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Chapter Author: Robert C. Wasson

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APPENDIX I: PART K

SOME PROBLEMS IN THE ESTIMATION OF SERVICE LIVES OF FIXED CAPITAL ASSETS

By Robert C. Wasson

Office of Business Economics

SOME PROBLEMS IN THE ESTIMATION OF SERVICE LIVES OF FIXED CAPITAL ASSETS

The comments I shall make here do not necessarily reflect the position of the Office of Business Economics, nor are they concerned with the proper method of computing service lives for tax purposes. The focus is on the type of service life measures which are of value in estimating stocks of fixed capital and related variables, such as discards and depreciation, for the purpose of economic analysis.

BULLETIN F LIVES

Mean service lives in the past have been based largely on Bulletin F tables. Actual means derived from this source have varied because of the weights employed, i.e., the relative proportions of total equipment purchases allocated either implicitly or explicitly to specific types. Whether computed carefully or by quickie methods, the use of Bulletin F averages without appropriate reduction factors is no longer acceptable, in view of the availability of Treasury Survey and Internal Revenue Service Life of Depreciable Asset (LDA) data. Survey of Current Business manufacturing, depreciation, and net asset tables based on Bulletin F lives will, of course, eventually be eliminated. The discussion of the nature of the replacement is a matter which has been deferred, as far as I am personally concerned, by the pressure of more urgent phases of our benchmark revisions.

BIAS IN THE USE OF A SINGLE MEAN

The use of Bulletin F as a point of reference, however, temporarily may be of value as a means of providing a rough method of computing a distribution. For example, a score of producers' durable equipment classes can be broken into more than a hundred different types, and the dispersion of lives greatly increased and made more realistic. The use of a dispersed pattern as contrasted with a single mean for equipment is quite important in computing gross stocks or depreciation by the perpetual inventory method. In a realistic model, I have found the simpler procedure created an upward bias of more than 10 percent in the level gross stocks. The bias in the case of net stocks was much less because of the offsets of gross stock and depreciation biases. This is one argument, incidentally, in favor of the use of net stocks over gross stocks, but otherwise I find nothing to criticize in Vernon Smith's preference for gross over net. It's a position I have held for years. A second priority might be given to depreciation, to which measure Denison gave first importance. One of the great advantages of net stocks is its reflection of the age factor. This can and should be shown more directly by the use of mean ages. The comparative advantages of the use of the gross-net ratios and of mean age are described by George Jaszi in a November 1962 Survey of Current Business article.

USE OF A CURVE IN DISTRIBUTING LIVES

Returning to the service life problem, consideration should be given to a different device than disperson based on a large number of combinations of lives derived from Bulletin F. The best known one, and I should also say the principal one that comes to my mind, is the MAPI device of the Robley Winfrey S–3 curve.[1] This curve assumes a symmetrical distribution around the mean in which the latter is one-half the maximum age and the degree of peakedness is moderate. Another researcher, Radivoj Ristic of Fortune magazine is also making use of this curve, which he refers to as the "MAPI" curve. It is being applied to a number of expenditure series, the Office of Business Economics 21 types of equipment, and also to construction.

Does the use of the curve include advantages not had by the grouping of a number of types of equipment and computing a number of averages? I don't really know the answer to this question, but I shall indicate my present mixed feelings on this subject as follows:

As a method of converting a single series with one mean into a number of series for the purpose of computing gross stocks, the S–3 curve is more realistic than failure to make a distribution. The original Winfrey distributions themselves, unlike our computations from Bulletin F which are merely an attempt to compute more means for a large number of relatively homogeneous types of equipment, resulted from mortality patterns around the means of such, or even more, homogeneous groups. Furthermore, some of the items considered by Winfrey, such as railroad ties, are treated as current expense, not capital items, and in general the items studied could hardly be accepted as statistically representative of capital. This became apparent when, almost a decade ago, we tried to match the detail in the Winfrey study against that in producers' durable equipment. It is both a compliment to the genius of this man, who is at present employed by the Department of Commerce in the Public Roads Administration, and a sad commentary on the research that has been done since, that his 1935 study is still not treated as obsolete.

As far as the particular curve selected, the S–3 curve, is concerned, I know of no particular justification for preferring it nor have I strong evidence that it is wrong.

It does impose, however, a type of uniform smoothness that is quite at variance with what we get by averaging equipment groups, and it seems likely that the degree of peakedness is exaggerated. These impressions of mine are based on Bulletin F derived means. They should be checked some day by a study of more recent data, such as those in the Treasury and LDA studies relating to distribution by service life, and also by obtaining new data related to actual practice.

INTERNAL REVENUE SERVICE STUDIES OF USEFUL LIFE

This leads to a consideration of the use of the Treasury and LDA data for computing service life means. The first question to consider is whether such tax-oriented data are realistic in a business sense. The Treasury Survey has one measure which assists in evaluating this point,

[1] See Robley Winfrey, "Statistical Analyses of Industrial Property Retirements," Iowa Engineering Experiment Station, Bulletin 125.

the amount of completely depreciated assets on hand. These vary greatly by industry, but average approximately 10 percent only for all manufacturing property and only about 7 percent when property written off under the 5-year life provisions of emergency amortization is excluded.

Much of such property may be held for only occasional use or pending the rise of scrap prices to the proper level. To what extent is property completely depreciated and then taken out of the balance sheet, but still used in everyday production? There would be what might be considered two successive accounting errors in this understatement of assets and service life. The first error would be in depreciating the equipment over too short a life. Until the issuance of the guidelines in July 1962, and with the principal exception of property subject to emergency amortization, Internal Revenue Service auditors expected such underestimates to be corrected in succeeding income periods. There were some types of group accounts for which this could occur, such as furniture and fixtures, without the true situation being known by either the IRS or the reporting firm. Physical inventories cannot always be easily compared with value figures. The second error would be the removal of the completely depreciated asset (and its reserve) from the balance sheet even though it continues to be used. Insofar as the IRS caught the first error, of course, it would have forestalled the second. Some years ago, we discussed this point with a Washington representative of one of the country's largest accounting firms. He assured us that it was his firm's policy to instruct its clients to reinstate these assets on the balance sheets, and this had occurred in the case of a Washington company only a few days before. The policies of such accounting firms, however, may not be influential enough to prevent a substantial amount of gross assets being removed from balance sheets prior to actual discard.

BIASES IN DERIVING SERVICE LIVES FROM GROSS STOCK AND DEPRECIATION DATA

Now we come to some computational problems which can greatly affect our results. Assuming that we wish to obtain service lives (or depreciation rates) which are applicable to capital inputs, i.e., the investment of each year, and not to a gross stock figure, should the IRS asset tabulations, either from the Treasury survey, or LDA study, be used as weights for service lives, or as weights for depreciation rates? Patrick Huntley and I have both argued that when assets are used as weights, they should be used with depreciation rates, not service lives. In a long period of stable investment the first procedure will give the correct answer and the second procedure will yield a service life that is biased upward. In a long period of rising investments such as we have experienced in a somewhat erratic fashion, neither procedure yields the correct answer. The weighted service life method still tends to be biased upward, although less so than under stable conditions, and the depreciation method is biased downward.

This point is illustrated by a simple example in which equal amounts are invested in equipment items having service lives of 10 years and of 5 years, with the annual investment always having a mean service life of 7.5 years.

In case I, the annual amounts of investment are unchanging with 50 each year for 10-year items and 50 for 5-year items, and the level of stocks reaches stability at the end of the 10th year. At this point and thereafter, weighting depreciation rates by gross stocks yields the correct mean service life, 7.5 years, but weighting service lives by gross stocks yields a service life of 8.33 years.

CASE I.—*Gross stocks in year*

	1	2	3	4	5	6	7	8	9	10	11
10-year item	50	100	150	200	250	300	350	400	450	500	500
5-year item	50	100	150	200	250	250	250	250	250	250	250
Total										750	750

Weighting depreciation rates by gross stocks:

$$\begin{aligned} 500\times.10&= 50\\ 250\times.20&= 50\\ &\overline{100} \end{aligned}$$

$$\frac{\text{Gross stocks: } 750}{\text{Depreciation: } 100}=7.50 \text{ years}$$

Weighting service lives by gross stocks:

$$\begin{aligned} 500\times10&=5{,}000\\ 250\times\ 5&=1{,}250\\ &\overline{6{,}250} \end{aligned}$$

$$\frac{6{,}250}{750}=8.33$$

In case II, in the sixth year the annual amount of investment of both the 10- and the 5-year items is doubled.

CASE II.—*Gross stocks in year*

	1	2	3	4	5	6	7	8	9	10
10-year item	50	100	150	200	250	300	350	400	450	500
						50	100	150	200	250
										750
5-year item	50	100	150	200	250	250	250	250	250	250
						50	100	150	200	250
										500
Total										1250

Weighting depreciation rates by gross stocks:

$$\begin{aligned} 750\times.10&= 75\\ 500\times.20&=100\\ &\overline{1,250} \end{aligned}$$

$$\frac{\text{Gross stocks: } 1,250}{\text{Depreciation: } 175}=7.14$$

Weighting service lives by gross stocks:

$$\begin{aligned} 750\times10&= 7,500\\ 500\times\ 5&= 2,500\\ &\overline{10,000} \end{aligned}$$

$$\frac{10,000}{1,250}=8 \text{ years}$$

One practical device for minimizing the error in using total gross asset weights under these conditions is to construct realistic models in order to determine the approximate magnitude of the bias.

TREATMENT OF STOCK ACQUISITIONS AS SERVICE LIFE WEIGHTS

The Treasury and LDA tabulations offer a breakdown, however, that leaves another avenue of escape from the bias problem. This is the separate tabulation of assets purchased after 1953, that is to say, assets purchased during the six-year period 1954–59 inclusive and still in existence at the end of 1959. These assets can then be treated as though they were purchase figures and used to weight service lives, not depreciation rates. Both the Treasury and LDA tabulations have employed this weighting scheme, as well as the alternative one of depreciation rates. When weighted service lives are used, however, equipment needs an adjustment for discards of items with a life of 5 years or less. A precise measure of the overall correction to be made by this adjustment is not available, but it might be a reduction of approximately 1 year.

IMPORTANCE OF CONSISTENCY IN DEFINING STRUCTURES AND EQUIPMENT

Another problem in computing service lives from the IRS data and then applying them to investment data derived from other sources is in matching the appropriate relative quantities of structures and equipment. If what is called structures in the IRS tabulations is a higher (or lower) proportion of the total than what is called structures in our investment series, the average implicit life in our synthetic series will be biased upward (or downward). There is some reason for thinking that this type of bias can be substantial and is of more than academic interest. This argues for, among other things, not treating equipment in complete isolation, but together with structures as a separable component of capital. In other words, we should try to insure that our treatment of equipment is consistent with our treatment of structures and that their combined average approaches the best estimated. This problem arises in a more acute form in making estimates for specific industries, especially utilities, and the possible existence of overlaps or gaps in the matching of equipment and structure service lives with their appropriate relative shares of total fixed investment should be considered.

The last point leads us to the noncorporate problem, but here the issue is more one of what lives, based mainly on corporate data, to apply to what values of investment rather than how to measure the service lives from noncorporate asset data, because the latter largely do not exist as yet in any available form which is useful for this purpose.

ADJUSTMENT OF IRS DATA FOR POSTWAR LEGAL CHANGES

Some of the objections to service lives computed from IRS data, e.g., the use of emergency amortization and declining balance depreciation, do not apply to the special Treasury and LDA tabulations, but they do apply to the regular statistics of income tabulations for all post-World War II years except 1946–50, and emergency amortiza-

tion may have some, though possibly slight, distorting effect on tabulations for those years. After 1950, the distortions in assets caused by the legal changes require adjustments. The failure to make these adjustments in a recent publication of the National Bureau was justified by arguments that I find unacceptable, although I would not argue that the failure to make the adjustment was an important omission for more than a relatively few 3-digit industry groups.

One weakness in the tax-oriented data which persists in the special tabulations is that arising from the special tax treatment given to expenditures for exploration and drilling of oil and gas wells. Adjustments should be made for this, and I shall be glad to discuss this point if questions are raised.

APPARENT DIFFERENCE BETWEEN THE WAR AND POSTWAR SERVICE LIVES

One last point will be made, the record of pre-World War II service lives as revealed by IRS Statistics of Income data. The drastic change in service lives as computed by Patrick Huntley for his Ph. D. thesis may, in part, reflect changes in composition, e.g., relative amounts of equipment and structure, but it is not likely that this alone could have yielded such big differences. A change in the composition of structures, e.g., the increase in the relative amount of short-lived additions and alterations, could have been one but not the only contributing factor. This problem seems to me to be one deserving more intensive analysis.

Comments on the Paper by Robert Wasson

By George Terborgh

The depreciation method to use is a basic decision to make in wealth estimates and deserves the most careful attention. I played around with the problem 10 years ago, when my book was in preparation. I came out with the conclusion after some empirical studies of the movement of resale values and some theoretical calculations of declining use value, that the runoff rate ought to be somewhat faster for short-lived assets than for long-lived. For the former, a good conservative target is to write off two-thirds of cost in the first half of the service life. I rigged up a writeoff schedule that recovered 60 percent instead of two-thirds of the cost of long-life assets such as buildings and structures over the half-life. Well, you can cook your own schedules. The only proposition I am prepared to offer is that you ought to have a substantial degree of acceleration in the writeoff, that straight line is a retarded method. Whether you settle in the area I did, or whether you go to the left or right of it, is your headache. This is, however, an absolutely fundamental preliminary decision for wealth estimates.

Now, am I right, Bob, that you are proposing to use as your basis the "Statistics of Income"? I admire your hardihood, but would despair of that approach myself, for the reasons you've suggested. We have had a lot of flux and change in writeoff practices over time, and I don't see how anyone can figure the proper depreciated value of industry's assets from the history of tax writeoffs.

WASSON. I want to distinguish between three sources. One is the "Statistics of Income," and this has been available for a long time; then the Treasury Survey, and finally the Life of Depreciable Assets. The fundamental difference between the type of data, here and here [pointing to the board]—these are just tabulations of depreciation—that here and here [pointing again] are in terms of what they actually use; for example, for tax purposes, with double declining balance in the first year for a 10-year item, the depreciation is 20 percent. So if you divide depreciation into the asset, you get 5, not 10, but the Treasury Survey instructions told the reporting firms that in such a case the answer should be 10. In other words, the life was not derived indirectly, the respondents were told how to estimate it.

TERBORGH. But look, the basic flaw is tax depreciation lives. I don't think that there is any close relation between the two and what you are interested in is service lives and not the tax lives.

WASSON. In most industries, I have been assured by the IRS people at various times, that when a report is audited an attempt is made to determine whether the life that has been used is realistic.

TERBORGH. That is where I part company. We questionnaired our own members on the tax lives they were getting on shop equipment, and what they were getting on factory buildings. We received a pretty good response—about 270 companies, all in the same general type of business, all metal working companies. The dispersion of these tax lives was something fantastic; I simply do not believe that there is any comparable dispersion of actual lives. But this is not the only bit of evidence; you can talk with these fellows and find out how they got their tax lives in the first place. These are negotiated lives on an individual company basis, and theoretically adhere to the retirement practice of the individual taxpayer. The fact is that very few of them have the kind of exhaustive retirement analysis that would permit them to arrive at their true average life expectancy. Depreciation allowances generally get caught up in a trading process. Usually they get in the final trade-out on audit. One company will trade for one item, another for another; one agent will be a bearcat on depreciation, another won't care. After this process goes on for a series of years, the disparaties that accumulate between allowable tax lives and the actual lives of assets are, as I said, simply fantastic. So with all due deference to the boys in the IRS, I still would recommend the acceptance of tax-life distributions as a satisfactory measure of actual-life distributions. Don't ever kid yourself that you have the answer when you are dealing with tax lives. So far as I know, these are all that the Treasury has. If they tabulated actual lives in connection with their study, they have not published them and I have never seen them.

Of course, old Bulletin F was supposed to be based on actual lives. They even claimed it was actual lives minus 15 percent. The studies dated from the late 1930's, and the Bulletin was put out in 1942. Who knows how they resemble actual lives now even if they were correct in the first place, which they probably were not.

The real problem is to get some reasonable hypothesis as to actual service lives. Over these you can spread depreciation by whatever spreading technique you would like. There are sources of information which have not been exploited, but they would require a research proj-

ect to get. A lot of companies, for instance, have their own assets annualized, sorted out by age of acquisition. These tabulations provide patterns of survivorship by attained age, and maybe enough of them would develop a picture you could use. I don't know. I once dreamed up a service-life distribution from Bulletin F. We tabulated more than 5,000 items of equipment, we grouped them, weighted them, and so on. We came out with an overall average of 17¼ years, and a heavily left-skewed distribution. I don't know if that bears any resemblance to reality or not. Since Bulletin F dates from the late thirties as far as the mortality studies are concerned, I don't use my own curve any more. I don't know what resources you have for deriving valid estimates of life expectancy, but anything you can do will be to the good.

Of course there is another problem. If you use a perpetual inventory method you have the problem of adjusting for changes in average life expectancy over time. I have processed a long series of historical data with my fancy Bulletin F curve, and I can show to the fourth decimal place what percentage of today's assets are 5 years old, what percentage are 6 years old, and what percentage are 10 years old. What does it mean? I don't know. I am ashamed to use the curve because, even if the mortality distribution was right for the period when Bulletin F was made up, who knows if it is right today, 25 years later?

As for techniques, suppose you follow a perpetual-inventory calculation. You then get your survivorship by years of origin so that you can depreciate them and sum your depreciation accruals. Then you have the question of what kind of accounting structure you are going to assume. Are you assuming that all the country's assets are thrown into one big depreciation account and are depreciated at an average life-rate? Or are you going to assume that there are a lot of subaccounts in the national aggregate, that these subaccounts are separately depreciated, and that the true national accrual is the sum of the subaccount accruals? If so, what kind of subaccount structures are you going to develop?

There is another nice problem. How do you handle the problem of accounting methods? Are you going to assume, for example, that all assets in whatever subgroups you select are depreciated consistently and throughout by group accounting rules? In other words, that undepreciated balances on retirement are simply charged to reserve and not taken as a terminal deduction? If you follow item accounting rules—if you close out the items when they reach the average age assumed in the depreciation rate—you get one result; if you follow group accounting rules, another. You get a deferment of the accrual over time with the group accounting rules as compared with the item accounting rules.

The method the Department of Commerce has used is dividing assets into rather fine subclasses, figuring the depreciation accruals on each subclass with a no mortality dispersion. and then summing the accruals. How does that method compare with the one that we have used, wherein we divided the grand total of assets into service-life subgroups, using an Iowa S3 to disperse the mortalities within each subgroup? I don't know. And as a matter of fact, I would not be inclined to fight the question because if you have enough subgroups a no-dispersion assumption will give generally similar results. Who knows which is the

better technique? I should say that for practical purposes, the time required to manipulate the data might easily be controlling. While I personally prefer the use of a mortality distribution with service-life groups, you will save a lot of time by the Commerce approach.

As for the justification for the Iowa S3, you are quite right in stating that the Iowa mortality studies were made back in the thirties. It is too bad that we do not have others, but we always go back to Robley Winfrey. He has 18 types of curves, 6 symmetrical, 6 left skewed, and 6 right skewed. We classified all his mortality distributions as to which type they most nearly approach and found that if you average them, the composite is very close to the S3. Admittedly this is not conclusive for equipment because the bulk of these assets analyzed by Robley Winfrey were fixtures—public utility properties like telephone and telegraph poles, and that sort of thing. Whether his S3 is best for equipment I don't know. I am inclined to say this: It is good for the mortality dispersion of a homogeneous group of assets; that is, homogeneous as to service-life characteristics. I would not regard it as satisfactory—I think it is too peaked, as you suggest—for a composite account made up of a lot of assets with diverse service life characteristics; there you need more dispersion.

Now, as to the method of figuring the depreciation rate. I did not follow your fancy mathematics, but I will lay down a dictum that may be relevant. There are two ways of figuring the depreciation rate on a group of assets of diverse service-life composition. One is to take a weighted average of service lives (weighted by cost); the other is to divide the group into service-life subgroups, accrue straight-line depreciation on each subgroup separately, aggregate the accruals, divide into the gross account, and take the reciprocal of the quotient. That will give you an implicit service life different from the average life figured by regular method.

Which of these methods is correct? The answer is that each one is correct, but for a different type of account. If you are running out a closed account on an original group, you will come out with the right answer if you use the first method as the basis of your depreciation rate. If, however, you are running what we may call a replacement account—that is, you maintain the original service-life composition of the account by like-for-like replacement, you use the second method. This will eventually stabilize the accruals with the retirement flow.

Do you disagree with that, Bob?

WASSON. I don't quite follow you; I was not speaking from the standpoint of the amount of depreciation that should be applied into any particular account. If you want to apply the depreciation rate or the life that seems to be implicit in historical experience, one has to determine first whether the investment curve has been stable or whether it has been rising or falling. And if it has been stable there is one technique to use, that is the weighting of depreciation rates by the assets and if it has not been stable, then no matter what method you use, it will have bias, and there has to be correction of that bias.

TERBORGH. If you want to investigate our studies on the subject, I will be glad to go into them. We have confirmed the proposition that there is no right or wrong here; it is a question of the type of account involved.

I feel that somehow or other you have to set up a perpetual inventory calculation, rather than to try to figure anything from the available balance sheet and income account data. It will drive you "nuts," not simply because of the fact that we have had all kinds of depreciations over the years and the surviving assets have been subjected to varying degrees of these different kinds, but also because we have not had balance sheet data that conform to our tax data. The balance sheets tabulated by the IRS are not tax balance sheets; they are published balance sheets. A lot of big companies have double property accounts, and do not show balance sheets related to the deductions tabulated in the "Statistics of Income." You have had, in addition, many transfers of properties from the original owner, and they are not transferred at book value. They are written up or down on the transfer. There have been consolidations, mergers, bankruptcies, and what not.

I have a feeling, moreover, that there is a lot of leakage in the tabulated figures of depreciation since they do not include terminal losses taken on a bankruptcy or failure. If a company has an undepreciated balance on its books and goes into bankruptcy, they represent a capital loss. It means it did not depreciate enough in prior years, but there is no retrospective correction for prior underdepreciation. These terminal losses never get into the measurement of capital consumption. No one knows what they are, but in the aggregate they are probably quite substantial. To go back in history, the electrical interurban railroad system had depreciable assets of almost $5 billion and in a very few years they were all gone. How much represented nonbeneficial losses?

So I would start, if I were running this, with the perpetual inventory approach. I would do the best I could to get reliable service-life estimates, fix the best writeoff techniques that I could, do everything on a consistent basis, and disregard tax statistics entirely. That, I think, would come out with a better answer.

Further Comments by Mr. Wasson

I should like to make some suggestions regarding the difference in service lives as used for tax purposes, as reflected in other public records, such as reports to stockholders or the SEC, and as actually used in business. The point of interest here does not relate to tax policy, but rather to usefulness for economic analysis. The suggestion has been made by George Terborgh that some indication of the gap between the lives used for tax purposes and those in effect in business operations might be obtained from a survey, perhaps a relatively inexpensive one. The minimum required information for any given type of asset would be (1) the value existing as of the end of a given year (e.g., 1963), including assets which may have been completely depreciated and excluded from balance sheet figures, by year of purchase, and (2) the amount originally purchased in each year. Dividing the first set of values by the second will yield percentages which can be used to build mortality tables. The data should be obtained separately for assets purchased when new and those which were used at the time of purchase. The experience of the IRS and Treasury, together with a few interviews we have had, leads me to believe that although the proportion of firms which could give the required infor-

mation is not high it is adequate, perhaps as much as 20 or 25 percent.

If successful, such a survey would not only improve our knowledge of the actual average service life of equipment and of structures, but it would also provide a better measure of the lives of specific types of equipment, and their age distribution in current stocks of capital. Significant additional and related information concerning capital, or especially data relating to capacity might be obtained as an incidental part of the survey.

The information to be obtained, in addition to the minimum stated above, would require some thought and also pilot study interviews. Both the questions and schedule design and the type and size of sample, however, would be affected by a decision as to whether the sample should be treated as an independent one, or whether the data for each firm should be related to the manner in which the firm reports to the Internal Revenue Service. I am of the opinion that the second method involves more complications, but is the only one which can yield satisfactory results with a relatively small sample. Various alternative approaches could be made, but one that I would suggest here as a basis for further discussion would involve a two stage sample, (1) an LDA type IRS study with (2) a subsample of (1) including, in addition, the questions relating to the distribution of actual assets by year of purchase and the amount of original purchases. A second and less expensive alternative would be to confine the subsample to the 1959 LDA firms, but still obtain the form 1040 schedule G data, together with any necessary supplementary information relating to those data, in addition to the survey questions. All fixed assets, including those which are amortizable (or have been completely amortized but still exist) and were excluded from the LDA study, should be covered.

It would be a mistake to assume that the tabulation of such data, and their inflation by the reciprocals of the sampling ratios, will yield the desired results. A number of adjustments might need to be made, such as those to insure that the sample is inflated to controls representing all business, including the nonrespondents and areas, such as possibly some noncorporate enterprise, not represented in the survey. In such a study, nonmanufacturing industries should be given an emphasis appropriate (though not necessarily strictly proportional) to their relative investment importance and an attempt to include at least a small segment of noncorporate business should be considered.