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DEPRECIATION POLICIES AND PRICE LEVEL CHANGES
(WITH SPECIAL REFERENCE TO THE U.S.A.)

BY
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ABSTRACT

The primary purpose of this paper is to deal with the problem, as currently unsolved in the United States of America, of price level depreciation and suggest reforms. The large decline in the purchasing power of the dollar during the past fifteen years have made the problem of measuring the cost of capital consumed a major one in many industries.

This study involves, in the first place, a demonstration and an analysis of the various meanings given to " Depreciation ". The reason for the many different meanings attributed to depreciation is that each business executive looks at depreciation from a different point of view. The accounting profession, however, emphasizes that the primary objective of depreciation accounting is to amortize the original cost of an asset in a systematic and rational manner.

The methods of allocation are next discussed. Accelerated methods of depreciation are found to be preferred whenever the physical efficiency of the asset declines over its estimated service life.

In chapter IV, the effects of price level changes on depreciable assets are discussed. Results of the study show that two significant factors are responsible for the depreciation deficiency: the rate of price level rise and the service life of the asset.

In chapter V, the various methods proposed to adjust for

and minimize the effect of price level changes are discussed. The author concludes that periodical adjustments of depreciation charges are the answer since these periodic adjustments show the cost of capital consumed per period and in terms of current monetary units.

In chapter VI, the author's conclusions are presented. The author is in favor of recognizing price level changes in depreciation allowances, if the aim of the business is to report true profits. The large decline in the value of the dollar since 1940 raises great doubts about the adequacy of historical cost depreciation. If historical cost depreciation does not measure adequately the cost of capital consumed, then depreciation based on original cost converted in terms of current cost, by the use of government calculated price indices, is a reasonable practice which meets the accounting objective of correct income determination.

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CHAPTER I

INTRODUCTION

Until recent years, accountants have paid little attention to the subject of fixed asset depreciation. Methods of allocation were selected, schedules were prepared, and journal entries were made in a somewhat rough and approximate manner. " The attitude seems to have been: depreciation can't be really determined accurately any way, so why bother ?"⁽¹⁾ This attitude is now questioned by many farsighted people in the accounting profession and many fundamental changes are being introduced into the existing techniques of accounting for depreciation.

The importance of depreciation cannot be overlooked. Depreciation accounting affects, nearly, every enterprise in the economy. In a period where the price level is rising, the effects on reported profits of the use of different bases for depreciation may become significant. In the United States of America, the variation in depreciation charges that ensues from the use of different bases in a rising price level is estimated in billions of dollars. ⁽²⁾

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1. Fred J. Sengstacke, " The Depreciation Dilemma Has More Than Two Horns ", N.A.A. Bulletin , Vol. XL, No. 6, Feb. 1959, p.15.
 2. Sumner Slichter, " Profits In A Laboristic Society ", Company testimony before Presidential fact finding board, Steel Industry Case, Aug. 1949. As quoted by William C. Flewelling, " Historical vs. Current Cost As Depreciation Bases ", N.A.A. Bulletin, Aug. 1958, p. 38.

Before the second world war, depreciation was considered as an insignificant item of cost. However, during the post-war period, several factors have combined to increase the importance of depreciation as a significant ingredient of total cost.

These factors are:

1. Increased mechanization and automation resulting from high wage rates and intense competition led to an increase in investment of depreciable assets and which consequently led to higher periodical depreciation charges.
2. Higher obsolescence rate of assets due to:
 - A. The early appearance of better types of equipment as a result of rapid technological changes.
 - B. The increased use of special purpose machinery.

In 1958, The National Association of Accountants in the U.S.A. made a research study about depreciation practices applied in 55 major U.S. companies. Results of the study show that depreciation in some companies reaches as much as 20 per cent of cost of goods sold, although 3 to 5 per cent seems to be the average. (1) In cases where depreciation is small in relation to total cost, it is usually large in relation to net

1. " Current Practice In Accounting For Depreciation ", Research report published by The National Association of Accountants, New-York, April 1, 1958, p.2.

operating income and dividends. Therefore, the need to reconsider depreciation methods, when depreciation has become a very significant item of cost, is becoming essential.

The post-war period has been considered to be a period of rapid change for most companies. Replacement of worn out and/or obsolete equipment was deemed necessary, technical progress enhanced the rate of obsolescence, and the expansion of business activity increased the demand for new equipment. Moreover, the rise in wages and prices resulted in insufficient amount of funds made available from depreciation based on original cost to meet the increased costs of replacement. These conditions have focused the attention of management to question the adequacy and reliability of depreciation charges in fulfilling their objectives.

Accounting for depreciation has proved to be one of the most controversial issues of the post war period. The rapid technological changes and the inflationary situation are probably the most important elements in the controversy. " The controversy has ranged from that concerned with whether depreciation should be considered as cost, which was not decided until the early years of the twentieth century after the tax advantages had become apparent, to the current controversy concerned with rising price levels." (1) The sharp rise in

1. William C. Flewellen, " Historical vs. Current Cost As Depreciation Bases ", N.A.A. Bulletin, New York, Aug. 1958, p. 37.

prices, combined with high tax rates, led accountants, economists, managers, workers and governmental agencies alike to focus great attention about the proper basis of accounting for depreciation.

The greatest problem in accounting for depreciation is the choice of a base . Should the owner of a depreciable asset choose historical cost or replacement cost or historical cost reexpressed in terms of current dollars or some other basis?

The prevalent opinion of the accounting profession advocates the historical cost basis. They argue that depreciation accounting is a process of allocation and not of valuation. Moreover, historical cost is the most objective basis available to the accountant, and since no agreement has been arrived at by the accounting profession on any other basis which could be considered equally objective, historical cost remains the only basis.

Economists, on the other hand, although agreed that the basis should not be historical cost, have not yet reached a decision as to the proper basis. Their major argument against the use of historical cost is that it will cause dissipation of capital by overestimating profits.

Management, as another group, has complained about the misleading effects of the historical cost basis but has continued to use that basis, being influenced by the attitude of the accounting profession and other regulatory agencies. " The position taken by the U.S. Supreme Court has presented a rather confusing picture. The court has given the nod of approval

to a replacement cost basis, a reproduction cost basis, and a fair value basis, which is a combination of the other bases."⁽¹⁾

Accountants have recognized that the problem is a serious one and deserves further consideration. The American Institute of Accountants and the American Accounting Association are in favor of having supplementary data reflecting the effect of fluctuations in prices but disapprove of making adjustments on the books.

Had there been no changes in the purchasing power of money, the whole issue of the adequacy of depreciation charges would not have arisen. The idea of value based on acquisition cost rests on the premise of a relatively stable currency. In the U.S.A. , the changes in the purchasing power of the dollar as a result of the sharp rise in the general price level have had great effects not only on the original cost concept, but also on other important economic and legal obligations.

Since 1933, with minor interruptions in 1938, 1949, and the middle fifties, the value of the dollar has shown a long-term downward trend. The value of the present dollar is less than 40 per cent of its value in 1932, and around 50 per cent of its value in 1940 as measured by the index of general prices. (2)

1. Ibid. p.39.

2. Willard J. Graham, " Depreciation And Capital Replacement ", The Accounting Review, Vol.XXXIV, No. 3, New York, July 1959, p.372.

Since the past has never witnessed a long period of price stability, it would be unrealistic to expect in the future a period of price stability. In this paper, arguments will deal only with inflation and rising price levels rather than with deflation and declining price levels. The reason being that in a period of rising price level, accounting for depreciation based on original cost produces ill effects greater in magnitude than in declining price level.

During the post war period, many individuals and groups have made proposals for changes in accounting for depreciation in the United States. Business men believe that by adhering to the historical cost concept, their reported profits will be overstated and this will eventually lead to dissipation of capital. As a result of the use of original/^{cost} as a base, the depreciation charge will be presented in dollars having a lower purchasing power than other items of cost and hence profits will be overstated. Overstatement of profits will consequently lead to larger dividends, inability to maintain real investment in plant and equipment, stimulate workers to demand higher wages and result in underpricing of products. High tax rates combined with low depreciation rates will cause a company to pay out in the form of taxes and dividends moneys that should have been retained in the business. The situation is accentuated further in an inflationary period.

Although agreement has not yet been reached on a method that reflects the changes in price levels, it is believed that something should be done to arrive at an equitable method

that is acceptable to both government and businessmen alike. In a country like the United States where the corporate tax reaches up to 52 per cent, changes in depreciation methods become significant to both government and businessmen.

The United States Government, realizing the disadvantages of the straight line method of depreciation, introduced the 1954 Revenue Code which permitted the use of the declining balance method with a maximum rate of 200 per cent of the straight line rate, and the sum of the year digits method. These methods permit a larger write-off during the early life of the asset which is commensurate with the service value received. However, both the declining balance and the sum of the year digits methods are based on original cost. " So long as depreciation deductions must be based on original cost it is almost certain that all of the forgoing speed-up devices taken together will fall far short of recovery of the current dollar equivalent of the cost of capital consumed and that confiscation of capital by taxation will continue." (1)

The problem is very important to any industrialized economy experiencing inflation and its solution is a challenge to the accounting profession.

1. Ibid. p. 375.

CHAPTER II

DEPRECIATION: MEANINGS AND PRACTICES

Meanings of depreciation.

Various meanings are attached to this word and a clear differentiation among the various meanings attributed to depreciation is very essential to avoid confusion and misunderstanding.

It is the purpose of this chapter to show that while businessmen and accountants arrive at depreciation cost by somewhat similar methods, they attribute different meanings to the term " depreciation ".

The Committee on Terminology of the American Institute of Accountants defines depreciation as follows:

" Depreciation accounting is a system of accounting which aims to distribute the cost or other basic value of tangible capital assets, less salvage (if any), over the estimated useful life of the unit (Which may be a group of assets) in a systematic and rational manner. It is a process of allocation, not of valuation. Depreciation for the year is the portion of the total charge under such a system that is allocated to the year. Although the allocation may properly take into account occurrences during the year, it is not intended to be a measurement of the effect of all such occurrences." (1)

1. American Institute of Accountants, "Accounting Research Bulletin No.22" (May 1944). As quoted by David R. Anderson, Practical Controllorship, Homewood, Ill., Richard Irwin Inc., 1955, p.422.

Depreciation, in this definition, is looked upon as a prepaid expense to be allocated over the useful life of an asset in a systematic and rational manner. It is to be emphasized that cost and not value is the basis for allocation.

To the layman, depreciation means decline in value. To avoid such misunderstanding, suggestions have been made to exchange the term " depreciation " for " cost installments ". Cost installments imply allocation of cost and this is in harmony with the objectives of accounting for depreciation.

A similar meaning given to depreciation is the following:
" Depreciation is a term used to describe a systematic amortization of cost over useful life without regard to value during that life ". (1)

As a matter of fact, this definition puts much stress on original cost which is in compliance with the basic accounting principle of recording assets at acquisition cost. The objectives of this definition are easily attained by the ordinary accounting techniques. A depreciation charge based on original cost will be less current than most of the items on the income statement. This implies that a depreciation charge based on original cost may be stated in dollars having a different purchasing power from the items with which this expense is matched. Proponents of this definition defend them-

1. H. H. Wade, Fundamental of Accounting, 3d Ed., New York, John Wiley & Sons Inc., 1951, p. 160. As quoted by Frank A. Singer, The Accounting Review, New York, Vol. XXXI, July 1957, p.406.

selves by basing their argument upon the false assumption that the dollar is stable in value. They offer as an explanation the " Going Concern " theory by stating " that the presumed continuity of operations of the firm makes the actual experience (acquisition cost) of the firm the measure of primary significance to that firm." (1) It is worth noting that the American Institute of Accountants supports this point of view.

The following definition of depreciation takes a different point of view.

" Depreciation, as used in accounting, means the exhaustion of service-units embodied in fixed assets." (2)

In this definition, the " exhaustion of service-units embodied in fixed assets " denotes " value ". Surely a valuation process seems to be needed. Assuming the reliability of the valuation process, the fixed assets then would be shown at current market values and this information is very essential to suppliers of capital. The significance of the depreciation charge based on this definition is great because it will be more in line with other figures representing other items of cost. However, appraisals are not desired for

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1. Frank A. Singer, " Depreciation Better left Unsaid ", The Accounting Review, New York, Vol. XXXII, July 1957, p.407.
 2. H. R. Hatfield, T. H. Sanders, and N. L. Burton, Accounting Principles And Practices, Boston, Ginn and Co., 1940, p.304. As quoted by Singer, op.cit. p.406.

two reasons: the first is the extent of the reliability of the valuation process, and second is the cost of the valuation process.

In the definition that follows, although " loss in value " is mentioned, the notion of " change in market value " must be conveyed. " Depreciation is generally defined as the loss in value of a fixed asset due to wear and tear, deterioration, and obsolescence. " (1) When market value receives the total emphasis, as is the case in this definition, then depreciation should no more be related to actual use. " In this case " depreciation " may become " appreciation ", which plus factor would command an equal right of representation on the income statement. This for fixed assets, is a complete departure from going concern theory." (2)

The next definition views depreciation as a way of keeping intact the funds invested in fixed assets. " In their broadest significance, depreciation and depletion are means of reserving out of the earnings amounts sufficient to keep intact the capital invested in wasting property assets, so that, when it becomes necessary to replace the property in order to continue business, additional capital will not have to be invested for that purpose. This is subject, of course, to

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1. John J. W. Neuner, Cost Accounting, Principles And Practices, 4th Ed., Homewood, Ill., Richard Irwin, Inc., 1952, p.264.
 2. Singer, op.cit. p.409.

the fact that the cost of replacement may be more or less than the original cost... In the present discussion the function of depreciation will be considered as it is ordinarily understood - that is, as the means of preserving the original capital, disregarding any difference there may be between the cost of the original capital assets and the cost to replace them." (1)

This definition, however, might imply either of two things. It may mean either replacing present depreciable fixed assets with others which will cost the same number of dollars as did those which are now in operation. Or it may mean that present fixed assets will be replaced with others which may be expected to produce the same net income to the business. The first alternative is not sound at all and is rejected. The second alternative may be attained if there is a substantial decline in the price level, but it becomes inappropriate if price level rises substantially. However, it is obvious that in either case no way of recording and reporting accounting data can achieve the objective of keeping intact capital invested in fixed assets.

If the business generates income, it must be the obligation of management to earmark sufficient funds to replace those depreciable assets which are used up in business operations.

1. W. H. Bell, R. S. Johns, and T. V. Hogan, Auditing, 3d Ed., N. Y., Prentice-Hall, Inc., 1952, p.250. As quoted by Singer, op.cit. p.406.

The required amount for replacement is liable to be more or less than the existing amount, and in any case something, other than depreciation accounting, should be resorted to.

It is evident, from the foregoing discussion, that several meanings are attributed to depreciation. This is largely due to the fact that each group looks at depreciation from a different point of view. However, it is obvious that what financial accountants call depreciation in their statements is merely the outcome of amortizing original cost. This definition is very simple and easily understood, but the presence of proponents of other definitions creates confusion and misunderstanding. " This misunderstanding could be eliminated if it were made very clear that depreciation is amortization." (1)

Although the Committee on Terminology of the American Institute of Accountants was cognizant of the defects of the term " depreciation ", it still continued its support for the use of this term as the most convenient to the accounting profession.

Here is an excerpt from the Accounting Research Bulletin, No. 20:

" Much of the confusion and many of the misapprehensions that have arisen in respect to depreciation accounting would, as the committee's report of last year suggests, be obviated

1. Singer, op.cit. p.410.

by the substitution of some word as " amortization " for " depreciation ". The use of the latter word to describe a fall in value is so widespread and so well justified by the root meaning of the word that it is unreasonable to expect that the technical accounting use of it will result in the complete abandonment of the use of the word in the popular sense, even in accounting." (1)

In this paper, the word depreciation will still be used but its meaning will be amortization of cost unless indicated otherwise.

1. From American Institute of Accountants, " Research Bulletin No. 20, Nov. 1943. As quoted by Ronald H. Robnett, Thomas M. Hill and John A. Beckett, Accounting, A Management Approach, Homewood, Ill., Richard Irwin Inc., 1955, p.346.

Practices of Depreciation

It is said that " all machinery is on an irresistible march to the junk heap." (1) Experience proves that this statement is valid. Hence, methods of allocating the cost of depreciable assets to periods must be devised if capital is to be conserved. There are various methods of depreciation, and each one must meet the accounting criteria of being systematic and rational.

It is important to note that methods of allocation adopted by businessmen in the United States have been largely influenced by income tax laws and regulations. Different depreciation methods, as will be shown later on, will result in different taxable incomes. The Revenue Code of 1954 led many U.S. companies to revise their depreciation methods for income tax purposes. (2)

An attempt is made in this paper to give a brief description of the important methods that are in use.

Outline of methods: (3)

1. Methods resulting in uniform depreciation charges.

A. Straight line method.

B. Annuity method.

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1. H. R. Hatfield, Accounting, N.Y., Appleton & Co., 1931, p.130. As quoted by Grant & Norton Jr., Depreciation, N.Y., Ronald Press Co., 1955, p.3.
 2. National Association of Accountants' Research Report, op.cit. p.5.
 3. The discussion relating to this part is largely based on Depreciation, by Grant & Norton Jr., c.10.

2. Methods resulting in smaller write-off than straight-line in early years of life.
 - A. Sinking fund method.
 - B. Retirement method.
 - C. Replacement method.
3. Accelerated methods of depreciation.
 - A. Declining balance method.
 - B. Sum of year digits method.
 - C. Multiple straight line method.
4. Consistent methods based on use.
 - A. Production method.
 - B. Combination of the production and straight line method.
5. Irregular methods.
 - A. Retirement reserve method.
 - B. Arbitrary write-offs determined annually by management.
 - C. Percent of revenue method.
 - D. Periodic appraisals.

Straight line method:

This method is the simplest of all. Under this method, the asset's cost (less salvage value if any) is divided by the estimated useful life. It assumes that each period receives equal benefit from the availability of the asset.

$$\frac{\text{Cost} - \text{Estimated salvage value}}{\text{Estimated useful life}} = \text{Annual depreciation charge}$$

The Bureau of Internal Revenue of the Treasury Department of the United States defines the straight line method as follows:

" Under this method, the cost or other basis of the property, less its estimated salvage value, is deducted in equal

annual installments over the period of its estimated useful life. Ordinarily the depreciation deduction is computed by applying a depreciation rate expressed as a percentage to the cost or other basis to be recovered, but it also may be computed by dividing that cost or other basis by the estimated useful life. The estimated useful life is subject to modification in the light of conditions known to exist at the end of each taxable period. Ordinarily depreciation computed by this method represents the actual diminution in service value from year to year as closely as the depreciation computed by any other method. The practical simplicity in accounting records required and the ease and flexibility by which revisions or changing life estimates may be applied tend to make this method the most acceptable one for general use." (1)

At the present, the use of this method has declined tremendously. Those who criticize this method claim that it is not conservative at all. The straight line method does not recognize the fact that as the machine grows older its efficiency declines, repair and maintenance costs increase, and the rate of obsolescence also increases. Therefore, this

1. U.S. Treasury Department, Bureau of Internal Revenue, Bulletin "F", Income Tax Depreciation And Obsolescence Rates, Revised, June 1942, Superintendent of documents, Washington, p.4. As quoted by Grant & Norton Jr., op.cit. p.88.

method does not result in reasonable matching of costs and revenues which is the essence of the principle of income determination. Another objection to this method is that as a result of its use, the rate of return on the remaining investment will be increased and hence the relation between income and capital will be misrepresented.

Annuity method:

This method results in uniform periodical charges over the whole useful life of the asset. The amount of periodic charge is arrived at by dividing the net book value over the present value of ordinary annuity of 1 at an arbitrary rate of interest. The credit goes to allowance for depreciation and to interest income. The amount of interest income decreases every year since it is based on the balance of the investment or net book value. The amount of allowance for depreciation increases every year by the same amount of the decrease in interest income.

One of the major criticisms advanced against this method is that the interest element is introduced into costs and inventories and hence prices are inflated. This method also results in an overstatement of costs and in an equal overstatement of income.

Sinking fund method:

This method results in lower depreciation charges in the early years of useful life and higher charges in later years. Consequently, the unamortized book value will always be more

than if the straight line method is used. The depreciation charge consists of two parts. The first part is an equal annual payment in the sinking fund, and the other part is the interest on that payment. So as time goes on, the annual depreciation charge increases because the interest portion of the depreciation charge increases as the sinking fund increases. The book value will be the acquisition cost less the depreciation reserve. The periodic payment into the fund is arrived at by dividing the net book value of the asset over the amount of annuity of 1 for n periods at an arbitrary rate of interest.

Retirement method:

Under this method, the total of acquisition cost is charged as expense in the year when the asset is retired. Therefore, during the useful life of the asset, no depreciation expense is recorded. Actually, this method distorts costing procedures and results in improper allocation of costs.

Replacement method:

This method is similar to the retirement method in that no periodical charge is made as long as the depreciable asset remains in operation. The charge, however, is made when the asset is retired and replaced, and the amount of the charge is the replacement cost of the asset. The acquisition cost of the retired unit will still be shown on the balance sheet as the book value of the replaced asset. Many object to this procedure because in many cases the replaced unit may not be

identical with the retired unit. To overcome such difficulty, some resort to the practice of charging to current expense the portion of replacement cost of a similar replacement. The excess of replacement cost is capitalized. The problem seems to be how to get a figure equal to the estimated cost of replacement. The same criticisms that apply to the retirement method apply also to this method.

Accelerated methods of depreciation:

Methods of depreciation that write-off larger amounts during early years of operation than during later years are called accelerated methods of depreciation. These methods, unlike the straight line method, take into account the declining productivity of the depreciable asset. Hence, accelerated methods of depreciation result in a better matching of revenues and costs which is in compliance with the principles of income determination.

Declining balance method:

Under this method, a fixed percentage is applied to the balance of an asset's acquisition cost each year. This results in larger depreciation charges during the early years of operation and lower charges during the latter years. If there is no salvage value, the book value of the depreciable asset will never fall to zero under this method. Therefore, in the year of retirement, that portion of book value remaining as unamortized may be treated as additional depreciation expense or written off as a loss.

Sum of year digits method:

This method is similar to the declining balance method in that it results in larger depreciation charges during the early years of operation and lower charges during the later years. If a machine has a useful life of 10 years, then the sum of the digits is obtained by adding $1+2+3\dots+10$ which amounts to 55. The depreciation charge for the first year will be 10 over 55 of the cost of the asset. The next year charge will be 9 over 55 of the cost of the asset and so on. This method and the declining balance method are referred to as accelerated methods of depreciation.

The following table shows the periodic and cumulative depreciation for an asset costing \$ 1,000 with no salvage value and an estimated useful life of 10 years.

Table 1

Depreciation on a single asset

Year	Annual amount			Cumulative amount		
	Straight line	D/B	SYD	Straight line	D/B	SYD
1	\$ 100	\$ 200	\$ 182	\$ 100	\$ 200	\$ 182
2	100	160	164	200	360	346
3	100	128	145	300	488	491
4	100	102	127	400	590	618
5	100	82	109	500	672	727
6	100	66	91	600	738	818
7	100	66*	73	700	804	891
8	100	66	55	800	870	946
9	100	65	36	900	935	982
10	100	65	18	1000	1000	1000

* Taxpayer switches to the straight line method.

Source: Leonard E. Morrissey, "The Many Sides Of Depreciation " Tuck Bulletin 23, Dartmouth College, Feb. 1960, p. 10.

Table 1 shows that for the first three years, the declining balance (D/B) and the sum of year digits (SYD) methods write-off 48.8 per cent and 49.1 per cent of original cost respectively, while the straight line method writes-off only 30 per cent.

Although, under any method, the asset will be eventually depreciated, the difference in the arrangement of payments may result in great benefits under accelerated methods of depreciation.

In the following table, it is assumed that the business buys every year a machine costing \$ 1,000 with no scrap value and with an estimated useful life of 10 years. It is assumed also that the tax rate is 50 per cent and the interest rate is 10 per cent.

Table 2
Financial value of SYD depreciation

Year	Excess over straight line depreciation	Tax Reduction	Present value factor	Present value of reduction
1	\$ 81.82	\$ 40.91	.9091	\$ 37.19
2	145.46	72.73	.8264	60.11
3	190.92	95.46	.7513	71.72
4	218.19	109.10	.6830	74.52
5	227.28	113.64	.6209	70.56
6	218.19	109.10	.5645	61.59
7	190.92	95.46	.5132	48.99
8	145.46	72.73	.4665	33.93
9	81.82	40.91	.4241	17.35
10	-----	-----	.3855	-----
				\$475.96

Source: Ibid. p.11.

Table 2 shows a gain with a present value of \$ 475.96 if

the sum of year digits method is used instead of the straight line method.

Multiple straight line method:

This method aims at writing-off three fourths of the cost of a depreciable asset in one half the average useful life and the last quarter during the last half of the useful life. This method has the characteristic of writing-off large amounts in the early years of life. However, it also could be made to result in smaller write-offs in the early years of life.

Production method:

This method is based on an estimate of the expected volume of production which the machine is capable of producing during its useful life. The original cost minus the salvage value is divided by the estimated volume of production to give the depreciation charge applicable to each unit of production. Two problems arise as a result of the use of this method. The first is the selection of a representative production unit, and the second problem is the extent of the reliability of the estimate of the volume of production over the useful life of the asset. The depreciation charge, under this method, will vary with output. Undoubtedly, this is in conformity with the proposition that depreciable assets should be amortized in proportion to actual use. However, this method does not recognize the time factor which is one of the elements of depreciation.

Combination of the production and the straight line method:

This method is very useful for industries whose volume of output is subject to wide fluctuations. It is "based on straight line depreciation accounting, with the straight line depreciation reduced by a factor related to production, when production is below a specified level". (1)

Retirement reserve method:

Under the retirement method, the total of original cost is charged as expense in the year when the asset is retired. Undoubtedly, this will result in unanticipated fluctuations of expenses. To avoid such fluctuations, the retirement reserve method is resorted to whereby annual "appropriations" are made to a retirement reserve account offset by debits to retirement expense. This method is largely used in privately owned electric, gas, and water utility industries in the United States. (2)

Other irregular methods:

The arbitrary write-offs, the percent of revenue, and the periodic appraisal are considered to be irregular methods. The use of these methods is not widespread and are ignored for the purpose of this paper.

Extent of use of various methods:

Prior to 1954, the straight line method was the most widely used method in the United States. However, after the

1. Grant and Norton Jr., op.cit. p.202.
2. Ibid. p.203.

1954 Revenue Code, many companies switched to accelerated methods of depreciation largely because of the tax advantage.

Table 3 shows the depreciation methods used for tax purposes which were adopted by fifty-five companies which participated in a study sponsored by the National Association of Accountants. Results of the study revealed that forty companies used accelerated methods of depreciation, fourteen companies used the straight line method, and only one company used the output method.

Table 3

Depreciation Methods Used For Tax Purposes
By Companies Participating In Study

	<u>Number of companies</u>
Declining charge methods (Sum of the Years Digits and/or Declining Balance) elected for assets eligible under Revenue Code of 1954.	40
Straight line method applied to all assets.	14
Output units method applied to all units.	<u>1</u>
TOTAL	55

Source: National Association of Accountants' Research Report, op.cit. p.6.

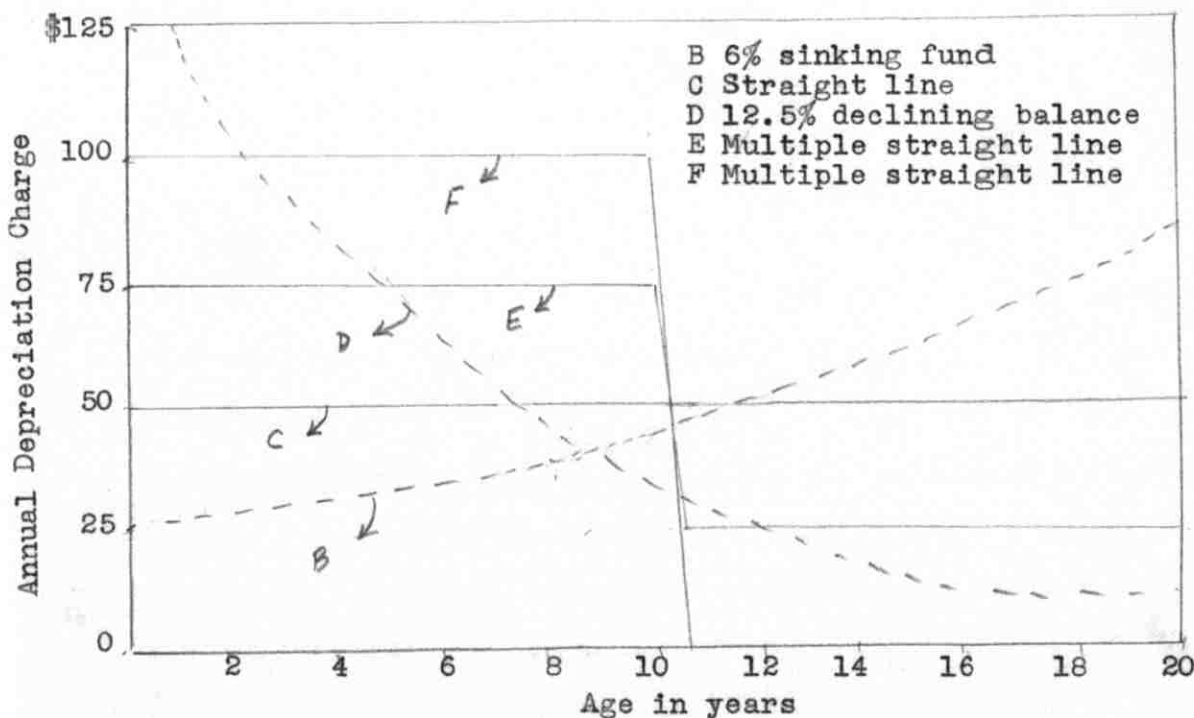
The production method is largely used in the extractive

industries, while the use of the retirement reserve method and the irregular methods has been declining mainly due to government regulations, stock exchange requirements, and the desirability of using depreciation methods based on systematic and rational bases.

It seems that the most widely used methods in the United States are the declining balance, the sum of year digits, and the straight line methods. Discussion in this paper will center mainly on these methods.

To give a more comprehensive picture of the differences in the annual depreciation charges as a result of the use of various methods of depreciation, chart I is presented.

Chart I



Source: Grant and Norton Jr., op.cit. p.186.

The curves represent the following methods:

Curve B 6% Sinking fund

Curve C Straight line

Curve D 12.5% Declining balance

Curve E Multiple straight line with 75% of cost written-off in the first half of useful life

Curve F Multiple straight line with 100% of cost written-off in the first half of useful life

The asset is worth \$ 1,000 with a useful life of 20 years.

There are various considerations that should be weighed whenever a choice has to be made among the various methods approved by the income tax law authorities. The comparative tax benefit is a factor to be considered. Accelerated methods of depreciation result in an increased tax advantage so long as the business continues to expand indefinitely and increase the gross amount of depreciable assets. Another factor is that if the earning power and efficiency of the asset fall with the passage of time, and repairs and maintenance increase each period, it would be then more logical to adopt accelerated methods of depreciation. When efficiency declines and the earning power is reduced, the straight line method will result in an unreasonable matching of costs and revenues; since it is based on the assumption that each period receives equal benefit. The usefulness of the asset should also be considered. A specialized asset, after two years of operation might turn to be useless or obsolete, although its useful life is es-

timated to be five or more years. In this case, accelerated methods of depreciation are strongly recommended. The effect of the depreciation charge on business decisions should also be weighed. Different depreciation methods have different effects on policies relating to retirement or acquisition of new assets, decisions on selling prices, decisions on distribution of profits, etc...

Proponents of accelerated methods of depreciation claim that " engineering economy studies for proposed new assets commonly recognize that if capital invested in fixed assets is to be recovered at all, a large part of it must be recovered in the early years of life of the assets." (1)

Depreciation accounting by itself does not generate funds. If for example total revenue is \$ 100 and total costs (excluding depreciation) are \$ 90, funds available will be \$ 10 whether the depreciation charge is \$ 10 or \$ 20. Therefore, " funds are provided by revenues, not by the act of accruing cost, and the volume of funds received from customers is not directly affected by the level of depreciation charges booked (excepting production under cost-plus contracts and other special situations)." (2)

For reasons mentioned earlier, accelerated methods of depreciation yield a better measure of depreciation cost.

1. Ibid. p.378.

2. W. A. Paton and W. A. Paton Jr., Asset Accounting, N.Y., The Macmillan Co., 1952, p.p.325-26.

The following comments made by officers participating in the study made by the National Association of Accountants support these view points. (1)

" The sum-of-years digits method was adopted since it provides a more rapid recovery of the cost of fixed assets and because it is our belief that it most nearly reflects the actual annual loss in plant values. "

" Previously, tax depreciation was always too low. Depreciation by the sum-of-years digits method is considered reasonably correct. "

" The declining balance method reflects the fact that obsolescence is more important than physical life of assets as a factor in depreciation. This is true despite the fact that technological changes have been fewer in this industry than they have in many others. "

" Accelerated depreciation balances off disproportionately rising maintenance costs. "

No doubt, early recovery of cost makes expansion easier. Accelerated methods of depreciation, by amortizing the depreciable asset at an earlier time than does the straight-line method, may enable the business to replace its assets at a faster rate than one whose assets are not fully amortized. Also early recovery of cost lessens the risk that total

1. National Association of Accountants'
Research Report, op.cit. p.22

cost will not be recovered. The tax benefit should also be considered. As was mentioned earlier in this chapter, " tax savings attributable to election of depreciation methods made available by the Revenue Code of 1954 are retained in the business indefinitely unless partial or complete liquidation of investment in depreciable assets occurs." (1)

For the above mentioned reasons, many U.S. companies switched to the accelerated methods of depreciation eligible under the Revenue Code of 1954. " The case for a more rapid write-off in the early years is sound both for income tax purposes and for purposes of business accounting regardless of inflation. But the existence of price-level changes strengthens the case even further. This is particularly true in a period of high income taxes." (2)

Once the method of allocation has been selected, and the service life has been estimated, the determination of periodic costs of depreciation becomes a simple mathematical operation. In the preceding paragraphs, the methods of allocation were described, and the formulae for calculating depreciation charges were explained. In the following paragraphs, some of the comments on these formulae will be presented and there is no intention of going into the details of calculating the depreciation charges under various methods.

1. Ibid. p.15.

2. Grant and Norton Jr., op.cit. p.389.

The British economist, J. R. Hicks, says that depreciation and other related concepts are " not logical categories at all; they are rough approximations, used by the businessman to steer himself through the bewildering changes of situation which confront him. " (1) A firm functions in an economy which is characterized by unforeseen changes in prices, technology, rates of production, and consumer preferences. Therefore, the depreciation charge is calculated in a manner which roughly takes into consideration the " bewildering changes " stated above.

The cost of a depreciable asset is distributed to periods on the basis of rigid formulae. Many claim " that most fixed asset cost is in some degree misallocated and there is not much which can be, or at least is likely to be, done about it. " (2)

Accountants realize that the uses of these formulae are " a necessary but unrealistic and probably inadequate substitute for any really scientific approach to the problem of fixed asset allocation. " (3)

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1. J. R. Hicks, Value And Capital, 2d. ed., Oxford, Clarendon Press, 1946, p.171.
 2. Robert R. Milroy, and Robert E. Walden, Accounting Theory And Practice, Cambridge, Mass., The Riverside Press, 1960, p.314.
 3. Ibid.

CHAPTER III

OBJECTIVES OF ACCOUNTING FOR DEPRECIATION

It is the purpose of this chapter to show that accounting for depreciation has the objective of amortizing original cost over useful life in a systematic and rational manner. Recent studies show that business men have quite different and heterogeneous concepts of accounting for depreciation. The reason for this is probably that depreciation accounting is being asked to serve too many purposes. Some businessmen claim that the objective of depreciation accounting is to maintain plant property at a high level of efficiency, others maintain that it should provide funds for replacements, while others maintain that depreciation accounting should keep capital intact and so on.

Who is to blame for this confusion? Probably it is the accountants who are to blame because of their use of the term "reserve for depreciation." The account "reserve for depreciation" and which was recently changed into "accumulated or allowance for depreciation" is the source of the confusion. "Reserve for depreciation" to the layman, may imply an accumulation of funds set aside for replacement. This is absolutely wrong. The amount of "allowance for depreciation" represents only the amortized cost of the asset.

Financial Accountants' point of view.

It should be clear by now that the primary objective of

accounting for depreciation from the majority of financial accountants' point of view is the allocation of original cost. The depreciable asset is similar to a prepaid expense or insurance policy, in that the accounting problem is to allocate or amortize the cost as a charge to operations over the useful life of the asset.

The purpose of accounting for depreciation is not for replacement. " The problem of financing the operations of a business is of course, an important and serious one, but it should not be confused with the problem of measuring the periodic net income of a business. " ⁽¹⁾ Depreciation and replacement are totally independent of each other. They are connected only in the sense that replacement would not be made if assets did not depreciate.

If a business acquires an eight year leasehold for \$ 16,000 and after five or six years it becomes evident that to renew the leasehold will cost \$ 20,000. It is doubtful if any body could argue that the rent expense for the first eight years should total \$ 20,000. By the same token, if an asset is to be replaced by another one costing a higher amount, we cannot say that depreciation accounting should have provided for this increase in cost. If replacements are to be made, then the increased costs should be met from additional capital

1. Carman G. Blough, ed., " Accounting And Auditing Problems ", The Journal of Accountancy, July 1958, p.79.

funds acquired from owners or creditors. " Depreciation was never meant as an accounting device to provide additional new capital for the enterprise but has been merely an accounting technique formulated to spread the original cost of the investment in fixed capital over its useful life. " (1)

Original cost is considered to be the most objective base for calculating depreciation charges. Any departure from original cost will give rise to value judgement and confusion. Accounting is concerned with recording only facts and nothing is more close to facts, in this case, than original cost.

In 1938, The National Bureau of Economic Research in the U.S.A. carried on a research study on capital consumption. Results of the research study showed that out of the 125 companies participating in this study, over 80 per cent used original cost as a base for amortization while the remainder used a revalued base. (2) In another research study carried on by the Massachusetts Institute of Technology, between 1952-54, results were quite different. " The response from accountants and controllers on this point was somewhat less indicative but, even in this group, less than twenty-five

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1. Harold G. Avery, " Economic Value vs. Original Cost - A Discussion Of Bases For Calculating Earnings, " N.A.A. Bulletin, Feb. 1959, p.9.
 2. Robert G. James, " What Do Executives Think Depreciation Is ", N.A.C.A. Bulletin, May 1954, p.1140.

per cent held to a concept of depreciation based on original cost. " (1) This shows clearly that there are some accountants who do not hold that the objective of accounting for depreciation is to amortize cost although in practice they adopt the original cost concept being influenced by regulatory agencies and independent auditors' opinions.

Non-Financial Accountants' point of views.

Non-Financial accountants, on the other hand, have quite different and heterogeneous ideas about the objectives of accounting for depreciation. The reason is that each business executive looks at depreciation from a different point of view. Results of the research study carried on by the Massachusetts Institute of Technology are tabulated below. There were thirty-four corporate presidents, vice presidents and treasurers, none of whom believed the purpose of depreciation was to amortize original cost.

Table 4

Concepts of Depreciation

Held by 52 Executives in 18 American Corporations.

	Historical Cost	Productive Capacity	Competitive Capacity	Change In Value	Real Inv.
<u>Total</u>	4	21	7	7	13
Accountants & Controllers	4	5	1	5	3
Presidents, Vice Presidents and Treasurers.		16	6	2	10

Source: N.A.C.A. Bulletin, May 1954, p. 1139

1. Ibid.

Productive Capacity:

Of the fifty-two executives, twenty-one believed that depreciation should provide enough funds for maintaining the "productive capacity" of the business. Five accountants were in this group and made this remark: "Our firm is a going concern; we don't intend to liquidate and depreciation should replace the assets we use up in operations so that we are able to continue our usual level of production." (1)

(Assistant Controller of a Farm Equipment Manufacturing Co.)

Here are two comments from the President-Treasurer group:

" Depreciation should measure the using up of our capacity to produce electric power. " (2) (Vice-President of an Electric Utility.)

" The provision for depreciation is a means of relating the cost of the renewal of the productive facilities to income. " (3) (Treasurer of a small Chemical Company)

The economists also support the productive capacity theory. " ... only after management has set aside enough of current income to maintain the productive capacity of the enterprise does it have funds which may properly be regarded as available for dividends, higher wages or lower prices. " (4)

1. Ibid. pp.1140-41.

2. Ibid. p.1141.

3. Ibid.

4. U.S. Congress, Report of a subcommittee of the joint committee on the Economic Report on Profits Hearings, 80th Congress, 2nd Sess., (Washington, U.S. Government Printing Office, 1949), p.48. As quoted by James, op.cit. p.1141.

As was shown in table 4, support for the productive capacity theory also comes from a number of accountants.

It is to be noted that proponents of this theory never speak of measuring productive capacity or accounting for the complications which would arise due to changes in techniques of production. It can be concluded that although in most cases original cost is used as a base for accounting for depreciation, the prevalent conception of depreciation is that of physical erosion of productive capacity.

Competitive Capacity:

Seven executives believed that the purpose of accounting for depreciation was to maintain the competitive capacity of the business. " This could be interpreted as maintaining durable assets at such a level in form and efficiency that the firm could continue to maintain its relative competitive status. " (1)

This concept has some background in economic theory. Economists define income as the maximum amount that could be distributed to stockholders and still leave the business as well off as before. If the " as well off as before " is interpreted as maintaining the competitive capacity of the business - and this was the understanding of the advocates of this theory - then their reasoning is in conformity with that of the economists.

1. James, op.cit. p.1143.

Here is an example of the remarks given by proponents of this concept:

" I believe our company should retain money from earnings to insure, at the least, that our machinery and equipment will be modern enough to enable us to retain our relative status in the industry. This should be done through depreciation, but of course, it isn't. If we don't, we are liable to go the way of a New England Cotton Industry." (1)
(President of a New England Machinery Manufacturing Company.)

There is some support for this concept in the literature on depreciation. Arthur S. Dewing, in his financial policy of corporations, says:

" The proprietors of the business do not ordinarily want the return of their investment in the form of cash; they want the continuing earning power of their investment... The maintenance of the original investment is not achieved by merely writing off, through successive earning periods, the money cost of the original investment. It is achieved only if the wearing and the aging parts of the permanent property are gradually replaced by new equipment having an equal or greater earning power. To accomplish this purpose the annual allowances for depreciation, based solely on original cost, must be supplemented by additional allowances adequate to permit the accumulation of a fund, through the years,

1. Ibid.p.1143.

sufficient to defray the additional cost of new equipment of improved design even though the general price level has risen." (1)

It is to be noted that many business executives believe that the aim of depreciation accounting is to maintain the earning power of the business. However, no objective method has been arrived at by proponents of this theory that will provide enough depreciation charges to maintain the competitive capacity of the business.

Change in Value:

Seven executives fell within this group. Five of them were from the accountant-controller group and were typified by this remark:

" ... depreciation measures the expiration in value of assets which must be recovered from income." (2) (Depreciation accountant in an electric utility.)

The accountants and controllers group favor an original cost interpretation of value while the other executives understood value in physical terms.

Real Investment:

Thirteen executives, who fell within this group, believed the aim of depreciation accounting was to recover real cost.

1. Arthur S. Dewing, Financial Policy of Corporations, 5th. ed., Vol. 1, New York, The Ronald Press Co., 1953, pp.589-90.
2. James, op.cit. p.1145.

One executive gave this remark:

" Depreciation as now calculated bears no relation to actual costs. To properly determine income a business should deduct real dollar cost from revenues... This might be called replacement cost but I would call it the current purchasing power of capital used up." ⁽¹⁾ (Treasurer of a retail drug chain.)

Economists also believe that depreciation based on original cost should be adjusted for the change in the purchasing power of money.

Proponents of the real investment concept claim that, in a rising price level, it is unfair to calculate depreciation based on original cost unless it is adjusted upward. Index numbers were proposed to make the adjustments, but there is disagreement as to the type of price index that should be adopted in reexpressing original cost in terms of real cost. It is argued that income should not be claimed before the purchasing power of the money invested has been maintained.

Conclusion:

In this chapter, an exposition of the various concepts of the objectives of depreciation accounting has been made. Results of the research study carried on by the Massachusetts Institute of Technology showed that none of the business executives interviewed believed the aim of depreciation accounting

1. Ibid. p.1145.

was to amortize original cost. Their complaint was that depreciation charges were too low to provide for replacements. Ralph C. Jones, in his book " Effects of Price Level Changes," says that depreciation charges are too low not because of any relation with current replacements, " but rather because the postinflation dollars in which costs are recovered have substantially less value than did the preinflation dollars in which the costs were incurred... When businessmen say that depreciation is inadequate because it doesn't provide for replacements, they are simply taking an easy short-cut which avoids the complications of a full explanation." (1) Therefore, replacements cannot be accepted as a measure of the adequacy of depreciation charges.

However, it is important to note that depreciation practices, in the United States and in many other countries, are based on original cost and theories held differ substantially from practices adopted.

1. Ralph C. Jones, Effects of Price Level Changes on Business Income, Capital and Taxes, New York, American Accounting Association, 1956, p.81.

CHAPTER IV

PRICE LEVEL CHANGES IN THE U. S. A.

Introduction:

Since inflation has become a universal phenomenon, the term is heard more and more often in every day language. Over the past two decades, the purchasing power of the dollar in the United States has been halved, in England the British pound buys about 40 per cent of ^{what} it would have bought in 1937, and in Brazil the purchasing power of the cruzeiro is about 7 per cent of what it was twenty years ago. (1)

Much of this world wide inflation has occurred during the post war period. The following table presents the falling value of money in a sample of countries.

Table 5

The falling value of money 1946-56

<u>Country</u>	<u>Value of money</u>		<u>Annual rate of depreciation</u>
	<u>1946</u>	<u>1956</u>	
Switzerland	100	86	1.5%
Germany	100	72	3.2
India	100	72	3.2
United States	100	71	3.4
Venezuela	100	70	3.5
Netherlands	100	67	4
Canada	100	65	4.2
Sweden	100	65	4.2
United Kingdom	100	65	4.2
France	100	58	6.5
Mexico	100	47	7.4
Brazil	100	26	12.7

Source: G. L. Bach, Inflation, Rhode Island, Brown University Press, 1958, p.2.

1. Ibid. p.1.

The term "inflation" has acquired several meanings and a clear explanation of its meaning seems to be warranted in this paper. However, the intention is not to go deep into the economics of inflation, since this is considered to be outside the scope of this paper. In simple terms, inflation can be defined as the disequilibrium between the volume of money and credit on the one side and the volume of production of goods and services on the other side. If the volume of money and credit is greater than the volume of goods and services produced, then we have a state of inflation. On the other hand, if the volume of money and credit is less than the volume of goods and services produced, a state of deflation will set in. Phrases like, "too much money chasing too few goods", and "fall in the value of money", indicate the meaning of the word "inflation".

Past changes in the price level:

The beginning of price level changes in the United States can be traced back to 1915, during the first world war. Before that period, prices were relatively stable. The general level of prices between 1880 and 1915 was about 65 per cent of the 1926 level. (1)

In 1913, the consumer price level index was 42.3 per cent

1. Merton Backer, ed., Handbook of Modern Accounting Theory, N.Y., Prentice-Hall, Inc., 1955, p.251.

of the 1947-49 average. ⁽¹⁾ However, with the advent of the war, consumer prices began to creep upwards until it reached a peak of 85.7 per cent in 1920. ⁽²⁾ Between 1921 and 1929, there was a period of relative stability. Starting with 1930, a depression set in, whereby prices dropped back to about the 1915 level. In 1933, the consumer price level index declined to a level of 55.3 per cent of the 1947-49 average. ⁽³⁾

Starting with 1935, hostilities began among the great powers and this culminated in the second world war. Prices continued to rise, until 1948, when the wholesale price level index reached to 160 per cent of the 1926 level. ⁽⁴⁾ Then there was a short decline as the war economy began to fade away. With the advent of the Korean War, prices rose to a new and even higher level. The consumer price level index rose to 114.8 per cent in 1954, fell slightly in 1955, and averaged 123.5 per cent of the 1947-49 average in 1958. ⁽⁵⁾ From 1940 to 1952, the average annual rate of price level rise was about $5\frac{1}{2}$ per cent. ⁽⁶⁾

What is the trend that we are likely to expect in the

1. Thorston Sellin, ed., Inflation, Philadelphia, The Annals of the American Academy of Political and Social Science, Vol. 326, Nov. 1959, p.7.

2. Ibid.

3. Ibid. p.5.

4. Backer, ed., op.cit. p.252.

5. Sellin, ed., op.cit. p.5.

6. Jones, op.cit. p.49.

future? Probably, it will be an upward trend and there are some strong factors that support such a prediction. The threat of war is one important factor. The United States is in a quasi-war economy, whereby, every year, large spending programs are undertaken on war projects to maintain its power. The other important factor is that control over wages has become very weak. Labor Unions in the United States are so strong that it is doubtful if the level of wages will be reduced in the future. It is worth remembering " that labor leaders now exercise the unfettered power to create continuous spirals of inflation." ⁽¹⁾ To control inflation, wages should be controlled since they are the most important factors in the control of the amount of money put into circulation. " Treasury and Federal Reserve policies have always been ineffective precisely because they cannot directly reach the factors responsible for the flow of money income. They may indirectly affect the situation but only by positive restrictions of credit which impede productive operations." ⁽²⁾ In addition to the above mentioned factors, the large federal debt of the U.S. Government will be multiplied by deflation, and hence the government will do its best to avoid any large decline in price levels.

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1. Paul Grady, " Economic Depreciation In Income Taxation and in Accounting ", The Journal of Accountancy, April 1959, p.55.
 2. Harold Moulton, Can Inflation Be Controlled? Washington, D.C., Anderson Kramer Associates, As quoted by Grady, op.cit. p.55.

Actually, no one is in a position to know what the future will bring - inflation, a relatively constant price level, or deflation. However, since the beginning of this century, the rise in the general price level has been at the rate of 2 per cent on the average and for the past fifteen years has been a little over 5 per cent a year. (1)

" A conservative estimate of the probable rate of price level rise would be $1\frac{1}{2}$ to 3 per cent. The evidence in favor of such a trend, while not conclusive, is certainly more convincing than that which indicates a stable price level and a constant value for the dollar." (2)

Measurement of price level changes for depreciable assets:

The best available method for measuring the changes in prices is through index numbers. An index number is simply defined as an indicator of the relative level of prices at a particular date compared with the figure 100 ruling at a period taken as standard.

There are various price indices, and each one is built for a special purpose. Thus, if the purpose is to measure the changes in consumer prices, a consumer price level index will serve best that purpose. On the other hand, if the aim is to measure the general movement of all prices, a general price level index will best fit that end.

1. Jones, op.cit. p.102.
2. Ibid. p.103.

However, it is important to note that not all prices move in the same direction. Some prices move upwards and some move downwards, and if prices move in the same direction, they do not follow the same trend. Prices of industrial machinery and prices of construction materials might be both moving upwards but each one at a different rate.

The problem of measuring the changes in prices of depreciable assets is an everlasting one. This is so, because prices of depreciable assets change not only because of changes in the price level, but also because of changes in quality and technology of the depreciable asset which are difficult if not impossible to measure. In this respect, Solomon Fabricant says: "As for price changes, variation among them is more considerable than most people suppose. It is one of the reasons why a single or general price index for putting original costs onto a replacement-cost basis cannot be wholly applicable to all types of industries." (1)

The movement of the prices of depreciable assets must be measured if replacement cost depreciation is to be arrived at. Changes in the prices of depreciable assets may be the

1. Solomon Fabricant, "The Varied Impact of Inflation on the Calculation of Business Income", Current Business Studies, March 1949, p.20. As quoted by E. C. Brown, Effects of Taxation Depreciation Adjustments For Price Changes, Boston, Division of Research, Graduate School of Business Administration, Harvard University, 1952, p.127.

result of one or more of the following: 1- change in nominal price without change in quality, 2- change in quality without change in price, or 3- changes in quality and price.

If there is a change in the nominal price without a change in quality, this change could be measured very easily through index numbers. However, there is no general index that is applicable to all depreciable assets. The use of a general index to adjust historical cost depreciation has its deficiencies for accounting purposes. " The accountant is faced with the task of making the adjustment for a specific corporation and the index should be derived from prices of the specific capital goods employed by the subject corporation. The use of aggregates may be misleading since the averaging technique may very well understate or overstate price changes in the capital goods employed by a specific company." (1)

The second difficulty encountered in measuring price changes of depreciable assets is how to account for quality changes. In many cases, a change in the price of an asset is partly due to a change in quality. A 1955 truck is different from a 1961 truck in power, durability, capacity, and efficiency. Hence, we cannot attribute all the difference in the prices of the two trucks to the change in the price

1. Michael Schiff, " Application of the Price Index Adjustment Concept to Depreciation Charges ", N.A.C.A. Bulletin, April 15, 1949, p.932. As quoted by Brown, op.cit. p.127.

level. Part of this change in prices is due to improvement in quality. An improvement in quality without a change in price is equivalent to a reduction in price, in real terms.

No doubt, technological changes, nowadays are taking place almost in all industries and at the present, no objective way has been found to measure changes in quality. So long as quality changes in depreciable assets cannot be measured effectively, the problem of determining replacement cost depreciation remains to be a troublesome one.

What kind of price level index should be used to measure replacement cost depreciation? It all depends on the desired level of accuracy. If the purpose is for determining taxable income, then a reasonably accurate price level index should be developed. In this case, the index should be built on an individual firm basis, since, as was mentioned earlier, capital goods do not all move in the same direction. Moreover, the fact that quality changes are constantly taking place makes adequate measurement of price changes almost impractical.

Effects of price level changes on depreciable assets. (1)

This section is written with the sole purpose of

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1. The charts, tables, formulae, and some of the discussion in this part is largely based on Jones' Effect of Price Level Changes, c. IV.

showing the impact of price level changes on depreciable assets. The question of whether price level changes should be given accounting recognition or not, will be discussed in a latter chapter.

Depreciation based on original cost will result in an overstatement of profits during a period of price level rise. The reason is " because the postinflation dollars in which costs are recovered have substantially less value than did the preinflation dollars in which the costs were incurred." ⁽¹⁾ Conventional accounting techniques do not reflect the fluctuations in the purchasing power of the monetary unit. If, for example, an investor in 1945 bought a government bond for \$ 800, in 1955 the government will pay him \$ 1000. This extra \$ 200 is a profit from the accounting point of view, but if the general price level in 1955 becomes 50 per cent higher than in 1945, then the investor from a realistic point of view has sustained a loss. This loss is accentuated even further by the income tax imposed on the accounting profit of \$ 200.

The unit of measurement used by the accountant for the purpose of recording and interpreting financial statements, unfortunately, has proved to be an unstable one. If one were to draw a graph of the purchasing power of the dollar

1. Ibid. p.81.

in the United States over the past fifty years, the result would show a long term upward trend in prices and a long term downward trend in the purchasing power of the dollar. The dollar, as a result of the fluctuations in the general price level, is likely to become a unit of different caliber. To add dollars of different calibers is like adding potatoes and apples. " ... The case is clear, and yet there are accountants who maintain as an infallible rule of their profession that the value of all assets must be stated in terms of their cost in dollars and that no account may be taken of the changes in the value of money. Does this sort of accounting perform its true function, which is to account to the owners for all changes in values which occur within the business? Mere accounting for the dollar marks on books does not give owners a true accounting of the value of their property, because the measure of value, the dollar, is constantly and at times rapidly changing." ⁽¹⁾ Therefore, if financial information is to be correctly recorded or compared, the unit of measurement must be homogeneous.

What is the impact of a price level rise on the adequacy of depreciation charges? Currently, depreciation charges are

1. S. Dubrul, " Accounting for Values or Dollars ", Management And Administration, X, 6, Dec. 1925, p.338. As quoted by H. Sweeney, Stabilized Accounting, N.Y. and London, Harpers & Brothers Publishers, 1936, p.10.

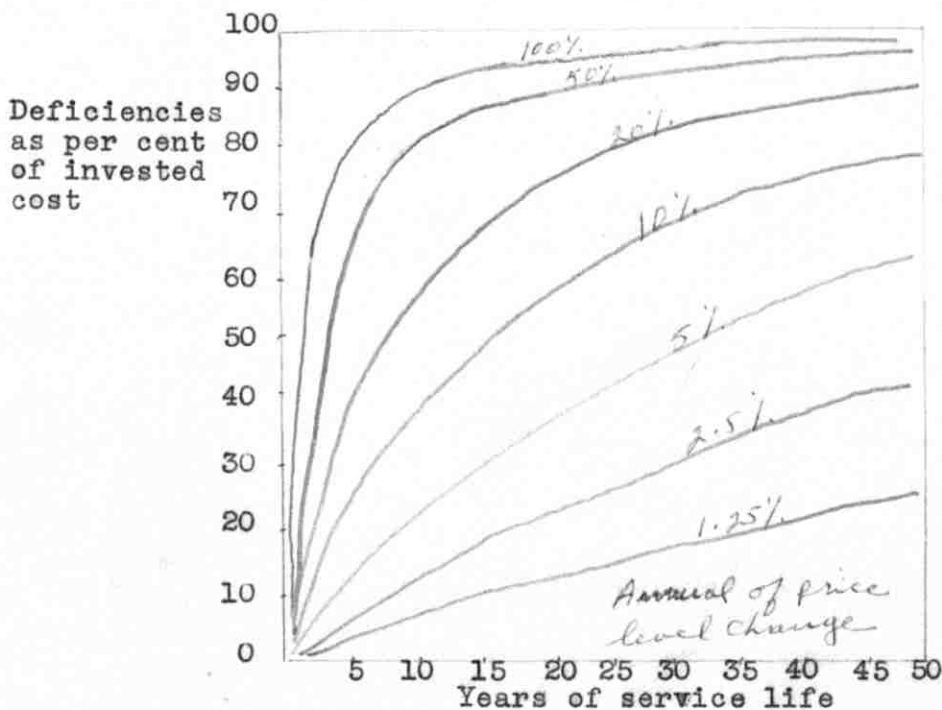
based on original cost. If the purchasing power of the dollar declines, then " there is a depreciation deficiency in the sense that the amount of revenue labeled as a return of capital represents a smaller amount of purchasing power than was originally invested in the asset." (1) To avoid any misinterpretation the following hypothetical case is illustrated. Suppose an asset is acquired at a cost of \$ 50,000 with an estimated useful life of ten years and has no scrap value. The annual depreciation charge, on a straight line basis, will be \$ 5,000. Assuming the dollar remains stable in value and assuming also total annual revenue is \$ 10,000, then \$ 5,000 will be net income and the other \$ 5,000 will be a return of capital, irrespective of the replacement cost of the asset. Let us assume now, for simplicity's sake, that the dollar loses fifty per cent of its purchasing power in the next year. Under conventional accounting techniques, the same result will still be reported, that is \$ 5,000 as net income and \$ 5,000 as a return of capital. If the purchasing power of the \$ 50,000 dollars investment should be maintained, then all the revenue of the second year should be considered as a return of capital and none should be reported as profit. The depreciation deficiency is the difference between the purchasing power

1. Jones, op.cit. p.45.

of the historical cost dollars and the purchasing power of an equal amount of current dollars. Assuming revenues remain constant, as the depreciable asset gets older the ratio of revenue to real depreciation cost decreases until the asset is retired whereby the amount of capital recovered

Chart II

Purchasing Power Deficiencies in Straight-line Depreciation Charges Over Whole Service Lives of Assets



Source: Ibid. p.47.

becomes very small. Replacement deficiencies, on the other hand, are different from depreciation deficiencies in that the former denote the amount of additional capital needed at the time of replacement and it is not necessary that both should be equal. Chart II and table 6 present the purchasing power deficiencies in straight line depreciation charges during all the useful lives of assets based on the presumption that the salvage values are nil and the general price level is rising at a constant rate.

Table 6

Total Purchasing Power Deficiencies in Straight-line Depreciation Charges Over Whole Service Lives of Assets as Percentage of Invested Cost When Net Salvage Value is Zero and the Price Level Rises at a Uniform Rate.

Deficiencies When Annual Rate
Of Price Level Rise Is

Service Life in Years	1½%	2½%	5%	10%	20%
5	3.6%	7.1%	13.4%	24.2%	38.6%
10	6.5	12.5	22.8	38.6	57.4
15	9.3	17.5	30.8	49.2	68.5
20	12.0	22.1	37.7	57.4	75.5
25	14.6	26.3	43.6	63.7	80.2
30	17.0	30.2	48.8	68.5	83.4
40	21.7	37.2	57.1	75.5	87.5
50	26.0	43.3	63.5	80.2	90.0

Source: Ibid. p.48.

The formula for calculating depreciation deficiencies under the straight line method is the following when salvage value is assumed to be zero.

$$D = 1 - \frac{1 - (1 + P)^{-n}}{nP}$$

D = The purchasing power deficiency

n = Service life in years

P = Annual rate of price level rise

Two important factors enter into the calculation of the purchasing power deficiencies: the useful life of the asset and the rate of the general price level rise. With assets whose service life is 5 years, the rise in the depreciation deficiency is almost proportional to the rise in the rate of the price level change. Changing the rate of price level rise from $2\frac{1}{2}$ per cent to 5 per cent, increases the depreciation deficiency from 7.1 per cent to 13.4 per cent for an asset whose service life is 5 years. However, this doubling process cannot proceed without limit, since the total depreciation deficiency cannot surpass the total cost irrespective of the rate of the price level rise. Hence the rise in depreciation deficiency, percentage wise, becomes less than proportional, when the rate of price level rise is more than 10 per cent.

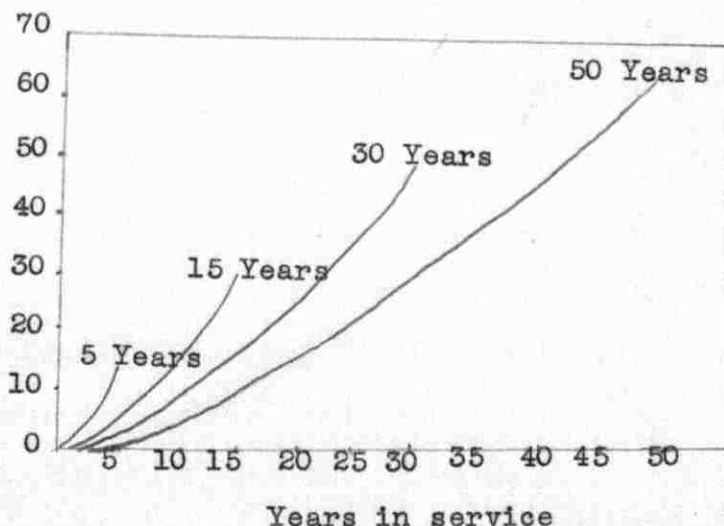
With reference to long lived assets, the total depreciation deficiencies will be greatly affected when the rate of price level change is very low. If an asset has a useful life of 50 years, and the rate of price level rise is $2\frac{1}{2}$ per cent, the cumulative depreciation deficiency will be 43.3 per cent of original cost. However, if the price level increases

from $2\frac{1}{2}$ to 20 per cent, that is 8 times, the cumulative depreciation deficiency increases from 43.3 per cent to 90 per cent, that is a little more than double. It is important to note that for long lived assets, the purchasing power deficiencies form a significant proportion of original cost when the rate of price level rise is low. If the rate of price level rise is $2\frac{1}{2}$ per cent, (the average rate of annual price level rise in the United States from 1940 to 1952 was about $5\frac{1}{2}$ per cent) then the cumulative depreciation deficiency on a 50 year asset is 43.3 per cent.

Chart III

Cumulative Purchasing Power Deficiencies in Straight-line Depreciation Charges As Percentages of Invested Cost Based on a 5 Per Cent Annual Price Level Rise.

Per Cent of
Invested Cost



Source: Ibid. p.50.

Chart III shows the cumulative depreciation deficiencies based on a 5 per cent price level rise every year. An asset with a useful life of 5 years has a depreciation deficiency of 13.4 per cent of original cost, while an asset whose service life is 15 years has a deficiency of 30.8 per cent, and an asset with a useful life of 30 years has a deficiency of 48.8 per cent, and an asset with a useful life of 50 years has a deficiency of 63.5 per cent.

Under the straight line method, the periodic depreciation charge is constant all over the useful life of the asset. If the value of the dollar is continuously declining, then more depreciation deficiencies will result in the charges of the succeeding years, as is shown in chart III. " The relatively low deficiencies in the early years suggest at once the use of some method of rapid write-off as a means of avoiding the large deficiencies which accrue in later years." (1)

The use of accelerated methods of depreciation will result in a reduction in the total purchasing power deficiency, but this reduction is relatively small. The formula for calculating the depreciation deficiency under the declining balance method will be: the rate of price level rise (P), divided by the declining balance rate (f), plus

1. Ibid. p.49.

the rate of price level rise (P).

$$D = \frac{P}{(f + P)}$$

To give a clearer picture of the differences in the purchasing power deficiencies under the straight line and declining balance methods, table 7 is presented. It is evident from this table that unless the rate of write-off is very rapid, that is much more than double the straight line rate, the reduction in the purchasing power deficiency would be relatively small.

Table 7

Total Purchasing Power Deficiencies in Declining Balance (DB) and Straight-line (SL) Charges As Percentages of Original Cost.

Service Life In Years	Deficiencies When Annual Rate Of Price Level Rise Is			
	2½ Per Cent		5 Per Cent	
	DB	SL	DB	SL
5	5.9%	7.1%	11.1%	13.4%
10	11.1	12.5	20	22.8
20	20	22.1	33.3	37.7
25	23.8	26.3	38.5	43.6
40	33.3	37.2	50	57.1
50	38.5	43.3	55.5	63.5

Source: Ibid. p.52.

In all the previous illustrations, salvage value was neglected and the reason for this is that it has little effect on the amount of depreciation deficiencies. Moreover, if salvage value comes into consideration, then the problem

of calculating the depreciation deficiency becomes indeed a very intricate problem. Realized salvage value and estimated salvage value rarely coincide with each other. If the realized salvage value is more than the estimated salvage value, then the total depreciation deficiency will be reduced and vice versa. The effect of salvage value is so small that it could be disregarded.

Conclusion:

In this chapter, a survey of the movements of the general price level in the United States over the past fifty years was presented. It was made clear that it would be illogical to expect a period of price stability in the future since the past has never witnessed a period of price stability. Factors in favor of an inflationary trend were found to be very powerful.

The problem of measuring price level changes for depreciable assets was also discussed. Improvement in quality of depreciable assets was the only obstacle facing any attempt to measure price level changes with reasonable accuracy.

In the last part of this chapter, the effects of a rise in the price level on depreciable assets were illustrated. In measuring the depreciation deficiency, two factors were found to be of significance: the rate of price level rise and the service life of the asset.

Accelerated methods of depreciation, although reduce

the amount of purchasing power deficiency, as compared with the straight line method, the reduction is very small.

The problem of measuring price level changes and its effects on depreciable assets and business profits is really an intricate problem. The significant effects of inflation on business profits combined with high income tax rates make it difficult for companies to earn for their investors, under present accounting techniques, a fair real rate of return.

CHAPTER V

METHODS PROPOSED TO ADJUST FOR AND MINIMIZE THE EFFECT OF PRICE LEVEL CHANGES.

During the last decade, numerous proposals have been made to adjust for and minimize the effect of price level changes. The cry for reform came from many people within and outside the accounting profession. advocates of the theory that depreciation charges should be adjusted to reflect the changes in the price level claim that, without adjustments, the capital of a business cannot be conserved. They contend that present depreciation methods do not reflect the changes in the purchasing power of the currency unit and hence result in an overstatement of profits and dissipation of capital. No doubt, overstated profits mislead management, owners, creditors, tax law authorities, labor unions, and many other parties interested in the business.

If there were no income taxes, overstated profits, as a result of the use of historical cost depreciation, could be left in the business. However, since a large proportion of the overstated profits are paid out as income taxes, then, it is not possible that the entirety of such profits would be left in the business.

In the following paragraphs, the various proposals to adjust for all or part of the additional depreciation

charge caused by inflation are presented.

Single adjustment:

This method is the simplest of all ~~other~~ methods. It requires one single adjustment, whereby all assets acquired before, say 1942, will be increased by a flat surcharge of 50 per cent. Assets acquired between 1942-50 will be increased by a lesser rate and so on. The periodic depreciation charges will then be based on the revalued bases. Although this method looks to be very simple and practical there is much opposition to it. This method results in great inequity among owners of depreciable assets; because these owners will be treated as if they had installed the assets all at the same date and the same price level. Also this method lacks flexibility and requires continuous adjustments. The single adjustment approach is recommendable, whenever a country, after experiencing a sharp rise in the general price level, expects price stability for a relatively long time.

(1)

Periodic adjustments:

Numerous proposals have been made for continuous adjustments. This method calls for the conversion of the original cost to current cost. The method of conversion is very simple and is expressed in the following formula:

1. Grady, op.cit. p.57.

$$\frac{\text{Original Cost}}{\text{Years of Life}} \times \frac{\text{Current Price Index}}{\text{Index at Time of Acquisition}} = \text{Current Cost}$$

Replacement Cost ?!

The only objection to this method is the kind of price level index that should be used. As was mentioned in chapter IV, no one price index represents the movements of prices of all depreciable assets. Proponents of this method believe that it is the obligation of an official agency or agencies to provide a suitable price index. If this method is adopted then it becomes necessary that when the price level declines, a downward adjustment must be made.

The question now arises as to what is the accounting treatment of the depreciation adjustment? There are various proposals for treating the additional depreciation charge and they are presented in the following paragraphs.

Table 8

Periodic Charges Under A Given Pattern Of Price Changes

Year	Price Index	Original Cost Depreciation		Current Cost	Allowance For Dep.
		Annual	Cumulative		
1	100	\$ 200	\$ 200	\$ 200	\$ 200
2	120	200	400	240	440
3	130	200	600	260	700
4	110	200	800	220	920
5	115	200	1000	230	1150

Table 8, illustrates the effects of price level changes on the annual depreciation charges of an asset acquired at a cost of \$ 1,000 and depreciated on a straight line basis.

The first procedure requires the restatement of depreciation expense, allowance for depreciation, and the asset account on a current cost basis. This could be best illustrated by an example. Suppose the ABC Company owns a building that cost \$ 1,000,000 and has been in operation for 10 years. The useful life of the building was estimated at 50 years and the total allowance for depreciation account to date, computed on a straight line basis, was \$ 200,000. After the 10th year the company decided to determine annual depreciation cost on a current cost basis and to convert the building account also on a current cost basis. If, after careful studies, the cost of replacement is \$ 2,000,000 , then the entries required to adjust the building account and allowance for depreciation account are:

Building-Adjusted to current cost	\$ 1,000,000
Building-Allowance for dep.(adjustment)	\$ 200,000
Capital stock-adjustment account	800,000

Since it is not fair to charge future periods with the loss in the depreciation charges prior to adjustment, it is possible to debit the retained earnings account, assuming it is sufficient, with the amount of adjustment related to past periods.

Retained earnings	\$ 200,000
Retained earnings-Reserve to cover increase in building cost	\$ 200,000

Frequent adjustments of depreciable assets are not desirable except when the price level change is extraordinary. If price changes are very low, adjustments similar to the above mentioned ones, involve much work and are not practicable.

The second procedure aims at restating the depreciation charge in terms of current costs while leaving the depreciable asset and the allowance for depreciation accounts at historical cost. (1) The excess of current cost over historical cost will be treated as an additional charge to depreciation expense and a credit to capital adjustment account. Thus the entry, on the basis of our previous example would be:

Depreciation expense	\$ 40,000
Allowance for depreciation-Building	\$ 20,000
Capital stock-Adjustment account	20,000

The third procedure is the best and most practical. (2) It involves first calculating depreciation on a current cost basis and measuring income also on a current cost basis, second adding back the excess of the depreciation charge to net income to arrive at income before taxes on an ori-

1. Paton and Paton Jr., op.cit. p.351.
2. Jones, op.cit. p.154.

ginal cost basis, third calculating net income after taxes on a conventional basis, and fourth charging the excess of current cost over historical cost to a capital adjustment account. The accounting treatment under this procedure is similar to the previous one. In this case, the income and surplus statements will show the whole picture without any complications in the asset account. This seems to be the simplest way to show the impact of price level changes on depreciation and net income.

The fourth and last procedure is the one that shows the amount of current cost as a footnote; while the accounts and statements are presented in the conventional form. This method is ~~only~~ useful for the analyst but for other purposes it is ineffective.

Reinvestment depreciation: (1)

This proposed method deals with the price level changes for depreciable assets on a basis similar to the LIFO inventory method. This method allows the taxpayer to deduct from his income statement the depreciation charge based on historical cost plus the price level adjustment. The price level deduction will be made only when the depreciable asset is retired from operations. The formula for calculating the price level adjustment would be the following:

1. Grady, op.cit. p.58.

$$\text{Original cost of depreciable asset} \times \frac{\text{Current price index}}{\text{Index at time of acquisition}} = \text{Amount of reinvestment depreciation}$$

Hence this formula would convert the original cost of a depreciable asset, by the use of a price index, into current cost. However, the taxpayer, in order to be entitled to the additional depreciation, must make new capital expenditures at minimum equal to the historical cost of the asset retired plus the amount of reinvestment depreciation. " Since retirements and new additions may not occur in the same taxable year, the reinvestment depreciation proposal would permit the taxpayer to have a carryover of retirement adjustments for two succeeding years." (1) This proposal is not restricted to replacements of specific assets, since the aim in the long run is to maintain the real capital of the enterprise.

The main criticisms advanced against this proposal are the following:

1. This method is designed to correct the adverse tax effects resulting from depreciation based on original cost; but it does not solve the problem of determining the cost of capital consumed in any one period.
2. It will be of little importance for newly established companies, whose rate of retirement is very low.

1. Ibid. p.58.

Liberalization of depreciation rates:

" A liberalization (of depreciation rates) ... would provide partial compensation for the fact that taxable profits are overstated due to the use of cost as a depreciation base." (1) Accelerated methods of depreciation, as was shown in chapter IV table 7, reduce the amount of depreciation deficiency, but in view of the maximum allowable rate of write-off in the U.S., this reduction is very small indeed. In the following table, a comparison of the percentages of cost written off by the declining balance and the sum of the years-digits methods will be shown. On long life assets, the sum of the years-digits will write off about twice the amount of straight line depreciation during the first year.

Table 9

A Comparison Of The Percentages Of Cost Written Off By The Declining Balance And The Sum Of The Years-digits Methods.

	<u>Declining Balance</u>	<u>Sum of the Years-digits</u>
First third of service life		
3-year assets	66.7%	50%
60-year assets	50.7	55.2
First two thirds of service life		
3-year assets	88.9%	83.3%
60-year assets	74.2	88.5

Source: Jones, op.cit. p.90.

1. Grant and Norton Jr., op.cit. p.389.

It is obvious from table 9 that on short lived assets, the declining balance method allows a more rapid write-off than the sum of the years-digits method. However, on long lived assets, the sum of the years digits method allows a more rapid write-off.

Accelerated methods of depreciation result in tax savings, and these savings can be easily measured. Assuming in one case the value of the dollar is constant, then the amount of taxes saved would be the difference between one dollar now and the present value of one dollar to be received after n years. This relationship can be expressed by the following formula:

$$1 - \frac{1}{(1 + i)^n}$$

If, however, the interest element is neglected the net advantage in an expected period of rising prices would be the difference between the value of the dollar now and its value after n years. The formula for expressing this relationship is similar to the previous one.

$$1 - \frac{1}{(1 + p)^n}$$

In this formula, p denotes the rate of annual price level rise. If both the rate of interest and the rate of price level rise are in effect, then they may be combined to show the impact of both factors. It is to be noted that the amount of tax savings resulting from the use of some

form of accelerated method of depreciation are relatively small if compared with the depreciation deficiencies resulting from a rise in the price level. " The depreciation deficiency computed by the combined declining balance and straight line method for a forty year asset is over 50 per cent when the price level rises 6 per cent a year, while the real net tax advantage of reducing charge depreciation is on the order of 5 or 6 per cent." (1)

Therefore, accelerated methods of depreciation, with a maximum rate of twice the straight line rate, do not close the gap in the purchasing power of the currency unit that result from price level changes except to a very limited extent. Critics of the conventional depreciation methods contend that taxpayers should be given more discretion in the determination of depreciation allowances. These critics claim that as long as the taxpayer applies depreciation schedules on a consistent basis and does not write-off more than the original cost, the government has nothing to worry about.

In this respect, Lewis H. Kimmel, states in his book, " Depreciation Policy And Post War Expansion ", the following in connection with liberalization of depreciation rates:

" The proposal for greater taxpayer discretion in depreciation allowances possesses greater merit than the other proposals-

1. Jones, op.cit. p.103.

large initial depreciation and double or accelerated rates on new investment - previously discussed. If approved, the indeterminate nature of depreciation would be recognized. A major source of disagreement between taxpayers and the Bureau of Internal Revenue would be largely eliminated. Greater discretion in depreciation allowances would stimulate investment, especially in the more venturesome undertakings. It would help to reduce the lag between technological improvements and their general adoption. For these reasons, it is believed this proposal should be favorably considered by congress and the treasury." (1)

Late in 1944, President Roosevelt, in an address in Chicago stated:

" I propose that the government do its part in helping private enterprise to finance expansion of our private industrial plant through normal investment channels.

For example, business, large and small must be encouraged by the government to expand their plants and to replace their obsolete or worn out equipment with new equipment. And to that end, the rate of depreciation on these new plants and facilities for tax purposes should be accelerated. That means more jobs for the worker, increased profits

1. Lewis H. Kimmel, Depreciation Policy And Post War Expansion, Washington, The Brookings Institution, 1946, pp.53-64. As quoted by Grant and Norton Jr., op.cit. p.364.

for the business man and lower costs to the consumer." (1)

The objections to this proposal are the following: First it will result in unexpected fluctuations in government revenues. The second objection to this proposal is that it may lead businessmen to make decisions motivated by the tax saving motive rather than sound business practice.

There are some accountants who refute the whole idea of accelerated depreciation as an incentive to investment. They claim that " it is unrealistic to consider " incentive " depreciation when we still do not have " realistic " depreciation - that is, depreciation adjusted for inflation." (2)

It is to be emphasized that accelerated depreciation is not the answer to the price level adjustment. In simple terms, accelerated depreciation deals with the amount of depreciation charges to be accounted for and does not recognize the change in the value of the currency unit.

Some post war measures adopted by some West European countries and other countries of the free world:

The problem of recognizing the price level changes in depreciation charges has received great attention by countries other than the United States. The reason for this is because these countries have been hit more severely by inflation.

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1. Quoted from a White House Press Release.
As quoted by Grant and Norton, op.cit. p.362.
 2. Morrissey, op.cit. p.16.

Japan, for example passed the Assets Revaluation Laws in 1950, 1951 and 1953 which permitted voluntary revaluation of the remaining book value of depreciable assets as of base dates. The price index used for adjustment, was furnished by the government of Japan and was the wholesale commodities price index. The base dates to show the fast movement in prices were January 1 of each 1950, 1951, 1952, 1953 and 1954. A six per cent tax was imposed on the revaluation and was payable within three years. Depreciation charges were calculated on the revalued base of the depreciable asset. These measures, however, solved the problem of past changes in the price level but left future changes unsolved.

" The miracle of West German economic recovery was sparked by a 50 per cent write-off the first year for manufacturers who replaced war-damaged plants. Expansion was so rapid that in 1955 the rate was cut to 20 per cent to curb too much spending on capital goods. The rate is still more than double that of the U.S.; it has helped make it possible for Germany to undersell the U.S. in many world markets." ⁽¹⁾

In France, upon assuming power, De Gaulle followed the Germans in modelling the depreciation charges. For example, if a depreciable asset has a useful life of three years, the French taxpayer can write-off up to 50 per cent of its original

1. " Tax Write-off Bonus How To Meet Foreign Competition ", Time, Oct. 3, 1960, p.60.

cost in the first year and for depreciable assets with a useful life of 10 or more years, the taxpayer can write-off no less than 25 per cent. ⁽¹⁾ The notion behind such liberalization of depreciation allowances is to provide an incentive for the French industry to modernize its assets rapidly.

In Sweden, there was a time whereby the government permitted total write-off of cost in the first year if companies wished to do so.

In the Netherlands, the Philips Company, one of the world's major industrial organizations, has applied replacement value method in financial reports to management and to stockholders. ⁽²⁾ The Philips Company does not recognize income for a period unless the capital of the business has been maintained. The replacement value of the asset is arrived at by determining the trend of the specific price levels. This implies that for each type of asset the trend of prices is determined separately and revaluation is regularly made by the use of index numbers. It is worth noting that adjustments are not made only on depreciable assets but also on inventories, investments and monetary assets.

In India, there is provision in the income tax law to

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1. Ibid.
 2. A. Goudekot, " An Application Of Replacement Value Theory ", The Journal of Accountancy, July 1960, pp.38-39.

encourage investments and the establishment of new industries. The taxpayer is given great latitude in determining the depreciation allowances. Depreciation rates range from seven per cent to twenty-five per cent on a declining balance basis. (1) Additional depreciation on newly acquired assets for a period of five years equal in amount to the normal depreciation is allowed. Also, if the full depreciation charge for any year is not absorbed by the profits of that year, the balance remaining may be applied against the profits of future years. Another attractive feature in the income tax law of India is the granting of a development rebate of 25 per cent of cost. This act was passed in 1955, whereby the taxpayer is allowed to depreciate the asset up to 125 per cent of the original cost.

Even in Great Britain, the most conservative country in regard to depreciation allowances among the Western European Countries, there was a departure from conventional accounting practice. A system of initial allowances had been initiated, whereby a taxpayer can deduct in the year of acquisition 15 per cent of the cost of an industrial building or 30 per cent of the cost of machinery and equipment. (2) The purpose behind such initial allowance is to reduce the book value of the asset on which depreciation is calculated. " The Small

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1. Herbert T. McAnly, " Recognizing The Deficiency Of Depreciation Provisions Based Upon Historical Costs", N.A.A. Bulletin, Feb. 1958, section I, p.14.
 2. Morrissey, op.cit. p.17.

Business Tax Revision Act of 1958 provided the first initial allowances in this country, of a very limited kind. It lets any taxpayer - "small" or otherwise - deduct in any year, besides his regular depreciation, up to 20 per cent of the first \$ 10,000 of the cost of tangible personal property (building are thus excluded) acquired that year. The property need not be new, but it must have an estimated useful life of six year or more." (1)

These measures, which have been taken by some countries of the free world, are not perfect at all and do not give the full solution to the problem of maintaining the purchasing power of the currency unit. However, an attempt at least, has been made on the part of these countries and they ought to be encouraged for taking such steps.

1. Ibid.

CHAPTER VI

SUGGESTIONS AND CONCLUSION

In this paper, depreciation policies and practices were presented and elucidated as clearly as possible. It was shown that the purpose of depreciation accounting was to amortize the original cost of an asset over its estimated useful life in a systematic and rational manner. The methods of allocation were presented and explained. It was found, that the practice for rapid write-off of depreciable assets in the early years, was increasing among U.S. companies. Regardless of inflation, accelerated methods of depreciation were sound both for income tax purposes and for purposes of income determination.

The various concepts of depreciation accounting were presented and analysed. Results of the Research Study carried on by the Massachusetts Institute of Technology showed that many accountants and business executives did not hold to the original cost concept although in practice they all applied such a concept being influenced, primarily, by regulatory agencies.

Conventional accounting practice does not yet fully recognize the differences in the purchasing power of the currency unit and consequently, when the general price level is rising, depreciation based on original cost will result in an overstatement of profits. It was also shown that even if the general level of prices was rising at a very low rate,

the amount of purchasing power deficiency on a relatively long life asset is substantial. By the use of mathematical formulae, it was shown that although accelerated methods of depreciation, compared with straight line depreciation, reduce the amount of purchasing power deficiencies, the reduction is so small as to be almost imperceptible.

Two factors are responsible for the gap between nominal and real depreciation during a period of continued rise in the price level. These factors are: the rate of price level change, and the estimated service life of the asset. It was shown that on assets with short service lives, a doubling of the price level increase will double the depreciation deficiencies; while on assets with relatively long service lives, the total depreciation deficiencies are, relatively speaking, insusceptible to the changes in the price level rates except when they are very low.

Numerous proposals have been made to adjust depreciation charges to reflect the price level changes within and outside the United States. U.S. tax legislation does not recognize adjustments of depreciation charges; while some West European countries and many other countries have adopted some measures which are considered to be a departure from conventional accounting practice.

The problem facing the accounting profession, at the present in the United States, is whether price level changes should be given accounting recognition or not, and if they

are to be recognized, what is the most practical and equitable method that will show the current cost of depreciation?

The American Institute of Certified Public Accountants circulated in 1957 a questionnaire on " Price Level Depreciation " to a selected list of 669 business executives and educators. ⁽¹⁾ The questionnaire dealt with the following points: the desirability of introducing current dollar cost of depreciation in corporate reports, methods of converting historical dollar cost into current dollar cost, the consideration of technological changes as an offset to price level changes, and the effect of capital additions as a counterbalance to the price level problem.

A summary of the findings of this questionnaire is presented in the following paragraphs:

With regard to the question of whether current dollar cost depreciation should be reflected in corporate reports or not, the majority approved of presenting current dollar cost in corporate reports provided that a practical and acceptable method of measuring price level changes is developed. Out of the 66 educators answering this question, 62 or 94 per cent answered "Yes". From the business executive group, 184 out of 265 or 69 per cent answered in the affirmative. The most common reason given for a positive answer

1. This questionnaire is reproduced in appendix A, and the results in appendix B.

to this question was " that unless operating expenses reflect current dollar costs of depreciation, they will be understated, and, as a result, net income will be overstated, income taxes will be inequitably high in many cases and often will partly be paid " out of capital ", and dividends may in part represent a return of capital rather than a distribution of earnings." (1)

Those who approved of reflecting price level changes in corporate reports, were asked if they believed it should be a requirement to disclose current dollar cost. The answers to this question were 51 per cent "Yes" and 49 per cent "No". There could have been much stronger support for reflecting current dollar cost of depreciation in corporate reports if such costs were deductible for income tax purposes.

Some accountants claim that technological changes may offset the effect of rising price levels. To get an opinion with regard to the effect of technological changes a question was included in the questionnaire which read as follows:

" Do you believe that technological changes in the productivity of new plants counterbalance the effect of rising price levels?

There were many qualified answers, but those who said "Yes" were 34 and "No" 184. However, the majority felt that the effect of price level changes could not be offset by

1. " Price Level Depreciation Survey ", The Journal of Accountancy, April 1958, p.37.

technological changes.

As to the question of whether large programs of capital additions can take care of the price level problem, many qualified answers were received. Those who answered "Yes" were 50 and "No" 219. The majority, however, believed that capital additions have not been important in this respect.

It can be concluded from this survey, that the general reaction was in favor of recognizing the effect of price level changes on depreciable assets.

Government statistics combined with careful studies in various industries, show that the current cost of depreciable assets owned by business companies is \$ 85 billion more than the original cost at the times of installation. (1)

The economic cost applicable to any one year is estimated at about \$ 6 billion. Therefore, it is believed that economic depreciation can no longer be ignored. The reasons for supporting such a belief are as follows:

1) Advocates of price level depreciation claim that historical costs are not useful, it is the current costs of depreciation which are useful to the business in its planning and decision making activities. Current costs reflect a more correct measure of the cost of the service utilized than original cost.

1. Grady, op.cit. p.56.

2) Price level depreciation will promote conservation of capital. Overstated profits, as a result of the use of original cost, will lead management to make unsound business decisions that will dissipate the capital of the business and imperil the capacity of national productivity.

3) Advocates of price level depreciation, claim that historical depreciation charges intensify business cycles. It is said that conventional accounting procedures show the business in a better position than when it actually is. It is contended that these " overstated " profits make the peaks higher in an inflation. It is not only that the businessman makes wrong expectations as to the marginal efficiency of capital but also the demand for consumer goods is increased during expansion due to the fact that part of the capital is being distributed as dividends and wages.

4) " About 50 per cent of the manufacturing capacity in America was installed prior to 1945 which probably means we have a greater proportion of overage plant than the principal industrial nations who are either friendly or unfriendly competitors. A recent survey by the McGraw-Hill Department of Economics shows that the estimated cost to replace all obsolete facilities with the best new plant and equipment would be \$ 95 billion. The survey illustrates the impact of modernization by stating that the latest models of machine tools are 40 per cent more productive than the predecessor models of just ten years ago." (1)

1. Ibid.

5) Depreciation allowances in the United States for the past five years have averaged \$ 16.8 billion while capital expenditures have averaged about \$ 27.4 billion. ⁽¹⁾ The ratio of depreciation allowances to capital expenditures is 61 per cent. This ratio appears to be inadequate to take care of modernization of worn out plants.

6) " A 1940 U.S. dollar on the books is not the same thing as a 1959 dollar also on the books, and to treat them as if they are identical is precisely the same kind of mistake - and a much more serious mistake quantitatively - as it would be to treat a current Canadian dollar as the precise equivalent of a current American dollar." ⁽²⁾ Hence the ordinary accounting procedure is mathematically unsound.

If the accounting profession does not recognize the current cost of depreciation, it is believed that this will result in dissipation of capital and in unwarranted deterrence to investment.

What are the arguments that are presented against price level depreciation?

Those who oppose price level adjustment claim that " a lot of the agitation of those who favor depreciation

1. Ibid.
2. William Paton, " Depreciation - Concept And Measurement ", The Journal of Accountancy, October 1959, p.40.

based on changing price levels would disappear into thin air, if they were convinced that they could do as they pleased for their own reporting purposes but would receive only sympathy from the tax collector, who would insist that depreciation be based on historical cost when it came to determining income subject to income taxes." (1)

It is to be noted that the solution of the price level depreciation problem is the responsibility of the accounting profession and need not wait upon its acceptance by income tax law authorities. " It is quite possible that the tax rules regarding depreciation might have been amended before this had the accounting profession taken strong stand for revision of conventional practice in the early forties." (2)

Another argument introduced against price level depreciation is that " working capital identified with depreciation charge is available periodically for reinvestment in a business. It is assumed that this working capital earns at least as much as the rest of the assets in the business. The full impact of depreciation can be judged by giving effect to this process." (3)

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1. Charles Melvoin, " Depreciation in Accountants' Reports ", The Journal of Accountancy, November 1959, p.37.
 2. Paton and Paton Jr., op.cit. p.330.
 3. Michael Schiff, " What Happens To Depreciation ", The Journal of Accountancy, March 1959, p.41.

Supporters of this argument claim that the depreciation cost is reinvested at a compound rate in the business and earns a rate of return equal to the average net income after taxes on all assets. This is believed to counterbalance the effects of rising prices.

This argument ignores several important facts of business. Assuming the service life of the depreciable asset was correctly estimated and assuming the value of the dollar remains constant, then the increase in working capital would be offset by the decrease in the value of the depreciable asset.

If the depreciable asset were bought on credit, and if the debt were to be paid on an installment basis proportionate to the estimated useful life of the asset there would be no earnings on the " working capital identified with depreciation " since this would have to be applied against the loan upon its realization.

Even when the depreciable asset is bought with equity money - hence no interest is paid - it should not be considered without cost. The costs are the earning which would have been realized if the amount of money spent on depreciable assets had been retained as working capital. It is presumed that these opportunity costs are the counterbalance to the earnings made on " working capital identified with the depreciation charge ".

Moreover, these profits which are claimed to be produced

by the use of the funds recovered in depreciation, become a part of the total profits and are not necessarily retained in the business being subject to taxes, dividends, wage increases, etc...

Other arguments advanced against price level depreciation is that it will create confusion and mislead stockholders. If a practical method is applied, then there is no reason to expect confusion in the statements. Some even argue that if price level adjustments are to be made then they must be made to all types of assets - cash, receivables, inventories and fixed assets. Henry W. Sweeney, in his book " Stabilized Accounting " advocates the adjustment of every item in the statements by the use of special index numbers. There is no reason why adjustments should not be applied to all types of assets, but since depreciation cost is a very important income determinant, it has received the greatest share in this controversy.

Some companies in the United States are providing for price level depreciation in their statement in some way or another.

The Iowa-Illinois Gas and Electric Company computed depreciation on a current dollar basis and charged it as an operating expense for the year ended December 31, 1958.

The Company gave the following explanation: (1)

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1. " Price Level Depreciation In Annual Statements ", The Journal of Accountancy, Sep. 1959, p.16.

" A 1957 decision of the Iowa Supreme Court in the case of the city of Fort Dodge vs. Iowa-Illinois Gas and Electric Company gave recognition to the inadequacies of cost depreciation and permitted the recovery, through rates charged customers, of the fair value of the property used to serve customers. Rate increases which include an allowance for fair value depreciation have subsequently been obtained in certain Iowa districts.

In June 1958, the Company began charging fair value depreciation to operating expenses based on the fair value of the property in those districts where such depreciation had been allowed in the determination of rates. An amount equivalent to revenues collected to provide fair value depreciation (\$ 420,000), after reduction for the estimated income tax on such increased revenues, or a net amount of \$ 198,000 , has been credited to an account for capital maintained by recovery of fair value depreciation. "

In the auditor's certificate there appeared the following comments:

" In 1958, the company commenced collecting increased revenues in certain of its operating areas in recognition of depreciation allowed in rate proceedings on the fair value of related property. To the extent recovered in increased rates, fair value depreciation has been recorded by the company as set forth in the notes to the financial statements. Although generally accepted accounting prin-

ciples presently provide that depreciation shall be based upon cost, it is our opinion that these principles should be changed with respect to depreciation to recognize increased price levels. We approve of the practice adopted by the company, since it results, in our opinion, in a fairer statement of income for the year than that resulting from the application of generally accepted accounting principles. In all other respects, the financial statements were prepared in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year. "

The United States Steel Corporation has applied price level depreciation in its reports. The following is an excerpt from a press release concerned with the quarterly income statement for June 30, 1947. (1)

" The reported income for the second quarter of 1947 reflects an increase of \$ 6,700,000 in the amount deducted as a cost covering wear and exhaustion of facilities. The present day cost of new facilities to replace those worn out through use in production is substantially more than the original cost of the facilities so replaced. If the charge for wear and exhaustion of facilities installed in earlier years is continued on the old basis of their original cost,

1. Grant and Norton Jr., op.cit. p.326.

the resulting reserve will be inadequate to cover the cost of the replacements which will be necessary when these earlier facilities have served their useful life.

The additional charges are equivalent to thirty per cent of the charges for depreciation as ordinarily computed in the past. This is materially less than the percentage of increase in cost of new plant construction over pre war cost but it is deemed appropriate at the moment pending further study. "

The most important element in the Steel Strike of 1959 was the amount of reported profits. The U.S. Steel Industry claimed that profits were overstated because of the way depreciation cost was calculated. " The industry's contention was that under conventional accounting, depreciation is calculated based on the original dollar cost, and this is inadequate because it fails to give effect to the tremendous change that has taken place in the purchasing power of the dollar, as a result of which it would cost many more dollars today to replace the plant than were originally spent. The industry maintains that realistic profits should be figured by reference to replacement figures. On that basis, the industry's profits are one-half of what the financial statements show. " (1) It is important to note that the practice

1. " Depreciation And The Steel Strike ",
The Journal of Accountancy, January
1960, p.22.

of disclosing price level depreciation, either as a footnote or in supplementary statements, is increasing among U.S. companies.

If the purpose of depreciation accounting is to measure the true economic cost of the capacity utilized of an asset, and if the purpose of the accountant is to report true profits, then price level depreciation should be introduced. Hence, and in view of the effects of price level changes on depreciable assets, depreciation based on historical cost has become inadequate for the purpose of making sound business decisions.

Granted that price level depreciation should be recognized, what then is the most practical and equitable method that will adjust for price level changes?

Price indices are the best indicators of the movements of prices in an economy. The value of any currency is expressed in terms of its purchasing power as reflected in the level of prices. Hence, the author believes that the best method to adjust for price level changes is through the use of index numbers.

Since not all prices move in the same direction, and also not all prices are taken into account in the calculation of a price index, it becomes logical that the construction of special indices is best fit for our purposes. Special indices are of more importance to owners of depreciable assets than a general price level index that reflects the

movement of the general price level. Owners and managers are curious about the effect of changes in prices upon the depreciable assets they own. For example, if the depreciable asset is a building, the government or any official agency, should calculate a price index for buildings which will reflect the movements of prices of building materials and wages, similarly for machinery and equipment or any other type of depreciable asset. In a competitive economy, it is the current cost of an asset rather than the historical cost, that is considered in the process of price determination. Special price indices seem to be the basis of a uniform method for converting historical cost into current cost. The author also believes that this method will result in reasonable equity to most companies. Moreover, it will allow uniform practice and avoid the element of judgement in the determination of current costs and taxable income.

Once the index number applicable to the depreciable asset has been determined, the method proposed for calculating current cost depreciation would be simple. The method involves the calculation of depreciation cost on a current cost basis as well as on a historical cost basis. Net income would be determined on both historical and current cost bases. The excess of current cost over historical will be charged to a capital adjustment account. For example, if depreciation cost on a current cost basis is \$ 2,000 and on a historical cost basis is \$ 1,500 , then the entry would be:

Depreciation expense- (Current cost)	\$ 2,000
Allowance for depreciation- (Historical cost)	\$ 1,500
Capital stock- (Adjustment account)	500

This seems to be the simplest method available that will show the impact of price level changes. The income statement will report income on both the historical and current cost bases and the balance sheet will show the adjustment in the capital account with the asset account being left untouched.

The author believes that the method of reinvestment depreciation is not the answer to the price level problem. Since depreciation cost is made on a periodical basis, adjustments should be made periodically. The major criticism advanced against reinvestment depreciation is that it does not solve the problem of determining the cost of capital consumed in any one period. It is very essential to determine periodically the cost of capital consumed irrespective of whether the asset will be replaced or not.

Accelerated methods of depreciation also are not the answer to the price level problem. They deal with the amount of depreciation to be charged periodically but do not take into consideration the change in the purchasing power of the currency unit.

The author believes that price level changes should be reflected in the determination of depreciation allowances.

It is deemed necessary and reasonable to recognize price level depreciation in determining business profits and taxable income if the purpose is to maintain capital and continue operations. Depreciation based on historical cost does not reflect the real cost. If true profits are to be reported, then depreciation cost must be expressed on a basis similar to that of material and labor costs, that is on a current cost basis.

Cost is not just a number written on the books. Cost is the amount of the purchasing power invested in an asset. This is probably the only meaning of cost that has any value for making decisions or interpreting financial statements.

In conclusion, if the measurement of true profits is one of the main goals of accounting, then the reporting of true profits is one of the best means of maintaining the investment producing such profits. Depreciation based on original cost will only maintain the same number of currency units invested and not the economic power invested.

Financial statements that do not give recognition to price level depreciation are misleading and harmful to the operation of the business and the economy as a whole. Undoubtedly, the conversion of historical cost of depreciation to a current cost basis, would serve as an incentive to expansion and modernization.

Appendix A

Price Level Depreciation
Questionnaire (1)

Dear Mr.:

The inflationary trend over the past several years has led Committees of the American Institute of Certified Public Accountants again to give careful study to the possible need for modification of existing techniques in corporate public reporting in order to give recognition to the effect of inflation. Of particular interest is the traditional practice of stating depreciation charges in terms of historical cost rather than in terms of current dollars.

As one facet of this study it would be helpful to know whether business managements feel that present methods of reporting are satisfactory to meet the needs of their shareholders and other readers of their corporate statements, or whether, due to continued inflation, managements now believe that reports would be more useful if they reflected in an appropriate manner the current dollar cost of depreciation as well as its historical cost, and whether they believe it is practicable to do so.

To this end, the Institute is directing this letter to the

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1. As quoted by The Journal of Accountancy, April 1958, pp.42-43.

presidents of several corporations and to certain others. We would like very much to have your ideas, by letter, by answer to the attached series of questions, or by both. Your cooperation will be greatly appreciated, and a summary of the results of the survey will be sent to all who participate. Your answer will be treated as confidential and used only in tabulation of all responses.

Very truly yours,

(signed) Marquis G. Eaton

President

American Institute of

Certified Public Accountants

1. In view of changes in price levels, and assuming for the purposes of this question that an acceptable means of measuring such changes is available, do you think that the current dollar cost of depreciation should be reflected in some appropriate manner in corporate reports to stockholders?

Yes _____

No _____

2. If your answer to question one is "Yes", which of the following methods do you consider acceptable:

a. Report net income in the presently accepted manner with an explanatory footnote disclosing cost of depreciation in current dollars. _____

b. Report net income in the presently accepted manner, accompanied by a supplementary statement which reflects current dollar cost of depreciation

and the adjusted net income. _____

c. Show in the income statement the amount of depreciation based upon historical cost and, as an additional item, an amount to bring the total charge for depreciation up to the current cost basis. Net income would be reported after the full current cost deduction and the additional provision would be carried to property replacement reserve. _____

d. Adjust both the balance sheet and the income statement to show current cost and historical cost of plant and equipment and their depreciation. Net income would be reported after the full current cost of depreciation. _____

Which of the above methods do you prefer.
(Circle your preference.)

a b c d

3. If you think the effect of price level changes should be recognized, do you believe there should be a mandatory requirement for disclosing the amount of current dollar cost of depreciation.

Yes _____

No _____

4. Would you favor reporting to stockholders a figure for net income which reflects charges for current cost depreciation, if current cost depreciation were accepted for income tax purposes?

Yes _____

No _____

5. Would you favor reporting to stockholders a figure for net income which reflects charges for current cost depreciation, even if current cost depreciation were not accepted for tax purposes?

Yes _____

No _____

6. Do you believe that technological changes in the productivity of new plants counterbalance the effect of rising price levels?

Yes _____

No _____

7. Do you feel that the large program of capital additions which most companies have undertaken in recent years has for practical purposes taken care of the price-level problem?

Yes _____

No _____

(Name of Company)

(Name of Individual)

If you do not care to sign the questionnaire, please indicate the following:

- a. As to company officials, the general type of business done by the company.
- b. As to others, your profession.

Opinion Survey on Price Level Adjustment of Depreciation
(1)

Summary of answers to questions

Group	1		2				3		4		5		6		7		
	Yes	No	Acceptable				Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
			a	b	c	d											a
Automobile	7	10	2	3	4	8	1	3	4	8	8	17	5	7	15	1	18
Aircraft & related indus.	4	4	3	3	0	3	1	3	0	6	5	12	2	4	9	0	10
Building Mat.	11	16	8	9	3	14	4	9	2	14	19	35	10	13	29	4	25
Machinery and Equipment	16	4	11	2	6	4	8	1	5	2	6	14	5	2	16	3	7
Chemicals, papers, etc.	8	3	2	3	1	3	1	3	0	5	2	7	3	4	6	1	6
Railroad equip.	8	0	1	0	4	1	0	4	1	3	5	10	0	4	3	0	7
Shipbuilding & Shipping	10	2	7	2	5	2	5	1	3	2	4	8	4	5	8	0	10
Steel	5	7	3	2	3	0	0	1	3	0	1	7	3	2	7	2	4
Mining & Metal Petroleum	13	14	9	2	4	2	7	1	3	1	10	19	7	1	25	8	13
Food, Drugs, Beverages & Tobacco	22	6	14	5	5	3	11	2	4	2	11	22	6	8	20	0	18
Other Mfg. Retail & Services	6	8	3	1	3	1	2	0	3	0	4	8	6	2	11	3	7
Railroads & Public Utilities	10	8	5	3	2	2	4	2	2	2	6	9	7	3	13	1	12
Finance & Insur.	28	7	16	15	8	5	15	8	7	3	10	34	3	13	22	7	12
Educators	62	4	20	35	18	14	14	24	12	14	36	49	17	44	19	4	35
TOTAL	246	85	122	82	76	42	94	47	64	33	126	250	78	112	203	34	184

Source: Ibid. p.43.

(1) Without comment or qualification.

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