation Accounting, 1937 and 1945

		STRAIGHT LINE		INTEREST		REVENUE		OTHER		TOTAL	
		1937	*1945*	*1937*	*1945*	*1937*	*1945*	*1937*	*1945*	*1937*	*1945*
1	Number of utilities	21	132	7	13	28	18	65	90	121	253
2	% distribution of line 1	17.4	52.2	5.8	5.1	23.2	7.1	53.6	35.6	100.0	100.0
3	Elec. plant ($ mil.)	783.0	3,269.5	215.4	582.3	1,399.9	857.7	2,959.4	4,170.9	5,357.7	8,880.4
4	% distribution of line 3	14.6	36.8	4.0	6.6	26.1	9.7	55.3	46.9	100.0	100.0
5	Depreciation reserve ($ mil.)	153.2	804.7	30.3	129.9	188.1	208.4	263.2	757.2	634.8	1,900.2
6	% distribution of line 5	24.1	42.3	4.8	6.8	29.6	11.0	41.5	39.9	100.0	100.0
7	Ratio of reserve to plant (%)	19.6	24.6	14.1	22.3	13.4	24.3	8.9	18.2	11.8	21.4

Included under straight line methods are utilities whose depreciation rates are based on the estimated average service life of individual units of property, of functional classes of property, or of total depreciable electric property.

Under interest methods the estimated average service life of the property is estimated as in straight line methods but the annual expense is fixed by sinking fund or compound interest formulas or modifications thereof.

Revenue methods include utilities whose charges to depreciation expense are based on percentages of electric revenues adjusted for the cost of purchased power, maintenance, or other variants.

Included under other methods are certain utilities which state that no definite rules or rates are used in determining depreciation and amortization charges. In such cases the amounts credited to the reserve in each year or from time to time after inspection of the property are such as will, in the judgment of management, be sufficient to provide for current retirements and to build up reserves against future requirements. A few utilities did not report their method of providing for depreciation. Two utilities use a 'stabilized reserve' method, the amounts appropriated for each year being such as are necessary to maintain reserves at an arbitrary percentage of plant. Four utilities use two or more methods.

ness accounting procedures, shifting substantial sums from 'maintenance and repairs' expense accounts to depreciation expenses. For purposes of ascertaining income it makes no difference whether the cost of the tire is charged to maintenance or to depreciation expense; in either event it is a deduction from gross revenue. But for purposes of fixing value it does make a difference whether one considers the tire as a fixed asset or not.

To avoid duplication and undue accounting refinement, regulatory commissions define the major items of plant as 'units of property'.[21] The retirement of a 'unit of property' results in a credit to the plant account and a charge to the depreciation reserve. The replacement of a minor item, i.e., not a 'unit of property', is charged to operating expense and does not lead to any entries in either the fixed asset or depreciation reserve accounts. This is a pragmatic approach to accounting, the effect of which on estimates of capital consumption depends upon how major or significant are the 'units of property'.

The extent of maintenance has of course a profound effect upon the accruing depreciation of plant. However, if the estimates of future economic life, and hence the annual charges to depreciation expense and credits to depreciation reserve, are made in the light of an expected 'normal' maintenance, there seems to be no need to add depreciation and maintenance expense to obtain an estimate of annual capital consumption. Only when maintenance and repairs expense gets out of balance with the annual depreciation expense, especially if the depreciation expense is on an average basis (such as straight line depreciation), will there be either an under- or an overstatement of capital consumption. It is in recognition of this situation that depreciation is defined, for utility regulatory

21 In general a unit of property is one whose economic life exceeds one year, the conventional accounting period. To avoid burdensome accounting detail 'minor' items, i.e., minor in terms of their cost, are not classified as units of property. For example, a valve whose life may be several years would nevertheless not be considered a unit of property because of its low cost as compared with that of the over-all boiler assembly.

purposes, as the consumption of capital not restored by current maintenance.[22]

The above should not be construed as suggesting that depreciation reserves on the books of all utilities can be presumed to be measures of accrued depreciation. Too many suffer from former sins of omission. However, as these reserves approach the standards set up by current uniform systems of accounting, they will not only reflect better estimates of accrued capital consumption for regulatory purposes, and hence for estimating value,[23] but also make available better estimates of capital consumption than are ordinarily available for any sector of the economy.

[22] The New York Public Service Commission's definition of depreciation is typical:

"Depreciation, as applied to electric plant, means the net loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of electric plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities."

I disagree in principle with certain parts of this definition, since it implies that the listed causes can be considered in fixing the annual depreciation expense. I agree, however, that on a *post hoc* basis, capital consumption may have resulted from each or any of those causes. By implication the definition neglects to distinguish between capital consumption on capital account and on income account. See my article, 'Uncertainty and the Provision for Depreciation in the Public Utility Industries', *Journal of Business,* University of Chicago, Oct. 1943, p. 209.

[23] At this point I must reiterate a basic premise: utility value tends to be what commissions make it.

I am aware of the argument that this premise may lead to the conclusion that two plants, one owned by a private company and used to produce electricity for its own use, and another a public utility, otherwise identical, would have different values, both gross and net. This is not only possible but logical. *Physically* the plants are identical; *economically* they are not. They are no more identical economically than a plant operating under monopoly conditions and the identical physical plant operating in a competitive situation; though the costs may be the same, the prices and incomes need not.

In fact I may go further—my premise would lead me to the conclusion that identical plants, subject to different commissions which adopt different depreciation rates, would have identical gross values but different net values. This too seems perfectly logical, and the inevitable result of the previously discussed institutional factor.

One qualification on this optimistic statement: A substantial number of utilities have turned to depreciation accounting relatively recently. Not all have adjusted their depreciation reserves to make up for past deficiencies. But the trend is toward restating such reserves so that they will eventually represent 'reserve requirements'. Until such time, the reported reserves must be used with caution, and are subject to these shortcomings. And while the theory of these adjustments is straightforward enough, the practice is a job far beyond the scope of this paper. However, despite the tendency of commissions to use original cost minus depreciation reserve as utility value for earnings and rate control, in a substantial area of utility regulation current cost of reproduction minus depreciation is used, or at least considered, in determining utility value.

Given a book or original cost depreciation reserve, and assuming it to be adequate for original cost valuation purposes, how should it be adjusted so that it may be used with an original cost adjusted to reflect cost at a given year's prices? Were the price level the sole variable to adjust for, the technique would not be difficult. Mr. Fabricant has already described and applied it in *Capital Consumption and Adjustment.*[24] The difficulty in applying this technique is statistical —it is hard to obtain enough representative data to develop the necessary indexes. One must design construction cost and other indexes—a problem that would be simplified by confining the method to utilities as a group, and possibly further, to individual industries within the group.[25] Since more

[24] See especially Chapter 10, Price Changes and Measures of Capital Consumption.

[25] It is undoubtedly simpler and much more accurate to devise an index for construction costs in the telephone industry than for all utilities, and that in turn better than an index for all business. By bringing the analysis down to that lower level a weighted average index of construction could be obtained, the weights reflecting the proportion of plant represented by each index, before weighting the weighted average index of construction by the estimated depreciation charge applicable to the plant constructed at the given prices. Also under these conditions the estimates of depreciation charge could be very much more precise. See *Capital Consumption and Adjustment,* p. 165.

comprehensive data are available for utilities, the task of adjusting original cost depreciation reserves to either current or a given year's prices is simplified. But, as Mr. Fabricant carefully points out, this elimination of the 'hetero-temporality' of original cost reserves does not correct for a change in kind or quality of the equipment. In other words, obsolescence due to advances in the arts and changes in demand (to mention two of the more important elements) cannot be corrected for statistically. Advances in the arts, probably the more important for most utilities, tend to make existing equipment relatively obsolete. Consequently, for utilities that typically have long-lived equipment and are subject to an improving technique, even the price level adjusted reserve becomes a poor measure of accrued capital consumption. It seems, at least tentatively, that a statistical approach to reproduction cost depreciation founders on the rock of obsolescence, as did the 'field inspection' approach.[26] Perhaps the problem could be solved by a combination of the two.

6 *Value of Utilities that Cannot Earn a Fair Return*

For the most part, the market for utility services is a growing one, and the character of demand such that except during severe depressions a 'fair return' can be earned at various price schedules. Relatively high prices will ordinarily restrict consumption, yet a 'fair return' can be earned for the corresponding low level of consumption. Lower prices will for certain sectors of the market lead to larger consumption; and a fair return can be earned at this higher level of use.[27]

However, at times because of what may be termed industrial

[26] The latter suffered not from any theoretical disability but from the failure to use the cost of reproducing the most economical plant to provide the service as a basis for measuring the obsolescence in the theoretically reproduced *actual* plant.

[27] Utilities do not sell a homogeneous product. A kw. hr. of electric energy consumed in lighting households is an entirely different economic good than a physically identical kw. hr. consumed in factory lighting. Utility services are therefore sold not on a single price schedule, but on a series of schedules, each listing the unit price for successive blocks of consumption. Differential pricing is quite well advanced in certain utility industries.

obsolescence the market for a given type of service so degenerates that at no schedule of prices can the utility or the industry earn what may be deemed a fair rate of return.[28] In other words, the 'fair rate of return', when applied to regulatory 'fair value', results in an indicated 'fair return' that cannot be earned by the utility at any conceivable series of rate schedules.[29] When faced with this problem, commissions set prices on essentially a monopoly-pricing basis—the maximization of profits. Does this situation require that we revise our concept of 'fair return' as well as of 'fair value', the more significant concept for our present purpose?

It might well be argued that if earnings are the key to value, and if a certain property cannot earn, or its earning power is impaired because of waning demand, its value has been correspondingly impaired. The property has to all intents and purposes depreciated; its plant has become at least partly obsolete because it is no longer in line with the demand for its services.

The commonly accepted definitions of depreciation include changes in demand as a cause. It would therefore seem that the depreciation reserve should reflect this obsolescence. However, the fact that the utility cannot earn a fair return on net value (i.e., after the deduction of this reserve) proves that the reserve does not reflect obsolescence.[30] The problem is how to measure the effect of the 'matured uncertainty'. A possible answer would be to capitalize the maximized income at the fair rate of return.[31]

28 The railroads seemed to be in that general situation prior to the war. The currently recurring applications for rate increases may be an indication that the disease is chronic. The telegraph industry too may be in this state.

29 This is true despite the 'essentiality' of utility services, and because at certain prices substitute services would be utilized.

30 It is theoretically impossible that the reserve could 'cover' such obsolescence. A long-term decline in demand seems to be a well-nigh perfect example of business 'uncertainty' (in the Knightian sense). In fact, it seems to be the prime business uncertainty. See my 'Uncertainty and the Provision for Depreciation in the Public Utility Industries'.

31 This does not involve circular reasoning, for here we are not determining the value upon which to base earnings. By definition the situation rules out this procedure; here earnings have been determined by factors other than regulation; we seek to discover the value implied by these earnings.

How does the cost of capital behave in such a situation? As the demand for the particular utility service declines below the economic capacity of the plant, and as a further decline is expected, the investment desirability of the securities of the utility (or utility industry if the decline is industry-wide) diminishes. Not only will the market price drop but the yield on the bonds and the earnings-price ratio of the stock will tend to go up, since present earnings will be discounted as indications of future earnings.[32] The determination of a capitalization rate under these circumstances would be even more difficult than usual. However, theoretically and subject to this difficulty, there seem to be no serious objections to determining utility value by capitalizing earnings.

To the extent that original cost minus depreciation is used for general value determinations of such utilities, that cost clearly overstates utility value. The overstatement is inflated by the fact that when demand is declining, as a long-term matter, firms skimp on maintenance and, to give a semblance of financial wellbeing, tend to understate depreciation charges (where and to the degree they are within the discretion of the company). The depreciation reserve becomes an ever poorer estimate of accrued capital consumption, as does the income statement for purposes of ascertaining net income on any realistic basis.

7 *The Claims Approach to Valuation*

Securities have value for the same reason that tangible assets have value—each is a 'source' of income. To the extent that both the tangible assets and the claims against them are valued for essentially the same income, the value of the latter may serve as a check on that of the former. However, claims and tangible assets can rarely be matched exactly. In addition to such assets as plant, cash, and receivables, there are always such intangibles as 'goodwill' or 'going concern value'.

[32] Under these circumstances the usual measures of cost of capital will tend to overstate the true capitalization rate and hence understate the value as measured by capitalized earnings.

And this is essentially the basic difficulty with using the claims-value approach as an independent check on the value of tangible assets. Does the value of claims reflect only the value of tangible assets or of tangible assets plus intangibles such as monopoly status and value of managerial skill? These are sources of income and hence constitute wealth. The question is, then, does such wealth attach to the tangible assets or is it a separable and separate item of wealth? If we assert that we have two distinct classes of wealth, we must conclude that a given electric motor has one value when operated by a skillful mechanic but a lower value when operated by a clumsy one. This proves nothing, for we can come to an apparently even more paradoxical conclusion: that a given combination of operator and motor is more valuable, i.e., constitutes more wealth, when operated to make a marketable product than when operated to make a product that cannot be sold; we have income in the first case and none in the second. We can of course define the difference in earning capacity as 'going concern value' or 'goodwill'.

This type of analysis by definition quickly leads into metaphysics. The crux of the matter is that in valuing claims we value the entire enterprise as a going concern. An attempt to value any segment of the total assets by the claims approach involves one in an impossible allocation—between tangible and intangible assets.

The claims approach in general proceeds on the theory that wealth is a capitalization of expected income and, as in the case of tangible assets, we must take the indirect approach. Obviously the reproduction cost of claims is identical with market price. The field here narrows to book cost and current market price. However, using the book cost of claims as an independent check on public utility value as determined for the most part by the original or book cost of plant leads to an identity. Assets equal liabilities as a bookkeeping procedure—the books balance. The earned surplus accounts (within the limits of corporate solvency) expand and contract to keep the books in balance. And since earned surplus is a part of common stock

equity, the book value of claims is bound to equal the net book value of the assets.

What about the current market price of claims? Are market prices of traded claims an acceptable basis for valuing them? We may ignore to a large extent the speculative factor, since it is at a minimum in the case of public utility securities. By and large they are traded on an earnings basis; the very fact of regulation would tend to bring this about. But what prices are we to use?

Stock market prices fluctuate daily. It is doubtful that income expectations fluctuate as rapidly. And the capitalization rate is conceptually a stable factor, which has significance only as a trend, not as a 'spot' figure. One could not use a 'spot' earnings-price ratio as a measure of the capitalization rate for common stock. 'Spot' market prices are equally meaningless as a measure of value.

However, if we are to 'normalize', or average market prices of securities, we meet the difficulty we had with current market prices of tangible property—how to define 'current'. A representative period for averaging utility common stock may range from 3 to 7 years or more. As in the case of tangible assets, current prices are not on 'as of a given date' data; they are, as Mr. Kuznets says, "an aspect of flow". In addition, the claims approach would leave some serious gaps in the data, since a surprising number of utilities do not have securities on the market; the securities are owned by holding companies or other affiliates. Utilities owned by governmental agencies and cooperatives would be excluded also.

In the case of combination companies, the market prices of the securities reflect a complex aggregate of evaluations of the various components. The problem of allocation becomes especially difficult; the statistical procedure of a partial regression analysis to analyze the combination even for a single utility industry is a major undertaking, and when completed, is subject to serious doubt on theoretical economic grounds.

Overhanging the whole claims approach is the matter of consolidating outstanding claims to avoid duplication. In the

utility industries there is extensive inter-company security holding. There would be numerous duplications in a simple arithmetic total of all the securities of a given utility industry. To eliminate them, especially on a market price basis, would be a prodigious task. However, to the extent that such an arithmetic sum does not conceal details of capital structure, it is of some significance.

Of course the use of cost of capital as a measure of rate of return precludes the use of the market price of certain securities as a means of setting regulatory utility value. But under continuous and effective regulation, with a rate of return reflecting security market realities, the market price of claims would approach regulatory value.[33] Therefore to use the market price of claims to indicate utility value is theoretically possible. To the degree that regulation is neither continuous nor effective, the market price of claims may not only reflect utility value in the long run but also a capitalization of windfall earnings due to the lag in or lack of regulation. This, in conjunction with the practical difficulties outlined, makes this approach to utility value very unsatisfactory. The book cost of claims is even less satisfactory. We seem to be left with the substantive approach to the valuation of public utility tangible assets.

E ALLOCATION

Allocation has three general aspects:

Separating utility operations from multipurpose operations. One instance is that exemplified by the Tennessee Valley Authority, where the electric utility operations are carried on jointly with those of flood control, navigation, soil conservation, etc.

Separating the various types of utility from combination utility operations. Typical of this situation are the combination electric and gas companies, and the electric and steam companies.

[33] If the fair rate of return or the actually earned rate of return were higher or lower than the ordinary interest rate, adjusted for uncertainty, the market's capitalization would differ from regulatory value.

Allocating the value of claims among the various types of assets underlying them.

The first aspect is of special importance in view of the basic premise that wealth determination should proceed on the basis of significant classifications of the economy. In addition to the multipurpose government projects many private industrial concerns own and operate very large power plants primarily to supply energy for their own industrial operations but sell, as utilities, substantial amounts of power. About 18 percent of the country's total electric energy production capacity is owned and operated by such industrial concerns. While the energy they sell as utilities and their revenue therefrom could be calculated, any allocation of their total power production facilities to such utility operation would be confronted with all the theoretical and practical difficulties of cost analysis. The problem is academic for present purposes since such operations are not formally classified as public utilities. In principle we have a case of both joint and overhead costs.

Any analysis on a byproduct assumption, while possibly valid for certain pricing purposes, is obviously not valid for purposes of wealth estimates. In the case of government-owned multipurpose projects, where the kind and volume of plant is what it is because it was built in expectation and partly for the purpose of providing power, a byproduct analysis is of even less value. Here we have the additional complicating factor that one or more of the joint products are not sold on any market, and those that are sold are often priced on a basis somewhat different from the basis on which the same products are sold by nongovernmental units. Hence a capitalization of income approach is of little if any use.[34] Here too the problem is one of allocating costs among joint products. It is a very important problem, an acceptable solution of which is yet to be found. My guess is that the answer lies in a careful econometric analysis of cost functions.

[34] It is not proposed to discuss here either what is a capitalization rate for government operation of utility plant or the ramifications of the effect of the payment (or nonpayment) of taxes or other expenses.

A similar problem of allocation arises in the case of natural gas companies. In many instances the production, or better, extraction of natural gas is a joint operation with petroleum extraction. The problem of allocation here is just as involved as in the case of multipurpose hydro-installations. In any event, for present purposes this problem too is academic since the extraction of natural gas is formally classified with mining, not with public utilities.

The second phase of the problem, to segregate the various types of utility from combination utilities, raises all the preceding questions as well as certain problems of a different character. If we are concerned with utilities as a group, this allocation is unnecessary. If some classification is desired, it can be based on the major operation of the combination utility, 'majority' being defined possibly in terms of gross revenue.

Another difficulty arises, again from the institutional factor of regulation. Even a casual analysis will often show that while, for example, the electric portion of a business is doing well, the gas operations are not. Strictly applied, utility regulation would set electric rates at a level to support the value of the electric investment. However, no schedule of rates can, in many cases, earn a fair return on the gas portion of the investment, and theoretically the gas rates would have to be so low as to earn less than a fair return. If they were, the total return to the utility would be less than a fair return on the total value. In many instances, however, such a situation is resolved by raising the electric rates to a level higher than necessary for the electric operation alone, so as to bring a total return adequate to support the total investment. In such cases the total value is reflected in the depreciated original cost of the total plant (assuming an original cost approach). Under these conditions, any allocation on the basis of original cost of each type of plant is logically incorrect. It will overstate the gas plant by exactly the same amount as would occur if the gas plant were separate and still unable to earn a fair return. However, in view of the regulatory action, the total value of the two would be correct.

The third aspect of allocation, that applicable to claims, par-

takes of the nature of the first two. If one is concerned with transactor groups, the allocation of claims to nonutility operations is significant. If a narrower definition is desired, i.e., steam utility as opposed to electric utility, etc., more extensive allocations will have to be made. In theory, the allocation should proceed on an income basis. However, the segregation of income itself entails an allocation of expenses and plant. On net balance such a procedure is, or comes dangerously close to, circular reasoning.

In view of the conclusion that the claims approach is not a very useful tool for valuing public utility assets, this complex subject is not discussed further. In any event, the general problem of overhead costs, joint production, and allocation is complicated, and the writer knows of no adequate general solution.

F Value Comparisons

One purpose of wealth estimates is to compare wealth at different times, either for the economy as a whole or for selected sectors. Before going into this question it is pertinent to inquire whether public utility value measured according to the concept adopted in this paper can be added to the value of other sectors of the economy, however measured, to yield an aggregate as of a given time. I think the answer is 'yes'. In this connection Mr. Kuznets' comments are apropos:

"The demands of the economic analyses in which estimates of groups of wealth instruments are to be used should dictate the answer to the question not only of scope but also of valuation. For some problems the gross value of such instruments, at either original or reproduction cost, is more significant than the gross value adjusted for accumulated consumption. For other problems either original cost or reproduction cost is the valid method. For still others the current market price may be the only admissible basis of valuation. No general statement can be made except the need of considering the various problems in which the estimates are to be used in deciding the questions of valuation. *And it is quite possible that such consideration will call for application of different methods of valution to different groups of wealth instruments, as the*

only condition of the comparability of the latter and of their addibility into a significant total." (my italics) [35]

It is the validity of the method of valuation for the particular group of wealth instruments, not necessarily the 'sameness' of the method for all groups, that is essential. In view of the current state of utility regulation, original or book cost not only is the most important single direct element considered by commissions in determining regulatory value, but also serves as the base for adjustments when elements other than original cost are considered. As such, original cost is probably as significant an estimate of utility value as can be obtained. If this regulatory value is accepted as the appropriate measure of utility value, it can properly be added to and compared with the value of other wealth instruments, however measured.

The objections to this 'split-inventory' approach are comparable with those leveled at a similar cost approach suggested by Means, Currie, and Nathan in their discussion of income from government activity.[36] There the chief objection to the cost approach also seems to be that data obtained on a cost basis would be inconsistent with those obtained for other sectors of the economy; and despite the difference in the nature of governmental activity, the market place approach should nevertheless rule for government-owned assets in order not to distort the over-all picture. But there is this significant difference between governmental activity and regulated utility operations: for government 'output' a market evaluation would have to be imputed; for utility output a market price is available. The latter, however, is set by regulatory action stemming from the regulatory value of utility assets, not by the free interplay of the market. Because of this institutional situation regulatory value is best adapted for estimating utility value; the latter can therefore be combined with the value of other groups of assets in determining total wealth. The apparent lack of comparability of valuation methods as among groups

[35] *Studies in Income and Wealth, Volume Two,* pp. 55-6.

[36] Ibid., Part Five, especially pp. 303-6.

of assets does not introduce any limitations not basically engendered by society's decision that utility rates be set by regulation.

For purposes of comparing wealth over time, the Conference on Research in Income and Wealth chose 1929, 1939, and 1946. Had regulatory policy since 1929 been substantially what it is today, and had utility accounting since 1929 been at the level it is today, it would be appropriate to compare original or book cost minus depreciation as of each date. But utility accounting has improved greatly since the 1920's, and utility regulatory policy has certainly changed. Until the early 1930's, or at least 1929, cost of reproduction (computed by repricing inventories) minus depreciation (estimated by inspection of physical assets) was the preponderant and ruling approach to regulatory value. By 1939 the situation was part way between that in 1929 and the present. Correcting for changes in accounting principles and practices would be only slightly less difficult than adjusting for shifts in regulatory policy. In either event any attempt in that direction would have to get down almost to individual companies. The volume of detail would be tremendous.

One point more: in the controversy over the relative efficiency of wealth and income estimates for purposes of economic analysis, may I put in a plea for income, if both would serve equally well? Income is more precisely defined and much more susceptible to adjustment for various purposes, especially comparisons over time.

When the question of the relation between income and wealth arises, it is my tentative suggestion that for utilities the claims approach will prove more efficient. The relation will then be defined in terms of weighted yields on market prices of securities.

G Summary

The value of public utility assets approaches and tends to equal their rate-making or regulatory value. As regulation becomes more continuous and effective, the gap between the two tends to narrow. In the absence of a universally accepted standard for

fixing regulatory value, and since actual income may differ from estimated 'fair return', it is impossible to ascertain specific industry-wide value; the best that can be hoped for is to define this value within certain limits. Since regulation sets utility value between cost of reproduction at current prices and original cost, or at either, these established the range. In view of the general use of uniform systems of accounting prescribing utility accounting for fixed assets on an original cost basis, such cost is not only one measure of utility value but also the datum from which the cost of reproduction at any price level can be calculated statistically.

To determine accrued capital consumption is much more difficult. In general, original or book depreciation reserves are an adequate basis for estimating accrued capital consumption. For utilities that have used depreciation accounting for a short time, or have not adjusted reserves to reflect what has been termed 'reserve requirements', adjustment is obviously necessary. It can best proceed on a company basis.

A much more difficult problem, theoretically as well as practically, is presented when an original cost or book depreciation reserve is to be adjusted to reflect accrued capital consumption on a cost of reproduction basis. Appropriate though the indexes to correct such a reserve for changes in price level may be, obsolescence, owing primarily to advances in the arts, makes for a wide margin of error. Since obsolescence due to the incidence of an uncertainty is, strictly speaking, capital consumption on capital account rather than on income account, the problem is not as serious in ascertaining utility income as it is in estimating net value. Therefore a depreciation reserve built up by credits of annual depreciation expense tends to understate accrued capital consumption, even on an original cost basis. The effect of adjusting such a reserve to a current cost basis compounds the error, especially in the light of an ever improving utility technology.

The claims approach resolves into a choice between book and market price values. The former is not an independent check on the direct evaluation of assets, and therefore adds

nothing. The market price of claims may reflect much more than the value of the underlying tangible assets, and that approach therefore yields ambiguous results. Windfall earnings arising from the lag in or ineffectiveness of utility regulation may act to create temporary values, which would be reflected in the market price of the associated claims. However, it is doubtful that the capitalization of such elements gives rise to values permanent enough to be included in estimates of national wealth.

The situation is somewhat different in the case of public utilities that, because of a 'permanently' depressed demand, cannot earn what would be called a fair return by the usual regulatory standards. In such instances it is suggested that the capitalization of maximized monopoly income affords, theoretically at least, a reasonable estimate of utility value. As a practical problem estimating such a value is not only fraught with all the difficulties of ascertaining an adequate capitalization rate but also poses the statistical problem of finding out which utilities are in the category.

In addition there is allocation, a problem not unique to public utilities, of course. In the case of utilities it has three aspects: the separation of two types of utility in the case of combination companies, the separation of utility from nonutility operation, and the allocation of the value of claims. For purposes of dividing the economy into meaningful sectors, some form of allocation is necessary, but poses serious theoretical difficulties. To estimate aggregate value, the theoretical difficulties are less serious, since the purpose is primarily to eliminate duplication and bridge gaps in the data.

If public utility value tends to approach regulatory value, what frame of reference have we for organizations that sell utility services to the public but are not subject to regulation? In this group are utilities operated by governmental bodies and cooperatives which by statute are often exempt from regulation, utilities operating in areas where there is no regulation, and incidental utilities exempt from regulation. A large proportion keep their accounts on a basis approximating that for

regulated utilities. Certain utilities keep no accounts worthy of the name.

As in the case of regulated utilities, original cost minus depreciation reserve, the latter estimated if not available, would seem to be a starting point. Adjustment to some current cost basis would meet difficulties engendered by obsolescence. The approach to valuation would thus be the same for both regulated and nonregulated utilities.

With respect to public utility value in general, we seem to be in the unhappy situation of having to pick the 'least worst' measure. The choice seems to be between original and reproduction cost.[37] The latter, usually determined as an adjustment to or revaluation of original cost, is subject to error; original cost has the virtue of being a fact.[38] Whatever inadequacy an original cost depreciation reserve may have, the adjustment to current price levels or a given year's price level introduces additional errors.

As yet a satisfactory method does not seem to have been devised for adjusting for obsolescence, especially that occasioned by changes in demand and advances in the arts.

In addition, there is the theoretical difficulty that reproduction cost is not a good measure of economic value for a monopoly industry, and, under certain conditions pertinent to utilities, has an upward bias. Moreover, utility income is fixed more and more on original cost, and when original cost is not the sole criterion, it is the more important.

We seem to be left, more or less by default, with original cost, not because original cost has fewer defects for our purpose but because cost of reproduction has more. In stressing book, or original cost, I do so with the full realization that accounting is in a sense more of an art than a science, and that I may be

[37] In a rate case, legal precedent allows for a combination of or a compromise between the two, on the basis of 'administrative judgment'. Within the limits of one utility, such judgment can be meaningful. To exercise such judgment on an industry-wide basis would be precarious.

[38] I do not propose to argue how relevant this fact is for a particular regulatory purpose. This paper considers the problem solely from the viewpoint of a national balance sheet.

making a fetish of mere accounting. Yet this 'mere accounting' offers the only data we have for business analysis. And when adjustment yields estimates with an indeterminate error, we must beware of making a fetish of adjustment.

Perhaps I rationalize a vested interest in available data. However, for purposes of devising a national balance sheet as of a recent date, original cost seems to provide the most meaningful available estimate of public utility wealth.

Original cost has had an increasing significance as evidence of 'fair value', and in many jurisdictions has come to be identified with 'fair value' almost as a matter of regulatory policy and procedure. The same is true with respect to the depreciation reserve as a measure of accrued capital consumption.

This statement is not intended to imply that book cost minus depreciation reserve is universally used as a rate base by all commissions, or by any commission all the time. However, I believe this method is given most weight or even preference by a majority of the commissions, and is applied to the major portion of public utility assets.[39] The statistical data presented in this paper are on a book cost basis.

On net balance it is my opinion that for the public utility

[39] I have not made any exhaustive or precise statistical study to support this belief. However, there are certain indications in addition to general knowledge based on experience in the field. Tables A and B on pages 7 and 8 of State Commission Jurisdiction and Regulation of Electric and Gas Utilities—1948, prepared by the Federal Power Commission in cooperation with the National Association of Railroad and Utilities Commissioners, constitute one bit of evidence.

My review of all utility decisions, commission and court, reported in the *Public Utility Fortnightly*, January 2, 1947-April 8, 1948, revealed 29 cases that could be counted as reflecting opinions concerning rate base. In 20 cases book or original cost was used. In two of these a 5 percent allowance above such cost was made to reflect 'consideration of reproduction cost'; in a third a 2.5 percent allowance was made. Of the other nine cases, four relate earnings to book cost, and in addition relate earnings to investment as reflected by book figures. A fifth uses an undepreciated rate base with a sinking fund depreciation; but since that represented new equipment, there is no indication of what that particular commission would prefer, except that about one year later, again with respect to a small telephone company, it used book cost. The sixth of this group used cost of reproduction depreciated; and the last three used combinations of various elements.

Included in this tabulation are states such as Wisconsin, Pennsylvania, New

sector of the economy not only is income a much more clearly defined concept but also can be ascertained with a materially narrower margin of error.

H Subjects for Future Consideration

This paper contains many gaps, in both statistical data and theoretical analysis, among which the following stand out: 1) The data on tangible assets that could be assembled in the time at my disposal are disappointingly incomplete. Much better coverage could have been attained by compiling balance

Jersey, Massachusetts, Maryland, Georgia, and Louisiana; the individual properties were by no means inconsequential—running as high as $185,000,000 on a net depreciated basis. Not included in this review were the District of Columbia, California, and the various federal regulatory commissions. Their inclusion would have added to the bodies using book or original cost.

In the above statistical analysis, and throughout this paper, the term original cost was not used in its strict sense as the cost to the person first devoting the property to public use. Original cost, book cost, prudent investment, historical cost, etc. were all used to mean about the same thing—the cost recorded on the books, when the books were kept or have been substantially adjusted to current and accepted uniform systems of account for public utilities. I am aware of differences in meaning among these terms, differences that are significant for certain purposes. However, for purposes of this paper and the estimation of national wealth they are not too important.

I am aware of the argument that in the last few years utilities were in such dire need of speedy rate increases that they based requirements on original cost rate bases in order to remove the question of valuation from the area of controversy. This is undoubtedly true to a certain, though unknown degree. However, it is doubtful that adjustment for this factor would reduce materially the indication that original cost is the most significant, and at times the only, element in determining fair value. Regardless why original cost was used, it is sufficient to note that it was.

I appreciate also the position that the so-called annual charges on account of depreciation expense (regardless whether based on a straight line or any other method) may not and in many cases do not equal the 'actual' depreciation that has materialized during the given year. In fact, the charges to depreciation expense may represent no more than the amount of asset cost amortized during the given accounting period, for the purpose of amortizing the cost of the assets during their life in an acceptable, conventional, and systematic manner. However, to the extent such depreciation, or better, amortization has won acceptance in regulatory valuation policy and practice, it should be reflected in the utility value. In this discussion we are concerned with what commissions do, rather than with what they should do.

sheet data from individual corporate reports published in most instances in financial services such as Moody's, or in annual statements to stockholders. Certain regulatory commissions issue annual consolidated balance sheets for the utilities under their jurisdiction, but not enough for national coverage. Questionnaires sent directly to the utilities offer the sole means of obtaining 100 percent coverage. Even this procedure would fail to bring out all the data for a large number of small utility operations rendering hauling, taxi, warehousing, and forwarding services, since many are not regulated but are merely licensed and as such keep no adequate accounts. It might be possible to obtain only an enumeration of physical assets; placing a net value on these might constitute a rough guess at best. For government-owned utilities too, especially those providing local transportation, water, sewers, etc., it might be necessary to impute a value; accounting information, especially on depreciation, that would be necessary for valuation purposes is often not available. To fill many of these gaps would require a vast amount of work. Merely to collect complete raw data would be a vast undertaking, not the least of which would be to decide from whom and in what form to request data. This may appear to be an unnecessarily detailed procedure, but I know of no other feasible method that would assure complete coverage or give a definitive estimate of coverage.

It was impossible, even for the data gathered, to divide assets into reproducible and nonreproducible; that would have required going to individual corporate reports for the most part. 2) No information was elicited that would allow for the consolidation of claims. The obvious difficulty of obtaining such data precluded also establishing an adequate basis upon which such consolidation should be made. While data are at hand that make possible some form of consolidation of railroad and telephone securities, data for other utilities are not available without considerable research. Many small utilities are not incorporated, and the claims approach becomes confusing. Of course government-owned utilities present a unique situation in this respect.

3) Because of time limitations no attempt was made to construct indexes needed for restating original cost in terms of prices as of any given date. Indexes can be obtained for certain industries such as railroads and telephone companies. As I had no opportunity to check their adequacy I cannot comment. There is little doubt, however, that over-all indexes are of little value. To be useful, indexes should be specific, dealing with major categories of plant for each industry. Such detail, while adding to accuracy, entails a lot of statistical labor. Some compromise is necessary. The general technique of adjusting an original cost to either a current cost or cost-as-of-a-given-date value is akin to that devised by Mr. Fabricant for adjusting capital consumption.

4) Mr. Fabricant has worked out a general theory of price-level adjustment of capital consumption, but in view of the rapid advance in the utility arts and the consequent obsolescence in utility plant, the problem of capital consumption cannot be deemed completely solved even theoretically. Perhaps it never will be. Meanwhile, it would be helpful if a method for estimating the order of magnitude of the effect of such obsolescence were devised. Such an estimate might indicate that I have been straining at a gnat, but I think not.

5) Although for many industries the coverage is incomplete in unknown degree, the data are adequate for computing significant balance sheet ratios. For example, the ratio of current assets to current liabilities, of fixed plant to total assets, of depreciation reserve to depreciable fixed plant, etc. afford useful information. I had hoped to find time to derive these ratios and discuss their implications. Such an analysis would have been useful not only in high-lighting the internal structures of the individual industries but also in showing their role in the economy as a whole.

One note in closing; even after we have adequate data and have made all the necessary and desirable adjustments, we are still faced with the task of ascertaining what Albert Hart has termed 'motivating characteristics', the significant characteristics of the balance sheet that will shed light on the workings of

each sector of the economy. Perhaps working with the data will suggest the questions that may be answered and the additional information needed to answer them. Having formulated the questions, we can then come to a significant analysis of wealth.

Appendix A

Extent of Industry Coverage and Source of Basic Data

Group 7211 Line Haul Railroad Companies
Of the Line Haul Railroad Companies, Class I and Lessors cover more than 99 percent of all railroad operations in the United States. Complete data for this class are included in the National Balance Sheet. For Class II and III Line Haul Railroad Companies and Lessors and for Electric Railroads, only selected balance sheet items were available and are included.
Source: Statistics of Railways in the United States, ICC, 1946 (worksheets).

Group 7221 Switching and Terminal Companies
For Class I and Lessor Switching and Terminal Companies data are complete, but for Class II and III and Lessors only selected balance sheet items could be obtained. Depreciation reserve for Class II and III and Lessors was estimated.
Source: Ibid.

Groups 7231 and 7241 Pullman Company and Railway Express Service
Data for the Pullman Company and Railway Express Service are complete.
Source: Ibid.

Groups 7421 and 7521 Motor Carriers
It is estimated that the data cover about 70 percent of interstate carriers of passengers and freight. No estimate of wholly intrastate carriers was found.
Source: Statistics of Class I Motor Carriers, ICC, 1946 (proof sheets).

Group 76 Water Carriers

The only exclusions are water carriers operating within a single harbor or between places in contiguous harbors, craft under 100 tons or 100 horsepower, ferries, passenger vessels with a capacity of fewer than 17, carriers operating wholly intrastate other than those operating on regular routes on the Great Lakes, and tank and bulk carriers. It is estimated that the majority of tank and bulk carriers are owned by steel or oil companies, so that investment is reflected in the balance sheets of those industries.

The 1945 data are distorted by the wartime requisitioning of vessels, subject to later repurchase.

Source: Composite Condensed Balance Sheet as of December 31, 1945, Maritime Commission (preliminary worksheets), and *Statistics of Railways in the United States,* ICC, 1945. Data adjusted to exclude reporting duplications.

Group 7711 Airline Carriers

Scheduled domestic carriers alone included; feeder lines and all unscheduled carriers of cargo and passengers excluded.

Source: Domestic Air Carriers, Comparative Statement of Balance Sheet Data as of December 31, 1946 and 1945, Civil Aeronautics Board.

Group 78 Pipe Line Carriers

All interstate common carriers of oil and other commodities, other than water and natural gas, included; pipe line departments of oil companies excluded.

Source: Statistics of Oil Pipe Line Companies Reporting to the Interstate Commerce Commission, ICC, 1946.

Group 801 Freight Forwarders

An estimated 90 percent of interstate forwarders covered.

Source: Selected Financial and Operating Statistics of Freight Forwarders for 1946, ICC (worksheets).

Group 8111 Telephone

95-98 percent of all telephone companies in the United States covered.

Source: Statistics of the Communications Industry in the United States, FCC, 1946 (worksheets).

Group 8121 Telegraph
Substantially the entire wire telegraph, ocean cable, and radio telegraph industry covered.
Source: Statistics of the Communications Industry in the United States, FCC, 1946 (worksheets).

Group 8131 Radio Broadcasting
Data on radio broadcasting do not adequately cover the industry. Television and frequency-modulation are wholly excluded.
Source: Financial and Employee Data Respecting Networks and Standard Broadcast Stations, FCC, 1946 (preliminary worksheets).

Group 8211 Electric
More than 98 percent of the privately-owned electric light and power industry included. No data are available for the publicly-owned portion of the industry, but the original cost minus depreciation of such utility plant was estimated.
Source: Statistics of Electric Utilities in the United States, 1946, Federal Power Commission.

Group 82 Gas
Degree of coverage unknown.
Source: American Gas Association (unpublished material).

National Balance Sheet, 1946, Exhibit II
Public Utilities
(millions of dollars)

Debtors & Issuers of Stock	Gross Total
I Short term claims on & liabilities of:	
1 Credit institutions	
a) Private institutions	
b) Federal government corporations & credit agencies	
2 Public utilities	6,055[a]
3 Manufacturing & trade	
4 Mining concerns	
5 Other obligors	
6 Farms	
7 Foreigners	
8 Collectives	
a) Private nonprofit institutions	
b) The rest of government	
9 Households	
10 Total	
II Long term claims on & liabilities of:	
1 Credit institutions	
a) Private institutions	
b) Federal government corporations & credit agencies	
2 Public utilities	21,808[b]
3 Manufacturing & trade	
4 Mining concerns	
5 Other obligors	
6 Farms	
7 Foreigners	
8 Collectives	
a) Private nonprofit institutions	
b) The rest of government	
9 Households	
10 Total	
III Stock issued by:	
1 Private credit institutions	
2 Public utilities	20,297[c]
3 Manufacturing & trade corporations	
4 Mining corporations	
5 Other domestic corporations	
6 Foreign corporations	
7 Total	

[a] Excludes Class II and III railroads and lessors, Class II and III switching and terminal companies and lessors, radio broadcasting, and publicly-owned electric utilities.

[b] Excludes radio broadcasting and publicly-owned electric utilities.

[c] Excludes Class I motor carriers, with an aggregate corporate and noncorporate capital of $234 million; all water carriers not filing with the ICC, with an aggregate corporate and noncorporate capital and surplus of $622 million; and stock of radio broadcasting corporations.

National Balance Sheet, 1946, Exhibit I: Public Utilities (millions of dollars)

TYPE OF ASSET OR CLAIM	LINE HAUL RR CO.			SWITCHING & TERMINAL CO.				WATER CARRIERS					
	Class I & lessors	Class II & III & lessors	ELEC. RY.	Class I & lessors	Class II & III & lessors	PULLMAN CO.	RY. EXP. SERV.	CLASS I INTERSTATE MOTOR CARRIERS	Amer. flag—for. serv. (yr. 1945)	Coastwise (yr. 1945)	Intercoastal (yr. 1945)	Reporting to the ICC (yr. 1945)	DOMESTIC AIRLINE CARRIERS
I Resumé of claims													
A Assets for holders													
1 Currency	873		16	23			52		53	31	12	20	
2 Demand & time deposits	1,273			10		38		328					170
3 Other short term claims	1,296		15	42			7		112	80	34	36	
4 Long term claims	4,667	23		28	52			55	206	49	41	33[b]	52[i]
5 Stock													
6 Direct investment abroad [a]													
7 Total above assets (1-6)	8,109	[d]	[d]	103	[d]	38	59	383	371	160	87	89	222
B Liab. & prop. of holders													
8 Short term claims due others	3,130		28	62		31	56	295	95	39	13	23	116
9 Long term claims due others	11,032	161	44	582	131		26	122	80	20	1	13	90
10 Prop. equity, corp. units	14,492	134	52	169	138	23	2	467	436	169	60	101	186
11 Prop. equity, noncorp. units													
12 Direct for. invest. in U.S.													
13 Total claims & eq. (8-12)	28,654	[d]	[d]	813	[d]	54	84	884	611	228	74	[d]	392
C Net claims held (7 minus 13)	(20,545)	[d]	[d]	(710)	[d]	(16)	(25)	(501)	(240)	(68)	13	[d]	(170)
II Reproducible assets in U.S.													
1 Residential buildings													
2 Other structures													
3 Roads & streets	19,861	287[e]	244	694	230[f]	2	22	445	240	67	(11)	57	171
4 Machinery & equipment													
5 Rolling stock													
6 Inventory [c]	653	[d]	4	12		13	1					2	
7 Livestock													
8 Consumer goods													
9 Monetary gold & silver													
10 Subtotal (1-9)	20,514	[d]	248	706	[d]	15	23	445	240	67	(11)	59	171

National Balance Sheet, 1946, Exhibit I (concl.)

TYPE OF ASSET OR CLAIM	LINE HAUL RR CO.			SWITCHING & TERMINAL CO.				WATER CARRIERS					
	Class I & lessors	Class II & III & lessors	ELEC. RY.	Class I & lessors	Class II & III & lessors	PULLMAN CO.	RY EXP. SERV.	CLASS I INTERSTATE MOTOR CARRIERS	Amer. flag—for. serv. (yr. 1945)	Coastwise (yr. 1945)	Intercoastal (yr. 1945)	Reporting to the ICC (yr. 1945)	DOMESTIC AIRLINE CARRIERS
III Nonreproducible assets in U.S.													
1 Land[b]													
2 Subsoil assets[b]													
3 Collectors' items													
4 Subtotal (1-3)													
IV Goodwill & related intangibles[g]	29			3		·		55					
V Total assets other than claims (II 10 + III 4 + IV)	20,543	d	d	709	d	15	23	500	240	67	(11)	d	171

TYPE OF ASSET OR CLAIM						ELECTRIC UTILITIES		GAS UTILITIES			TOTAL PUBLIC UTILITIES		
	PIPELINE CARRIERS	FREIGHT FORWARDERS	TELEPHONE	TELEGRAPH	RADIO BROADCASTING	Privately owned	Publicly owned	Natural gas	Mfd. gas	Mixed gas	Total each line	Total subgroups	Total groups
I Resumé of claims													
A Assets for holders													
1 Currency	28			25		487					1,620		
2 Demand & time deposits		28	794[i]			549		439	56	58	1,832	7,552	
3 Other short term claims	40			85		457					2,189		14,421
4 Long term claims	63	2	286	14		1,067		188	12	16		6,779	
5 Stock													
6 Direct investment abroad[a]													
7 Total above assets (1-6)	131	30	1,080	124		2,560		627	68	74	14,315		

B Liab. & prop. of holders													
8 Short term claims due others	72	23	544	75		1,116		277	34	26	6,055		
9 Long term claims due others	74	2	1,844	93		6,196		1,025	167	105	21,808		
10 Prop. equity, corp. units	374	6	3,035	227		7,395		1,550	250	166	28,300	29,432	57,295
11 Prop. equity, noncorp. units		j									j		
12 Direct for. invest. in U.S.													
13 Total claims & eq. (8-12)	520	31	5,423	395		14,707		2,852	451	297	56,470		
C Net claims held (7 minus 13)	(389)	(1)	(4,343)	(271)		(12,147)		(2,225)	(383)	(223)	(42,244)		
II Reproducible assets in U.S.													
1 Residential buildings 2 Other structures 3 Roads & streets 4 Machinery & equipment 5 Rolling stock	373	2	4,345	257	56[k]	11,625	1,088[l]		383			39,697	41,466
6 Inventory [c]	17			15		311					1,028		
7 Livestock													
8 Consumer goods													
9 Monetary gold & silver													
10 Subtotal (1-9)	390	2	4,345	272	56	11,936	1,088	2,222[m]	383	224[m]	43,395		
III Nonreproducible assets in U.S.													
1 Land [b]													
2 Subsoil assets [b]													
3 Collectors' items													
4 Subtotal (1-3)													
IV Goodwill & related intangibles [g]						211		5	3		306		
V Total assets other than claims (II 10 + III 4 + IV)	390	2	4,345	272		12,147		2,227	386	224	42,250		

[a] May exist in an undetermined amount. If held, would be included under A4 or 5.

[b] Included under II 1-5.

[c] Including materials and supplies. When not listed separately, are included under II 1-5 or 1-6 unless otherwise noted.

[d] Selected balance sheet items only.

[e] Depreciation data not available. Net plant estimated on the basis of the ratio of depreciation and amortization reserve to gross plant of Class I and lessor railroads.

[f] Depreciation data not available. Net plant estimated on the basis of the ratio of depreciation and amortization reserve to gross plant of Class I and lessor switching and terminal companies.

[g] May be included in II 1-5.

[h] Incomplete total; selected balance sheet items only.

[i] Includes materials and supplies, classifiable under II 6.

[j] Less than $500,000.

[k] Acquisition cost of tangible broadcast property minus depreciation since acquisition.

[l] Estimated original cost minus depreciation.

[m] Not classified under II 1-5 since believed to include large amounts of land and/or subsoil assets.

Appendix B

Scope of Aggregates

It will be noted that there are three 'Total' columns for each industry. The 'Total Each Line' is the aggregate of the values on that line for each industry. However, for certain industries either the values for a particular item were not available or values could be definitely classified only as within a group of items or lines. The 'Total Subgroups' aggregate the values for particular items and the values for items classifiable only within a group of items. The 'Total Groups' is the third step, aggregating values for individual lines, values classified in subgroups, and overlapping subgroups or values classifiable only as included within the group.

Since Urban Transit (Industry 73 and 7411) is excluded from the totals and the extent of coverage of each industry is only as defined by reference to Appendix A, the figures best representing aggregate Public Utility Balance Sheet data are:
Item I A, Assets for Holders, $14,421 million. This figure excludes Radio Broadcasting (Industry 8131), Publicly-Owned Electric Utilities (Industry 8211), and some assets of Class II and III Railroads and Lessors, Electric Railways (Industry 7211), and of Class II and III Switching and Terminal Companies (Industry 7221).
Item I B, Liabilities and Proprietorship for Holders, $57,295 million. This figure has the same exclusions and partial exclusions as the preceding.
Item II, Reproducible Assets in the United States, $43,908 million. This figure totals the Line Total of Item II 10 ($56,470 million) Class II and III Railroads and Lessors, and Class II and III Switching and Terminal Companies and Lessors, for which partial information only was available; Land and Subsoil Assets, classifiable under Item III, are included.
Item V, Total Assets Other than Claims, $44,218 million. This figure totals the Line Total of Item V, plus the partial data for

Reproducible Assets included in Class II and III Railroads and Lessors, Electric Railways, Class II and III Switching and Terminal Companies and Lessors, Water Carriers Reporting to the ICC, Radio Broadcasting, and Publicly-Owned Electric Utilities.