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METHODS FOR RESTATING INVENTORY AND DEPRECIATION NUMBERS

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ABSTRACT

This paper presents methods of approximating the values of accounting numbers that a firm would report if it chose to change its inventory valuation and depreciation accounting methods. I deal with two inventory valuation methods: first-in first-out and last-in first-out and with three depreciation methods: straight-line, sum of years digits, and double declining balance. The objective has been to develop restatement methods which require only simple calculations and publicly available data. I also present estimates of the accuracy of each restatement technique derived by comparing the number produced by my methods with the number actually reported by a sample of firms.

METHODS FOR RESTATING INVENTORY AND DEPRECIATION NUMBERS

This paper presents methods for estimating inventory and depreciation numbers under alternative inventory valuation and depreciation accounting methods. The objective is to produce approximations of the values of accounting numbers that a firm would report if it chose to change its inventory valuation and depreciation accounting methods. Such methods will be of interest to users of financial statements, such as investment analysts and accounting and economic researchers, who wish to estimate comparable financial data for firms which actually use different inventory valuation and depreciation accounting methods in their published reports. I deal with two methods of inventory valuation: first-in-first-out (FIFO) and last-in-first-out (LIFO) and three methods of depreciation: straight line (SL), sum of years digits (SYD) and double declining balance (DDB).

The complaint that differences in accounting methods between firms prevent comparisons of their published figures is common. For example, Fortune (August 1970, page 98) states:

> The wide range of accounting options permits companies enormous leeway, with various paths to take in consolidating earnings of subsidiaries, depreciating assets, evaluating inventory, accounting for various drilling costs. Thus identical earnings figures for two similar companies with identical sales do not necessarily represent equal performance by management.

A similar complaint can be found in Lorie and Hamilton (1973). Differing methods for valuing inventory and calculating depreciation are, as seen above, among the most common reasons cited for

noncomparability of firms' published figures. Thus, restatement methods which would produce estimates of inventory and depreciation numbers under alternative methods would be useful to many users of financial statements. For example, a need for such methods is expressed in Gonedes and Dopuch (1976). The intent of this paper is to present methods which produce such approximations using only publicly available information and consisting of fairly simple calculations.

I first present methods for restating inventory figures, dealing with the method for estimating LIFO from reported FIFO figures and then with the restatement from LIFO to FIFO. Following the descripiton of those methods are the results of attempts to assess the accuracy of the estimates produced by these methods. I then outline my methods for restating depreciation numbers and report on the accuracy of those estimation methods.

Inventory Restatement

The basic method used to approximate alternative inventory numbers relies on the Dollar-Value LIFO method. A similar method is referenced by Derstine and Huefner (1974). They however do not present any details of their computational procedures or of their attempts to assess the accuracy of their estimation methods. Moreover, their restatement methods rely on price indexes for groups of commodities published in the Federal Reserve Bulletin, which are of a greater degree of aggregation (8 commodity groups under 3 industrial groupings) than the price indexes used in this paper. I use price indexes of the U.S. Department of Labor from the Survey of Current Business (which publishes such price information for forty-

four individual commodities in fourteen industrial groups), thus making my approximation of the price movement of specific commodities in inventory more precise.

FIFO to LIFO Restatement

The Dollar-Value LIFO technique adjusts inventory values reported at current costs (assumed to be equivalent to FIFO inventory valuation). The objective of the method is to determine the real change in the number of units on hand and to price these units appropriately. This is done by using price indexes to remove the price change component in the reported (current cost) inventory value and to express inventory amounts in terms of base year prices. The actual quantity change each period is taken as the difference between the inventory value for each period converted to base year prices. This change is treated as the incremental (decremental) LIFO layer and is restated to prices of the year of acquisition through price indexes. A good example of the Dollar-Value LIFO technique is given in Hirsch (1969). The estimation method will be illustrated here with actual data from Zenith Radio Corporation given in Table 1. (FIFO data for 1974, 1975, and 1976 are taken from footnote disclosures, because Zenith switched to LIFO on January 1, 1974. This point will be taken up later in the paper).

Zenith reported FIFO values of $198,957,000 in 1973, $232,428,000 in 1974, $206,852,000 in 1975 and $181,405,000 in 1976. If we treat 1973 as the base year for calculations, the values of inventory in 1974, 1975 and 1976 in terms of 1973 prices (using the Wholesale Price Index for Home Electronic Equipment) are $229,432,000,

TABLE 1

DOLLAR VALUE LIFO EXAMPLE: RESTATEMENT FROM FIFO TO LIFO

Zenith Radio Corporation (in $Thousands)

	ITEM	1973	1974	1975	1976
1.	Current value of inventory (FIFO values)	$198,957	$232,428	$206,852	$181,405
2.	WPI for Home Electronic Equipment (1967 = 100)	91.9	93.1	93.5	91.3
3.	Inventory values in 1973 prices	$198,957	$229,432	$203,312	$182,597
4.	Increments in 1973 prices		$30,475	-$26,119	-$20,714
5.	Increments in dollars of year of acquisition		$30,873	-$26,460	-$20,771
6.	Calculated LIFO values		$229,830	$203,369	$182,598

Source: U.S., Department of Labor in Survey of Current Business; Zenith Radio Corporation, 10-K Reports, 1973-1976.

$203,312,000 and $182,597,000 respectively. This means that the increment (decrement) each year in 1973 prices is $30,475,000 ($26,119,000) and ($20,714,000). Restating these changes in inventory to prices of the year of their original acquisition gives $30,873,000, ($26,460,000) and ($20,714,000). It should be noted that in accordance with a LIFO flow the decrement in 1975 comes from acquisitions in 1974 and the decrement in 1976 draws layers acquired in 1974 and 1973. Using the FIFO ending inventory for 1973 as the LIFO beginning inventory for 1974, in accordance with current business practice, the estimated LIFO values for 1974, 1975 and 1976 are $229,830,000, $203,369,000 and $182,598,000 respectively. The accuracy of these estimates of LIFO values is taken up later in this section.

LIFO to FIFO restatement

The same method can be used to restate reported LIFO inventory values in terms of FIFO. This restatement procedure requires more assumptions than the previous one, because in dealing with LIFO inventory it is difficult to determine the periods from which the prices used to determine the value originate. With FIFO values we can be reasonably certain that the prices used to determine the inventory value originate from the current period. On the other hand, if a firm reports a LIFO inventory value of $10,000,000 in 1975, the prices used to determine that value may go back to say 1970, with layers having been added in 1971, 1972 and so on. It is difficult to trace the actual years the various prices are drawn from. On the other hand, with a FIFO inventory value of the same dollar

amount, we can be reasonably certain that the prices used are 1975 prices. The method used here to get around this handicap in restating reported LIFO values to FIFO is to assume that the base LIFO inventory was acquired five years before the restatement process begins. This can be justified by pointing out that a similar assumption that the base LIFO inventory was acquired at an arbitrary point in time before restating for price level changes was used by Parker (1977) who assumed that the base inventory of LIFO firms in his study, which commenced in 1971, was acquired in 1965. Greater accuracy may be obtained by assuming acquisition of base inventory at a point in time earlier than five years if inventory data are available for long periods of time.

The adapation of the Dollar-Value LIFO method to handle the restatement of LIFO inventory values can be illustrated with data from Chrysler Corporation. As shown in Table 2 Chrysler reported LIFO values of $665,227,000, $738,649,000, $849,684,000, $996,196,000, $1,225,194,000 and $1,240,681,000 in the years from 1965 to 1970 inclusive. (In 1970 Chrysler changed its inventory accounting method to FIFO, and the LIFO value for that year is taken from footnote disclosure). As noted above, I am assuming that the base LIFO inventory was acquired five years before the year from which the restatement process commences. That is, for restating the inventory value to FIFO for Chrysler from 1970 onwards we assume that 1965 is the year in which the base inventory was acquired. In this example we only restate the LIFO value for 1970. From this time perspective the LIFO layers acquired in each year (in prices of the year of acquisition) are $73,422,000, $111,035,000, $146,512,000, $228,998,000,

TABLE 2

DOLLAR VALUE LIFO EXAMPLE: RESTATEMENT FROM LIFO TO FIFO

Chrysler Corporation (in $Thousands)

Year	LIFO Values	LIFO Layers in $s of Acquisition Year	WPI for Motor Vehicles	1965 Inventory and Each Layer in 1970 $s
1965	$ 665,227		98.5	$734,113
1966	738,649	$ 73,422	98.6	80,492
1967	849,684	111,035	100.0	120,695
1968	996,196	146,512	102.8	154,921
1969	1,225,194	228,998	104.8	238,430
1970	1,240,681	15,487	108.7	15,487
			Calculated FIFO value (1970) =	1,344,588

Sources: Chrysler Corporation; U.S., Department of Labor, Survey of Current Business, Wholesale Price Indexes.

and $15,487,000 in 1966, 1967, 1968, 1969 and 1970 respectively. I then use the Wholesale Price Index for Motor Vehicles and Equipment to restate the base inventory and the layers to 1970 prices. This yields the values of $734,113,000, $80,492,000, $120,695,000, $154,921,000, $238,430,000 and $15,487,000 for the years 1965 to 1970 inclusive, in terms of 1970 dollars. Aggregating these figures gives the value of $1,344,588,000 as an estimate of FIFO for Chrysler in 1970. The accuracy of this estimate is dealt with later in the section. Using exactly the same methods estimates of FIFO inventory values in subsequent years can be developed.

Possible refinements of procedures

Before dealing with the accuracy of the estimates produced by these two methods I should note a few additional points about the assumptions of these restatement techniques and possible changes if more data are available.

1. For firms which use combinations of accounting methods simultaneously it can be assumed that the stated primary method of inventory valuation is used for all its inventory. Alternatively, if greater accuracy is desired and a precise breakdown of the portions of inventory valued on different methods is available, then the restatement techniques can be applied to only the relevant portions. For example, if a firm has 75 percent of its inventory on FIFO and 25 percent on LIFO and a LIFO valuation for the whole inventory is desired, the restatement should be done only for 75 percent of the inventory. In this paper the first assumption is used in all restatements.

2. In this paper, a multi-industry firm is represented by the

price index for commodities which represents the firm's primary line of business. This index is applied to all levels of inventory, regardless of geographical location. If desired, refinements can be introduced by determining the proportions in which different commodities make up the inventory, if this breakdown is easily available, and applying different indexes to each. The same can be done for inventories in different countries and at different stages of production if exact breakdowns and appropriate indexes can be found. For example, for restating inventory in different stages of production the Bureau of Labor Statistics' Wholesale Price Index which lists indexes by stage of processing can be used.

3. Income effects of inventory value changes through cost of goods sold can be estimated by making appropriate estimates of the effective tax rate for each firm. Indirect effects, such as those of profit-sharing agreements, can also be introduced into the estimation of income effects.

4. It should be noted that in this paper in starting the FIFO to LIFO estimation procedure in 1974 I take the FIFO ending inventory in 1973 as the LIFO beginning inventory in 1974 in accordance with business practice. However, the LIFO values estimated for 1974 and subsequent years are not the same as those which would have been reported if the firm had been on LIFO from the beginning of its existence. This problem may be minimized by beginning the restatement at a point as far back as data are available. Similarly in restating LIFO inventory to FIFO I assume that the base inventory was acquired five years before the restatement process commences. Again, greater accuracy may be achieved by going back further if

such data are available.

5. The indexes used in this study are wholesale price indexes for various commodities. They are assumed to reflect the movement of prices paid by manufacturers in those various industries for their production inputs. Moreover, the price indexes used are the annual average of the monthly indexes for each commodity. Therefore, in the restatement procedure I assume that purchases are spread evenly through the year. If greater accuracy in restating FIFO to LIFO is required the age of goods in year-end inventory can be determined by finding the number of days' purchases contained therein. Then the prices of goods purchased each month can be restated using the index for that month. I found, however, that doing this improved accuracy only very slightly.

The price indexes used in my study for restating inventory values are drawn from the Survey of Current Business published monthly by the Department of Commerce, which gives monthly and annual wholesale price indexes of the U.S Department of Labor for forty-four commodity groups.

Validation of procedures

Because the restatement procedures involve a fair number of assumptions and approximations, rendering error inescapable, it is necessary to judge the accuracy of the procedures. Also, such a validation will yield estimates of error which can be used for testing the sensitivity of any conclusions or inferences drawn from the estimated numbers. I first present the results of testing the accuracy of the FIFO to LIFO restatement.

The method of validation was to select firms which had

recently switched to LIFO. Owing to the high inflation rates in 1974, many firms such as Zenith chose that year to switch their inventory valuation method from FIFO to LIFO using the FIFO ending inventory in 1973 as the LIFO beginning inventory for 1974. Then because of Rule 5-02-6 of Regulation S-X of the Securities and Exchange Commission, which requires firms on LIFO after 1974 to disclose the excess of current cost (usually approximated by FIFO) over stated LIFO value, these firms continued to disclose FIFO values. These firms offered the opportunity for validating the FIFO to LIFO restatement procedure. This was because they continued to disclose FIFO values in footnotes (Zenith, for example), which could be used as input to the restatement procedure, and the actual LIFO values given in the balance sheet could be used to assess the accuracy of the estimated LIFO values produced by the restatement procedure.

Firms which changed their inventory valuation method from FIFO to LIFO in 1974 were identified through the LEXIS/NAARS data bank and a sample of ten was selected. The criterion for selection was that the commodity which represented the firm's primary line of business should be one for which the Survey of Current Business publishes a wholesale price index.

The results of the comparison of the output of the restatement procedures with actual financial data for the ten firms, including Zenith, are given in Table 3. As shown there, my estimates have an error percentage ranging from 14.07 percent for Fruehauf Corporation to -18.5 percent for Monsanto. The average absolute error across the 30 estimates is 6.13 percent and the average error is - 0.07 percent. In 14 out of the 30 cases, the error does not

TABLE 3

RESULTS OF VALIDATION OF FIFO TO LIFO RESTATEMENT

FIRM	YEAR	ACTUAL LIFO	CALCULATED LIFO	ERROR= CALCULATED LESS ACTUAL	ERROR%= 100 x ERROR / ACTUAL LIFO
AMETEK	1974	$46,769,757	$52,366,045	$5,596,288	11.96
	1975	41,783,897	43,202,416	1,418,519	3.4
	1976	41,895,164	43,802,453	1,907,289	4.6
AMSTED INDUSTRIES	1974	58,579,000	62,639,000	4,060,000	6.93
	1975	59,711,000	63,268,000	3,557,000	5.96
	1976	59,307,000	60,200,000	893,000	1.5
FEDERAL MOGUL	1974	94,743,000	100,158,000	5,415,000	5.7
	1975	94,002,000	90,196,000	-3,806,000	-4.04
	1976	111,087,000	104,203,000	-6,884,000	-6.19
FRUEHAUF CORP.	1974	225,609,000	257,371,000	31,762,000	14.07
	1975	177,879,000	177,937,000	58,000	0.03
	1976	229,037,000	227,388,000	-1,649,000	-0.72
HUGHES TOOL COMPANY	1974	99,836,000	96,432,000	-3,404,000	-3.4
	1975	127,941,000	121,297,000	-6,644,000	-5.19
	1976	146,525,000	136,942,000	-9,583,000	-6.54
KENNECOTT	1974	235,337,000	221,608,000	-13,729,000	-5.83
	1975	275,202,000	297,513,000	22,311,000	8.1
	1976	251,543,000	239,279,000	-12,264,000	-4.88
MONSANTO	1974	636,800,000	659,900,000	23,100,000	3.6
	1975	526,100,000	428,500,000	-97,600,000	-18.5
	1976	631,800,000	545,515,000	-86,285,000	-13.66
PFIZER	1974	445,843,000	440,885,000	-5,058,000	-1.13
	1975	484,927,000	446,279,000	-38,648,000	-7.97
	1976	466,463,000	396,537,000	-69,926,000	-14.9
RCA	1974	642,300,000	669,790,000	27,490,000	4.28
	1975	551,200,000	574,470,000	23,270,000	4.22
	1976	581,200,000	614,616,000	33,416,000	5.75
ZENITH	1974	224,128,000	229,830,000	5,702,000	2.5
	1975	198,952,000	203,369,000	4,417,000	2.2
	1976	172,205,000	182,598,000	10,393,000	6.04

exceed ±5 percent. The differences between the actual and estimated series were tested by a t-test to see if the differences were statistically significant (Snedecor and Cochran, p. 93). A t-statistic of 0.88739 with 29 degrees of freedom was obtained. The probability of obtaining a t-statistic greater than or equal to this value, if the two series were actually the same, is 0.3822. Thus we fail to reject the hypothesis that the mean of the differences is zero at both the .05 and .01 levels of significance. Statistically, the two series are alike. The error does not seem to be cumulative and in all cases the calculated LIFO values move in the same direction as the actual LIFO values. The acceptability of the stated amount of error is of course conditional upon the use to be made of the restated data and the sensitivity of any conclusions to different amounts of error.

We can now turn to the results of testing the accuracy of the LIFO to FIFO restatement. Here again, the method was to identify firms which had changed their inventory accounting method, in this case from LIFO to FIFO. Eight such firms were identified through Accounting Trends and Techniques. Most of these changes were made in the late 1950s and the early 1960s. In this case however, only one data point is available for comparison, because dual values (under both FIFO and LIFO) are revealed only for the year of change and not for any subsequent years. The results of the validation of the restatement procedure from LIFO to FIFO for the 8 firms, including Chrysler, are given in Table 4. As shown there my estimates of FIFO inventory values have an error percentage ranging from 3.47 percent for Eastern Stainless Steel Corporation to -11.03 percent for R. H. Macy. The average absolute error for the eight cases is

TABLE 4

RESULTS OF VALIDATION OF LIFO TO FIFO RESTATEMENT

FIRM	YEAR OF CHANGE	ACTUAL FIFO	CALCULATED FIFO	ERROR= CALCULATED LESS ACTUAL	ERROR % = 100 x ERROR/ACTUAL FIFO
Associated Dry Goods	1960	46,201,000	43,825,000	-2,376,000	-5.14
Chrysler	1970	1,390,681,000	1,344,588,000	-46,093,000	-3.3
Eastern Stainless Steel Corp.	1963	12,751,000	13,193,000	442,000	3.47
Goodrich	1963	185,576,000	166,772,000	-18,804,000	-10.1
Johnson and Johnson	1963	60,643,000	57,720,000	-2,923,000	-4.8
R. H. Macy	1966	105,458,000	93,817,000	-11,641,000	-11.03
Maytag	1959	15,601,000	14,277,000	-1,324,000	-8.48
N.C.R.	1970	511,635,000	525,879,000	14,244,000	2.78

Average absolute error = 5.79%

Average error = -4.58%

5.79 percent and the average error is -4.58 percent. Because only one data point (the year of change) is available for comparison, we cannot tell if errors are cumulative or if the calculated FIFO values move in the same direction as the actual FIFO values. The differences between the actual and calculated series were tested by a t-test to see if the differences were statistically significant. A t-statistic of 1.3514 with 7 degrees of freedom was obtained. The probability of observing a t-statistic greater than or equal to this value, if the two series were actually the same, is 0.2186. Thus we fail to reject the hypothesis that the mean of the differences is zero at both the .01 and .05 levels of significance. Statistically, there is no difference between the two series.

Restatement of Depreciation

In reconstructing depreciation numbers under alternative methods the technique used is to layer the existing gross plant and equipment account to find the years from which the existing balance is assumed to date. Alternative depreciation methods can then be applied to each acquisition layer to determine the alternative depreciation expenses for a given year. For example, if the balance in the gross plant and equipment account was $1,000,000 at the end of 1976 and we find property acquisition at the end of each year to be:

1976:	$300,000
1975:	200,000
1974:	400,000
1973:	100,000

then the alternative calculations of depreciation expense, for 1976, assuming a 10-year life and no salvage value are:

1. Straight-line: $ 70,000.00
2. Sum of years digits: $116,800.00
3. Double declining balance: $116,800.00

The method of calculation will be illustrated in greater detail, with data from General Motors, later in this section. At that point I also present results of validating these techniques with data from a sample of 13 firms. Before that, however, a few additional points should be noted about these procedures.

Possible refinements of procedures

This section discusses the assumptions underlying the restatement technique and changes which can be made in some of them if more data are easily available.

1. I am assuming a first-in first-out flow with respect to property acquisitions and retirements. The existing balance is assumed to come from the most recent acquisitions, and retirements are supposed to come from the earlier purchases of plant.

2. The same assumptions can be made with regard to the tax rate as with inventory restatement in order to find the effects on net income of the new depreciation numbers.

3. In the calculation of depreciation in this paper, salvage value is assumed to be zero. If necessary, a salvage value in terms of some percentage of the acquisition layer, say 10 percent, can be assumed.

4. In finding the useful life over which a firm's assets are depreciated we assume that that is the average of the lives of the various types of productive assets a firm acquires. Also, multi-industry firms are represented by the asset life appropriate for their primary business classification.

For firms which actually use the straight line (SL) method, the beginning value of gross plant for those firms was taken for each year from 1961 to 1975. This annual amount was divided by the actual depreciation for the given year to yield annual estimates of the useful life of plant. The arithmetic average over the 15 years was then computed for each firm to yield an estimate of the life of property over the period. For firms which followed accelerated (SYD or DDB) methods, the Asset Depreciation Range given in Revenue Procedure 72-10 was consulted. This system is used to calculate depreciation expense for tax purposes, and asset lives are given for productive assets used in different 3-digit SIC industries. This is a useful starting point since financial lives are usually longer than tax lives. For each firm in my final sample which used accelerated methods, various integer lives in a range above the given tax life were used to calculate depreciation, and the useful life which provided the closest fit to actual recorded depreciation for 1974 and 1975 was picked. This estimate of useful life could then be used in the calculation of depreciation expense under either of the other methods.

If the useful life for depreciation is longer than the period required to layer gross plant (the age of assets), this implies that assets are sold before they are fully depreciated. If the useful life is shorter than the period required to layer gross plant, then this implies that fully depreciated assets are on the books. In calculating depreciation expense in the latter case, I use only those layers which have not been fully depreciated.

5. The pattern of asset acquisition over the year was found by testing three different assumed patterns. These were a) all

assets assumed to be acquired at the beginning of the year, b) all assets assumed to be acquired at the end of the year and c) assets assumed acquired evenly through the year. Each acquisition pattern would yield different depreciation figures. The three patterns were used to calculate depreciation to see which one provided the closest fit to actual depreciation expense in 1974 and 1975. For ten out of the thirteen firms the second assumption provided the best fit. For the other three, the first assumption provided the best fit.

Data for layers of acquisition of property for restating depreciation were drawn from Moody's Industrial Manual. In an "Analysis of Property" account they give additions at cost as reported to the Securities and Exchange Commission on Form 10-K. In most cases the data are available for every year going back to 1934. I thus avoid the problems associated with the errors common to the measurement of this variable on the Compustat tapes (Thies and Revsine, 1977). The accuracy of the Moody's data was checked against actual 10-K filings for the sample of 13 firms for the period 1968-1975.

Validation of procedures

In this case, as with inventory, the restatement method was validated. This was done by applying the restatement procedure to firms which actually followed the three different depreciation methods to see if I could duplicate or come close to the actual depreciation expense reported by those firms for 1974 and 1975. Because for some firms recent data on capital expenditures were not available or because they had changed depreciation methods recently, depreciation data for two earlier years for these firms was used. It should be

noted that, as was not the case with inventory valuation methods, situations in which firms disclose depreciation numbers under alternative methods are very rare. Because of this I could compare the estimated depreciation expense with the reported depreciation expense only for the depreciation method actually followed by the firm. This however, is sufficient to test the adequacy of the assumptions of the first-in first-out flow of asset acquisitions and retirements, of the acquisition pattern of assets, and of the age of assets. Firms on different depreciation methods were identified through the LEXIS/NAARS data file. The method of calculation is first illustrated with one of those firms, General Motors, which uses the double declining balance method.

As can be seen from the data given in Table 5, General Motors had a balance in gross plant of $16,808,457,000 and $17,503,583,000 at the end of 1974 and 1975 respectively. From Moody's I found the expenditures by General Motors on property starting from 1975 (for 1975 gross plant) and going back as far as necessary for the sum of the annual expenditures to equal the value of gross plant in 1975. I had to go back to 1964 to do this. A similar procedure was applied to the 1974 balance for gross plant. As noted earlier, three different asset acquisition patterns were fitted. For General Motors I found that ssuming that assets were acquired at the end of the year provided the best fit to actual depreciation. This assumption implies that no depreciation is taken on assets in the year of acquisition. The useful life of assets was found by using the life given in the Asset Depreciation Range as the starting point and then trying out various lives above this point to find the one which provided the best fit to actual depreciation. For General Motors this starting

Table 5

EXAMPLE OF DEPRECIATION RESTATEMENT

(General Motors [DDB] Life of 22 years)

	1974 (Gross Plant: $16,808,457,000)			1975 (Gross Plant: $17,503,000)	
	Additions to Property at Cost (in 000s):	Depreciation of Each Layer:		Additions to Property at Cost (in 000s):	Depreciation of Each Layer:
1974:	1,458,453	0	1975:	1,200,889	0
1973:	1,163,421	105,765	1974:	1,458,453	132,587
1972:	940,038	77,689	1973:	1,163,421	96,150
1971:	1,012,968	76,106	1972:	940,038	70,626
1970:	1,134,165	77,464	1971:	1,012,968	69,187
1969:	1,043,842	64,814	1970:	1,134,165	70,423
1968:	1,726,012	97,429	1969:	1,043,842	58,922
1967:	1,793,845	92,053	1968:	1,726,012	88,572
1966:	2,078,832	96,979	1967:	1,793,845	83,684
1965:	2,051,760	87,014	1966:	2,078,832	88,163
1964:	1,681,532	64,380	1965:	2,051,760	79,104
1963:	723,589	25,361	1964:	1,681,522	58,937
	Calculated depreciation -	865,504		Calculated depreciation -	896,355
	Actual depreciation ---	843,308		Actual depreciation -----	902,629

point was 12 years, and the best fit was provided by a life of 22 years. This useful life was then used to calculate the depreciation for 1974 and 1975 of each acquisition layer. These figures were then aggregated to yield the estimated depreciation expense for General Motors under DDB. They could then be compared with actual depreciation expense reported for General Motors under DDB for those two years to test the accuracy of my restatement procedures. As can be seen, the actual depreciation expense for General Motors was $843,308,000 in 1974 and $902,629,000 in 1975. The estimated depreciation expense was $865,504,000 in 1974 and $896,355,000 in 1975. An analyst interested in finding out General Motors' depreciation expense under another method, such as straight line (SL), would simply have to apply the appropriate technique to the various acquisition layers given in Table 5 using the useful life of 22 years.

The results of the validation of the restatement procedure for depreciation are given in Table 6. As shown there, my estimates have an error percentage ranging from 7.5 percent to - 9.81 percent. The average of the absolute error over the 26 observations is 3.48 percent and the average error is -1.46 percent. The error does not seem to be cumulative. The differences between the actual and calculated series were tested by a t-test to see if they were statistically significant. A t-statistic of 1.0397 with 25 degrees of freedom was obtained. The probability of observing a t-statistic greater than or equal to this value, if the series were the same, is 0.3084. Thus we fail to reject the hypothesis that the mean of the differences is zero at both the .01 and the .05 levels of significance. Statistically, the two series are alike.

Table 6

RESULTS OF VALIDATION TEST FOR DEPRECIATION RESTATEMENT

Firm	Depreciation Method	Year	Actual Depreciation Expense	Calculated Depreciation Expense	Error = Calculated - Actual	Error % 100x Error/Actual
Owens-Corning Fib.	DDB	1974	33,438,000	35,952,000	2,514,000	7.5
(Life: 17 years)	DDB	1975	43,873,000	42,375,000	- 1,493,000	-3.4
Standard Oil of CA[1]	DDB	1974	509,596,000	514,143,000	4,547,000	0.89
(Life: 20 years)	DDB	1975	585,100,000	561,964,000	-23,136,000	-3.95
Texas Instruments	DDB	1970	54,513,000	53,155,000	- 1,358,000	-2.49
(Life: 7 years)	DDB	1971	50,420,000	48,570,000	- 1,850,000	-3.67
Zenith[1]	DDB	1972	11,335,000	10,809,000	- 526,000	-4.64
(Life: 15 years)	DDB	1971	11,313,000	11,297,000	- 16,000	-0.14
Dupont	SYD	1975	506,400,000	481,615,000	-24,785,000	-4.89
(Life: 13 years)	SYD	1974	579,500,000	566,358,000	-13,142,000	-2.27
General Electric	SYD	1974	376,200,000	390,995,000	14,795,000	3.93
(Life: 18 years)	SYD	1975	418,600,000	422,566,000	3,966,000	0.94
Sperry Rand[1]	SYD	1970	100,864,000	103,897,000	3,033,000	3.0
(Life: 13 years)	SYD	1971	116,969,000	110,010,000	- 6,959,000	-5.95
Allis-Chalmers	SL	1974	20,969,000	21,010,000	41,000	0.19
(Life: 19 years)	SL	1975	23,884,000	21,600,000	- 2,284,000	-9.56

Continued

[1]Assets assumed acquired at beginning of year.

Table 6 - Continued

RESULTS OF VALIDATION TEST FOR DEPRECIATION RESTATEMENT

Firm	Depreciation Method	Year	Actual Depreciation Expense	Calculated Depreciation Expense	Error = Calculated - Actual	Error % 100x Error/Actual
Kennecott	SL	1974	91,284,000	82,330,000	- 8,954,000	-9.81
(Life: 26 years)	SL	1975	49,036,000	48,690,000	- 346,000	-0.71
R.C.A.	SL	1974	259,800,000	256,100,000	- 3,700,000	-1.42
(Life: 10 years)	SL	1975	271,700,000	253,600,000	-18,100,000	-6.66
General Motors	DDB	1974	843,308,000	865,504,000	22,196,000	2.63
(Life: 22 years)	DDB	1975	902,629,000	896,355,000	- 6,274,000	-0.69
R. J. Reynolds	SYD	1974	98,667,000	98,589,000	- 78,000	-0.079
(Life: 24 years)	SYD	1975	107,962,000	103,713,000	- 4,249,000	-3.94
Monsanto	SYD	1970	156,910,000	159,808,000	2,898,000	1.85
(Life: 18 years)	SYD	1971	169,081,000	178,225,000	9,144,000	5.41

Conclusion

This paper has presented methods of approximating the values of accounting numbers that a firm would report if it chose to change its inventory valuation and depreciation accounting methods. The objective has been to develop methods of such approximation which only require simple calculations and publicly available information. I also present estimates of the accuracy of these restatement methods. The acceptability of the stated amount of error is of course conditional upon the uses to be made of the approximations. The range of error presented here can be used as a guide in testing the sensitivity of any inferences drawn from the numbers.

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