

The Measurement of Business Capital, Income and Performance

Tutorial presented at the University Autònoma of Barcelona, Spain, September 21-22, 2005, revised February, 2006.

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1. Introduction

In this chapter, we will review what accounting theory has to say on some controversial topics associated with the measurement of capital. To an outsider with an economics background, the accounting treatment of capital, interest and depreciation seems rather strange. Hopefully, this chapter will help to explain why the accounting profession ended up with the positions that it has taken with respect to these measurement issues.

Sections 2, 3 and 5 look at the accounting treatment of interest on equity capital, on depreciation and on the treatment of capital gains respectively. Section 4 provides an introduction to section 5 and it tries to explain why accountants do not regard capital gains as being “productive”, whether these gains were anticipated or not.

2. Accounting Theory and Interest as a Cost of Production

“The stock which is lent at interest is always considered as a capital by the lender. He expects that in due time it is to be restored to him, and that in the mean time the borrower is to pay him a certain annual rent for the use of it.” Adam Smith (1776; reprinted 1963; 271).

“And human nature being what it is, we are justified in speaking of the interest on capital as the reward of the sacrifice involved in the waiting for the enjoyment of material resources, because few people would

¹ The author thanks Peter Hill for valuable comments on an earlier draft of this chapter.

save much without reward; just as we speak of wages as the reward of labour, because few people would work hard without reward.” Alfred Marshall (1920; 232).

It is clear that economists from Adam Smith through Alfred Marshall regarded interest as a reward (to the lender of financial capital for abstaining from or deferring consumption and as a cost of production for producers who are recipients of the financial capital.²

However, the problem of explaining the factors that determined the interest rate was a much more difficult task. Böhm-Bawerk (1891; 24-72) summarized the literature on this topic up to his time and provided a verbal description of a modern theory of interest³ while Fisher (1930) presented a very convincing algebraic and geometric description of the same theory.⁴ Böhm-Bawerk (1891; 285-6), Fisher (1897; 522) and Hicks (1946; 141-142) explained how the present price of a good purchased now for delivery next period is equal to the (spot) price of the good next period divided by one plus the current period interest rate. Hicks (1946; 136) generalized the simple one (spot) commodity and multiple time period models of Fisher (1930) into a general model with many commodities and many time periods (his “Futures Economy” where all commodities can be bought and sold on forward markets) and Debreu (1959) provided a rigorous proof of the existence of equilibrium in such a model. But Hicks (1946; 119-127) also developed another model of intertemporal equilibrium that had a theory of the interest rate built into it: the temporary equilibrium model.⁵ This second Hicksian model used the same building blocks as the futures economy model, except that instead of assuming the existence of futures markets, Hicks assumed the existence of current period (spot) markets for commodities and financial capital and the existence of definite expectations

² Böhm-Bawerk (1891; 301-303 and 365-371) and Fisher (1930; 48-52) patiently refuted the Marxian exploitation theory which denied that interest was a valid cost of production.

³ “In our science there are three views in circulation as to the formation of capital. One finds its origin in Saving, a second in Production, and a third in both together. Of these, the third enjoys the widest acceptance, and it is also the correct one.” Eugene von Böhm-Bawerk (1891; 100).

⁴ For the case of one (spot) commodity and two periods, his geometric analysis was particularly compelling. Fisher (1930; 246) introduced a family of “willingness lines” (i.e., indifference curves over combinations of consumption today and consumption tomorrow) and in Fisher (1930; 265), he introduced the “opportunity line” (i.e., the combinations of consumption today and consumption tomorrow that the economy could produce—the intertemporal production possibilities set). Unfortunately, Fisher (1930; 57) viewed interest as a capital gain and hence interest payments were not negative “income” for a producer and hence could not be a “cost” in his view. Fisher’s “income” was what everybody else called “consumption” and so his terminology caused great confusion in the economics literature of his time.

⁵ The Hicksian model of temporary equilibrium can be viewed as a generalization of a model of capital formation due to Walras (1874; translated 1954; 267-306). In order to justify a demand to save or defer present consumption, Walras (1954; 274) assumed the existence of a single future period commodity that would be consumed in fixed proportions indefinitely and hence had a price which was proportional to the reciprocal of the one period interest rate, which was assumed to be constant over time. In deriving the price of this future composite commodity, Walras assumed that the spot price of the composite commodity would remain constant over future periods; i.e., he made a static expectations assumption. Hicks (1946; 227-232) was able to dispense with these restrictive assumptions by assuming general intertemporal preferences for consumers and definite expectations about future prices. Walras’ (1954; 239-240) theory of production was also somewhat primitive. He essentially assumed: no joint production, constant returns to scale and fixed coefficient or no substitution production functions (which have come to be known as Leontief (1941) production functions). On the other hand, Hicks (1946; 325-326) had a perfectly general intertemporal production function. For a modern interpretation of Walras’ theory of capital formation and interest rate determination, see Diewert (1977).

about future period spot prices (which could depend on current period prices) for all consumers and producers in the economy. In this model, these expected future period spot prices were used by producers and consumers in their intertemporal profit maximization and utility maximization plans.

The above sketch of the role of interest in modern economic theory would seem to indicate that economists generally accept interest as a valid cost of production, and indeed, interest plays a vital role in the intertemporal allocation of resources. However, many accountants and some economists objected to interest as a cost of production; in particular, they objected to interest that is imputed to the equity capital employed by a business unit. A few accountants objected to associating an interest cost with the use of a durable input over an accounting period (in addition to a depreciation cost) on the grounds that such interest rate adjustments are likely to be minor in view of the errors involved in estimating depreciation.⁶ However, if interest rates are high and the durable input is long lived, other accountants have pointed out that the neglect of interest can lead to substantial underestimation of costs.⁷ On the other hand, the main objection of accountants⁸ and some economists⁹ to the inclusion of interest on equity capital as a cost

⁶ “In the muddy pool of controversy over the question of ‘interest on the investment’, one finds all kinds of slippery arguments about what rate is to be employed. Most who discuss the question seem to think that, given a correct rate, there is little to object to except the arbitrariness of the rate chosen and of the valuations that result, and the clerical labor involved in the calculating and recording But the present writer wishes to urge a somewhat different objection. If interest is to be charged at some agreed rate, into what quantity shall that rate be multiplied? Into book value of the assets? But look at these book values. Consider how they are themselves determined and consider how far they are likely, under any valuation rule yet discovered, to miss the ideally useful and convenient figure. To go through the book valuations found by the simple [accounting depreciation] formulas in Appendix A, where exact prevision of events is supposed, and begin charging interest upon them, is as absurd as trying to correct for the earth’s rotation in a snowball fight. To attempt a 5% alteration of an amount which may be 50% in error in a direction unknown to us, is what the kindergarten teachers call ‘busy work’”. John B. Canning (1929; 297).

⁷ “Cost-of-capital is seldom recognized when practical men calculate depreciation. This is not unreasonable if the rate is low or the life is short. But cost-of-capital alters the figures materially if the rate is high or the life is long (as they often are): its recognition then gives useful extra information about asset values, income and costs.” William T. Baxter (1975; 159).

⁸ “The whole question of whether actual historical costs or imputed costs (this includes all costs that are not actual, from the point of view of explicit transactions entered into between the particular enterprise and other parties) should constitute accounting data is that of whether the accountant can or should attempt to account for enterprise income on the basis of the same set of concepts that the economist uses. The inclusion of imputed costs of any variety, in the accounts, invariably results in a confusion of expenses with aspects of business income or its distribution.” William T. Crandell (1935; 387). “Although few would assert that equity interest is not a cost, many persons argue that it is an imputed cost and that accounting does not record imputed costs.” Robert N. Anthony (1973; 90).

⁹ Economists who are national income accountants have in the past resisted imputing an interest cost for the use of equity capital as the following quotations from SNA 1993 indicate: “The amounts of rents and interest actually payable on rented land and borrowed funds are recorded in the allocation of primary income account, and the entrepreneurial income account, but the implicit rents on land owned by the enterprise and the implicit interest chargeable on the use of the enterprise’s own funds are not recorded in the accounts of the System.” Eurostat (1993; 175). “The volumes of intermediate consumption, consumption of fixed capital and any taxes on production measured at the prices or rates of the previous year or the fixed base year should be added to obtain a comprehensive volume measure covering all inputs.” Eurostat (1993; 402-3). The last quotation indicates that the current System of National Accounts 1993 does not recognize interest, either imputed or paid, as a period cost that should be associated with the

is that it is an imputation or estimated value and accountants should stick to recording values rather than creating them. These objectors have a valid point: it is not a trivial matter to determine precisely what are the relevant debt and equity interest rates.¹⁰ However, in our view, imputations associated with capital are inevitable and are due to the durable nature of capital inputs and the fact that not all capital inputs are rented or leased. It is better to be approximately correct than precisely wrong!¹¹

In section 4 below, we attempt to cast a bit more light on the question about the productiveness of interest by looking at the literature on exactly which types of economic activity are “productive”. However, before we do this, we consider what the accounting literature has said about the nature of depreciation in the following section.

3. Accounting Theory and Depreciation

3.1 Introduction

“Depreciation is defined simply as rate of decrease of value.” Harold Hotelling (1925; 341).

“The net stock concept is motivated by the observed fact that the value of a capital good declines with age (and/or use). This decline is due to several factors, the main ones being the decline in the life expectancy of the asset (it has fewer work years left), the declines in the physical productivity of the asset (it has poorer work years left), and the decline in the relative market return for the productivity of this asset due to the availability of better machines and other relative price changes (its remaining work years are worth less). One may label these three major forces as exhaustion, deterioration, and obsolescence.” Zvi Griliches (1963; 119).

Chapter I above defined the (cross sectional) depreciation rate of a durable input in terms of the decline in value of a “newer” machine or other durable input compared to a “used” machine that had been used for one additional accounting period.¹² The two values that

use of capital inputs: only depreciation and tax costs are recognized by the System. However, the next international version of the SNA will probably recognize interest as a cost of production in principle, thanks to the efforts of the Canberra Group II on the Measurement of Non-Financial Assets.

¹⁰ Wright noted that the “correct” opportunity cost of equity funds for the firm might depend on whether it was necessary for the firm to raise funds or whether it had excess funds that need to be invested: “Since this article is concerned with the theory rather than the practice of depreciation, however, a few remarks about the determination of the interest rate may not be out of place. The appropriate rate for any period will be the opportunity cost of funds during that period. In the case of a firm whose growth is not restricted by the amount of funds it can raise, the opportunity cost of funds will usually be the average cost of raising additional funds, though in some cases it might be the rate at which surplus funds can be placed in the market.” F.K. Wright (1964; 86).

¹¹ This phrase is attributed to J.M. Keynes. Of course, not all accountants objected to the economists treatment of interest: “On the other hand the capitalization of interest during construction can be supported by reference to the economist’s conceptions of effective cost. Our old friend, ‘interest on investment as an operating cost’, bobs up in this connection. Suffice it to say here on this point that the case against the inclusion of hypothetical interest charges in operating expense must be based on other grounds than the economist’s theories of price determination. Virtually all economists view interest on capital, proprietary as well as borrowed, as an effective cost of production.” W.W. Paton (1931; 93-94).

¹² However, Chapter I indicated that *real time series depreciation* was also a useful depreciation concept. It is this latter concept that fits in nicely into a user cost formula, which will form a hopefully good approximation to a market rental rate for the asset in question for the period under consideration. Thus the purpose to which we want to use the depreciation estimate must be kept in mind.

were compared were market values that pertained to the end (or the beginning) of the accounting period. If the price of “new” machines were the same at the beginning and the end of the accounting period (so that $P_0^t = P_0^{t+1}$), then the decline in the value at the end of the period, $P_1^{t+1} - P_0^{t+1}$, would be the same as the decline in value over period t , $P_1^{t+1} - P_0^t$. Many of the early treatments of depreciation implicitly assumed price stability (i.e., $P_0^t = P_0^{t+1}$), and hence depreciation was identified with the decline in value of the durable input over the accounting period.¹³

As the above quotation by Griliches (1963; 119) above indicates, economists tried to analyze the factors that determine depreciation rates.¹⁴ Accountants, engineers, statisticians and economists have all made contributions to the literature on depreciation. We shall review some of their approaches below; see Chapter I for other approaches.

3.2 The Appraisal Approach

The earliest approaches to depreciation were based on appraisals:

“[There are] various methods of estimating the Depreciation of a Factory, and of recording alteration in value, but it may be said in regard to any of them that the object in view is, so to treat the nominal capital in the books of account that it shall always represent as nearly as possible the real value. Theoretically, the most effectual method of securing this would be, if it were feasible, to Revalue everything at stated intervals, and to write off whatever loss such valuations might reveal without regard to any prescribed rate The plan of valuing every year instead of adopting a depreciation rate, though it might appear the more perfect, is too tedious and expensive to be adopted ... the next best plan, which is that generally followed ... is to establish average rates which can without much trouble be written off every year, to check the result by complete or partial valuation at longer intervals, and to adjust the depreciation rate if required.” Ewing Matheson (1884; 35).

“One of the first clear references to depreciation accounting was in the annual report of the Baltimore and Ohio Railroad for the year ended September 30, 1835. That report explained that income for the year was determined ‘after carrying \$75,000 to the debit of profit and loss to make good deterioration of the railway and machinery’ During the years following 1835, there was no consistent policy followed by any group of companies or even by any one company. Apparently, some companies made a separate provision for depreciation as did the Baltimore and Ohio Railroad, while other companies charged replacement costs to expense in lieu of depreciation.” P.D. Woodward (1956; 71).

¹³ Recall the above quotation by Hotelling. It should be noted that the economic statistician Hotelling (1925; 345) deduced a continuous time counterpart to the user cost formula (7) in chapter I.

¹⁴ It is interesting to note that Pigou identified more or less the same three factors affecting depreciation as Griliches: “Allowance must be made for such part of capital depletion as may fairly be called ‘normal’; and the practical test of normality is that the depletion is sufficiently regular to be foreseen, if not in detail, at least in the large. This test brings under the head of depreciation all ordinary forms of wear and tear, whether due to the actual working of machines or to mere passage of time—rust, rodents and so on—and all ordinary obsolescence, whether due to technical advance or to changes of taste. It brings in too the consequences of all ordinary accidents, such as shipwreck and fire, in short of all accidents against which it is customary to insure. But it leaves out capital depletion that springs from the act of God or the King's enemies, or from such a miracle as a decision tomorrow on the part of this country to forbid the manufacture of whisky or beer. These sorts of capital depletion constitute, not depreciation to be made good before current net income is reckoned, but capital losses that are irrelevant to current net income.” A.C. Pigou (1935; 240-241).

Thus the very earliest treatments of the depreciation problem seem to have been on the basis of periodic appraisals of the value of fixed assets. Thus the first early accounting approach to the determination of depreciation is (i) the appraisal approach: changes in appraised values, if negative, were regarded as costs to be charged to the accounting period between appraisals.¹⁵ However, as the quotation by Woodward above indicates, there were two additional early treatments of depreciation: (ii) engineers made estimates of the value of the physical deterioration and loss of productive life that equipment and machinery might have experienced during an accounting period¹⁶ and (iii) new purchases of durable inputs were simply expensed in the period of purchase.

Obviously, the third approach (which is consistent with cash flow accounting) is not helpful in the determination of periodic income (period by period income), which is the task at hand.¹⁷ The other two approaches are reasonable but not helpful in the context of the explicit determination of depreciation rates: approach (i) mixes up (unanticipated) capital gains with the determination of depreciation rates while approach (ii) gives no indication as to how depreciation rates would be determined. However, in general, appraisal approaches are useful, particularly if the purpose of the accounting exercise is to measure ex post income.

3.3 Sinking Fund Approaches

Another approach to depreciation accounting used by early accountants was the *sinking fund approach*:

“The depreciation problem, in general terms, is the problem of writing off from fiscal period to fiscal period sums sufficient to return the capital invested in a property when that property has outlived its usefulness.” J.S. Taylor (1923; 1010).

“After the straight line formula the one perhaps most widely used is the sinking fund formula and the modifications of this method.” John B. Canning (1929; 273).

As the above quotations indicate, some early statisticians and accountants viewed the depreciation problem as a method for funding the future replacement of a durable input. In this sinking fund method, the focus shifted from changes in asset values to the problem

¹⁵ “Bookkeeping Modernized by John Mair (2nd edition, 1768). The same general procedure is described as in Bookkeeping Methodiz'd and there are no illustrations of depreciation but the inference might be made that if the ‘value’ of the property were less than cost, this decrease in value would be included in the change of Profit and Loss.” Perry Mason (1933; 210-211). “There is little reason to doubt that depreciation was originally calculated on the basis of appraisals. The appraisal, it may be conjectured, was originally on a market price basis in order to obtain a figure roughly equivalent to what would have been realized at the date of the appraisal had the asset actually been sold After general adoption of the accounting period convention, such appraisals were probably made at the end of each accounting period. It must, however, soon have been obvious that such periodic appraisals gave erratic results depending, of course, upon who made them, how they were made and the general state of business at the time they were made.” Stephen Gilman (1939; 488).

¹⁶ This is really a variant of method (i).

¹⁷ However, if period by period estimates of “income” are not required, the third approach is perfectly consistent with the economist’s usual approach, which consists in maximizing the discounted value of future expected profits; e.g., see Hicks (1946).

of setting aside period by period accounting charges into a fund which will cumulate over the useful life of a fixed asset into an amount which will be sufficient to replace the asset on its retirement date. This treatment of depreciation has some elements in common with the maintenance of physical capital approach to income determination, but the two methods are distinct.

In the 1930's, the sinking fund approach to depreciation was successfully attacked by a number of accountants on the grounds that depreciation accounting should be viewed as a method of spreading the initial cost of a durable input over its useful life rather than as a solution to the logically distinct problem of deciding whether the asset should be replaced at the end of its life:

“There is a much larger number who in some way try to identify the deposits to a sinking fund or the deposits and earnings thereon with ‘depreciation expense’. The only source of an ‘expense’ of depreciation is the outlay or outlays made or agreed to be made for the asset in order to have the enjoyment of the service.” John B. Canning (1929; 274).

“Depreciation exists whether the property being used is to be replaced or not. In no sense does the depreciation allowance (‘reserve’) account represent the accumulation for the purpose of acquiring future assets.” M.B. Daniels (1933; 306).

“Generally it is conceded that it is the purpose of recording depreciation to recover the original expenditure, the purchase of a new truck being a separate and distinct transaction having no possible connection with, or relation to, the recovery of the original investment. It is simple to point out that the truck at the end of six years may be replaced at a higher price or a lower price, or at the same price, or by teams and wagons, or that no replacement will be made if the need for a truck has disappeared. The above arguments seem sufficiently convincing to discredit this replacement theory in so far as it is related to fixed assets .” Stephen Gilman (1939; 349).

“The availability of money for replacement may offer serious financial problems. The problem of financing replacements may be sufficiently difficult to tax the resourcefulness and foresight of business men but it is in no sense whatever an accounting problem. The originally acquired asset was a deferred charge and its cost is recovered by the depreciation program. The replacement whether it be an identical item or not, is a fresh transaction resulting in the creation of a new deferred charge the cost of which in turn must, from the accounting viewpoint, be recovered over the years which follow its acquisition.” Stephen Gilman (1939; 494).

We turn now to accounting treatments of depreciation that take the *intertemporal cost allocation viewpoint*. These are basically the approaches that were reviewed in the Appendix to chapter I, except that this early accounting literature implicitly assumed a stable general price level and made no adjustments for changes in the general price level and it avoided the complications introduced by discounting.

3.4 Intertemporal Cost Allocation Approaches

“A plough, for instance, which lasts twenty years, will contribute a twentieth part of its life-work and use to the ingathering of twenty different harvests.” Eugen von Böhm-Bawerk (1891; 305).

“Straight Line Formula In general, only two primary estimates require to be made, viz., scrap value at the end of n periods and the numerical value of n Obviously the number of periods of contemplated use of an asset can seldom be intelligently estimated without reference to the anticipated conditions of use. If

the formula is to be respectable at all, the value of n must be the most probable number of periods that will yield the most economical use.” John B. Canning (1929; 265-266).

The first method that comes to mind in attempting to determine a sequence of depreciation rates for a durable capital input as it ages is the one suggested by Böhm-Bawerk above: estimate the expected number of accounting periods n that the input is likely to be used in production and assume that the single period depreciation rate is $\delta = 1/n$. This straight line method of depreciation can be used to allocate the initial purchase cost of the asset, say P^0 , across the n periods of its life; these historical cost allocations under *straight line depreciation* would be $(1/n)P^0, (1/n)P^0, \dots, (1/n)P^0$, a sequence of n equal allocations. This would correspond to a *historical cost method of depreciation*. The straight line depreciation method can also be used in conjunction with current values of new units of the asset, yielding the following sequence of *current value depreciation charges*: $(1/n)P^0, (1/n)P^1, \dots, (1/n)P^{n-1}$, where P^t is the price of a new unit of the asset at the beginning of period t , for $t = 0, 1, \dots, n-1$.¹⁸

Another commonly used method for the determination of depreciation rates rests on the assumption that depreciation occurs on the undepreciated value of the asset at a *constant geometric rate* δ where $0 < \delta < 1$. The sequence of historical cost allocations of original cost P^0 that this method generates is $\delta P^0, \delta(1-\delta)P^0, \delta(1-\delta)^2P^0, \dots, \delta(1-\delta)^n P^0, \dots$ while the corresponding stream of periodic current cost accounting charges is $\delta P^0, \delta(1-\delta)P^1, \delta(1-\delta)^2P^2, \dots, \delta(1-\delta)^n P^n, \dots$. This method of depreciation is sometimes called the *reducing balance method*¹⁹ or the *declining balance method*.²⁰ As we saw in chapter I, this method of accounting for depreciation (applied to current values) is very convenient when it is necessary to construct capital aggregates for productivity measurement purposes. Empirical estimates for the declining balance depreciation parameter δ generally come from: (i) “official” estimates by broad asset class made by the national tax or regulatory authorities;²¹ (ii) estimates made by the engineers or managers of the business unit,²² or (iii) statistical studies such as those to be discussed in chapter I.

¹⁸ These depreciation methods neglect the complications that occur when we take into account anticipated asset price changes that are expected to take place over the accounting period.

¹⁹ See Hotelling (1925; 350).

²⁰ See Canning (1929; 276-277).

²¹ “It is undoubtedly true that the methods now in use for the systematic accounting for depreciation and many of the now generally accepted concepts of depreciation have a comparatively recent origin, and that much of the development of the subject has taken place since and as a result of the establishment of governmental regulation of public utilities and the enactment of income tax legislation.” Perry Mason (1933; 209). “Under the impetus of increased income tax rates due to World War I, the interest in depreciation calculation increased. The first edition of Bulletin F issued by the Bureau of Internal Revenue in August 31, 1920, advocated the straight-line age-life method.” P.D. Woodward (1956; 74). “Rates of depreciation must of necessity conform to Internal Revenue edicts ... on documents submitted to the Internal Revenue Service. Unfortunately, the same rates are often used in accounts which do not have to be submitted to the IRS, with attendant undesirable influences on business decisions The writer advises engineering students as follows: 1. Disregard official rates of depreciation. 2. Estimate economical length of life for the type of service originally intended for the asset” William F. Berkow (1964; 380).

²² “Finally, a word should be said about the professional responsibility for valuation. Many accountants assert that valuation of fixed tangible assets is a job for appraisal engineers. Others say that it is the job of the management themselves and that accountants have discharged their whole duty when they avoid certifying statements in which the assets have been negligently or fraudulently valued. The engineers are

Saliers (1922) and Canning (1929; 260-309) list many other rather arbitrary methods that accountants have used to estimate depreciation rates. The arbitrariness of these accounting depreciation methods and the fact that the estimates are generally based on a priori reasoning rather than on empirically observable declines in value²³ has of course attracted comment from many accountants and economists over the years:

“Accountants immediately discard their own figures and demand an appraisal of the plant and other fixed assets, whenever they are called upon to compute capital value for the purpose of sale, reorganization etc. Apart from such occasions they adhere to their depreciation methods with the proviso that the method itself matters less than consistent adherence to it, once it has been adopted. These methods generally limit guessing to a minimum considered unavoidable in the circumstances.” Gabriel A.D. Preinreich (1938; 240).

“For the past hundred years accountants have been searching for the ‘true’ depreciation method which would allocate the cost of the machine over its lifetime in accordance with the rate at which it is actually being ‘used’ up. They have reluctantly concluded that there is no ‘true’ depreciation method, and that all the methods used or proposed are mere conventions, the choice between which is a matter of convenience.” F. Lutz and V. Lutz (1951; 7).

However, historical cost accountants such as Daniels and Ijiri have defended the arbitrariness of accounting cost allocations as follows:

“The function of depreciation is recognized by most accountants as the provision of a means for spreading equitably the cost of comparatively long lived assets. Thus, if a building will be of use during twenty years of operations, its cost should be recognized as operating expense, not of the first year, nor the last, but of all twenty years. Various methods may be proper in so allocating cost. The method used, however, is unimportant in this connection. The important matter is that at the time of abandonment the cost of the asset shall as nearly as possible have been charged off as expense, under some systematic method.” M.B. Daniels (1933; 303).

“However, there is a diametrically opposite problem in historical cost accounting ... the problem is one of disaggregation or allocation. Suppose that resources A and B are purchased together for \$20, but at the end of the year the firm had only Resource A. How much of the \$20 should be assigned to Resource A? Depreciation is a typical problem of this kind. However, accountants have devised many methods, however arbitrary they may be, by which such allocations are carried out objectively.” Yuji Ijiri (1979; 67).

Both of the above authors recognize the arbitrariness of historical cost accounting allocations of asset cost; the best that can be said of these methods is that they are

not too happy with the burden thrust upon them. They say, at least many of them do, that it is impossible to make valuations unless the operating policy, particularly that of maintenance, upkeep and repairs, is foreknown.” John B. Canning (1929; 307).

²³ Wright contrasted the accountant’s allocation approach with the economist’s change in value approach as follows: “There have been two distinct approaches to the solution of the depreciation problem which might be designated the ‘accounting approach’ and the ‘economic approach’, respectively. The accounting approach requires the cost of an asset less salvage, if any, to be distributed over the life of the unit ‘in a systematic and rational manner’. The economic approach, on the other hand, ignores cost as an irrelevant datum: the value of an asset at any point of time is simply the sum of its discounted future services (including salvage if any). It seems clear that the accounting approach does not really represent an attempt at valuation: indeed, it has been officially described as ‘a process of allocation, not of valuation’.” F.K. Wright (1964; 81). Wright was right!

“systematic”. If the tax authorities specify that one or more depreciation formulae must be used for tax purposes, then the use of the resulting historical cost allocations might also be characterized as “objective”.

Since historical cost accountants regularly criticize current value accountants for their use of imputed or estimated values, it is important to recognize that historical cost accounting is subject to precisely the same criticism: historical cost accounting, by accepting an arbitrary a priori pattern of depreciation rates *imputes* period by period depreciation costs. If we attempt to estimate the period by period durable input costs accruing to a business unit, *then any method of accounting will have to resort to imputed or estimated values.*²⁴

We conclude this section with three additional criticisms of historical cost depreciation allocations.

The first criticism is due to Canning²⁵ who asked that criteria be developed to choose among the many depreciation methods that were used by historical cost accountants. This request for a rational criterion for choosing a depreciation formula has not been answered because the answer cannot be given on the basis of a priori reasoning: period by period empirical evaluation of the physical condition and market value of the assets to be depreciated is required.

The second criticism is due to Edwards and Bell²⁶ who noted that the historical cost accountant would need to be clairvoyant in order to determine the useful life of an asset; i.e., identical new assets are not all retired at the same time.²⁷ On the other hand, current value accounting techniques, by estimating period by period used asset values avoid in principle the difficult problems that arise when durable inputs are used at different

²⁴ “For a specific asset, objective verifiable values based upon external transactions are available at only two points of time: at the moment of acquisition, and at the moment of disposal. If these two events occur within the same accounting period, no depreciation problem arises. But when the events are widely separated in time (as is usually the case with fixed assets), determination of periodic income is impossible without establishing a value for the asset at the end of each intervening period. The problem of depreciation accounting is the problem of establishing these needed values without the objective verifiable basis which only external transactions can provide.” F.K. Wright (1964; 81).

²⁵ “The interminable argument that has been carried on by the text writers and others about the relative merits of the many formulas for measuring depreciation has failed, not only to produce the real merits of the several methods, but, more significantly, it has failed to produce a rational set of criteria of excellence whereby to test the aptness of any formula for any sub-class of fixed assets.” John B. Canning (1929; 204).

²⁶ . “If historic cost is to be allocated among the asset’s services as time passes, it is necessary to know in advance the total stock of these services. Otherwise there can be no basis for apportionment. Current cost depreciation, on the other hand, requires in theory no such clairvoyance. We need only know the services used or foregone this period and the price this period of those services.” Edgar O. Edwards and Philip W. Bell (1961; 175). The position of Edwards and Bell is precisely the position that we took in chapter I: we are interested in measuring depreciation in order to form an approximation to the rental value of a capital input for the period under consideration and the opportunity cost approach advocated by Edwards and Bell is one of the best approaches to this measurement problem.

²⁷ “A thousand new Ford cars, regardless of prior statistics, may last five years, eight years, or ten years, a fact which no one can determine from examining statistics of old Ford cars.” Stephen Gilman (1939; 513).

intensities.²⁸ We can paraphrase this second criticism of historical cost accounting techniques as follows: different historical cost accountants will estimate different lengths of life (and scrap values) for the same asset, leading to variable or “nonobjective” period by period depreciation estimates.

The third criticism of the historical cost accountant’s allocation method for determining period by period depreciation is the most important one: historical cost accounting will not preserve the real capital of the firm during periods of inflation; i.e., *historical cost accounting income will be vastly overstated during periods of high inflation* and will lead to unsustainable levels of taxation for firms who face an income tax that is based on income measures generated by historical cost accounting conventions. Thus the unpleasant consequences of the neglect of general or specific price change in the treatment of depreciation include the following items:

- The possibility of crippling income taxes;
- The possibility of unsustainable dividend payments being made; and
- The possibility of products being priced incorrectly (i.e., being priced below cost).

Sweeney noted that the above problems with historical cost accounting methods for determining depreciation became very apparent during the German hyperinflation²⁹ of 1923:

“Regarded from the more technical viewpoint of accounting, the problems faced and solved by German accountants during the period of absurd price fluctuations are quite worthy of study by accountants of all other countries. For the problems associated with keeping and interpreting financial records that must be expressed in a monetary unit oscillating even hourly are problems that the rest of the world must face to a less extreme degree.” Henry W. Sweeney (1927; 180-181).

Sweeney went on to point out that if traditional historical cost depreciation is used under these conditions, firms will record apparent profits that are really losses and business income taxation will be too high:

“This kind of profit is an ‘apparent profit’ (Scheingewinn). But the true result was a loss because the goods were sold at less than actual cost in terms of the current price level.” Henry W Sweeney (1927; 184).

“Finally, such inflation tends to cause profits and income taxes to be paid on merely apparent profits, and, therefore, from capital. What Mahlberg considered very unjust was not merely the fact that apparent profits, which were actually capital losses, were taxed; but especially the fact that many large genuine profits could not be taxed according to law. Such genuine profits were made by concerns with large capital asset holdings and small depreciation thereon on the one side, and with large long term liabilities on the other. The injustice of a taxation system that measures income in a depreciating monetary unit and then taxes it is well stated by F.W. Thornton with regard to the United States.” Henry W. Sweeney (1927; 190-191).

²⁸ However, in practice, it is difficult to determine these opportunity cost values accurately. But the principle is a good one.

²⁹ Sweeney (1927; 181-182) indicated that the number of paper marks need to buy one gold mark went from 1 in January 1914 to the following values: 1.353 in January 1916, 1.389 in January 1918, 14.776 in January 1920, 47.911 in January 1922, 11,672 in January 1923 and to 1,000,494,971,000 on December 27, 1923.

How do accountants (and government tax authorities) cope with the defects of historical cost accounting when inflation becomes so high that it cannot be ignored? Sweeney pointed out what happened in Germany during its hyperinflation:

“At first various supplementary measures were adopted, such as charging all new fixed asset costs to expense and creating a special reserve to provide for maintenance of plant value and business efficiency ... Later, computation of depreciation on the basis of reproductive cost grew in popularity, which, indeed, is still evident from a survey of cotemporary German depreciation theory.” Henry W. Sweeney (1931; 166).

Thus when there is very high inflation, historical cost accounting has to be abandoned with either all asset purchases being immediately expensed (so there is no need for depreciation allowances) or with nominal dollar depreciation values being indexed for general inflation (this is consistent with maintaining real financial capital intact) or for the specific asset inflation rate (this is consistent with maintaining real physical capital intact).³⁰ Sweeney described the differences between historical cost accounting and the two methods for indexing depreciation (using a general price index—his stabilized accounting³¹—versus a specific price index—reproductive cost depreciation³²) as follows:

“The fundamental difference between ordinary and stabilized depreciation methods is that, whereas the former is based upon original cost per books, the latter rests upon original cost adjusted for the change in average price levels. And the underlying difference between stabilized depreciation and reproductive cost depreciation is that, whereas the former is based upon the current *general* price level equivalent of original cost, the latter depends upon the current *special* price level equivalent of original cost (viz., cost of reproduction). Or, otherwise expressed, the ordinary depreciation method is concerned with maintenance of nominal, monetary capital; the stabilized type with preservation of real, economic capital; and the reproductive cost type with keeping physical, material capital intact.” Henry W. Sweeney (1931; 174).

It should be mentioned that the type of accounting that adjusts asset values and depreciation amounts from historical cost into current values (either of the general or specific type) is known as *current value accounting* in order to distinguish it from traditional historical cost accounting.³³ Sweeney (1927) (1931) favored general price level adjustments and the related maintenance of real financial capital concept as did Hayek (1941) some years later. Sweeney explained his preference for general price level adjustments as follows:

³⁰ Recall the controversy between Pigou (1941) and Hayek (1941) on maintaining capital intact.

³¹ Middleditch appears to be the first accountant to advocate this general price level adjustment method. He referred to the problem of incomparable units of purchasing power as follows: “Today’s dollar is, then, a totally different unit from the dollar of 1897. As the general price level fluctuates, the dollar is bound to become a unit of different magnitude. To mix these units is like mixing inches and centimeters or measuring a field with a rubber-tape.” Livingston Middleditch (1918; 114-115). Sweeney (1927; 183) later made a similar observation: “Such comparison violates the mathematical principle that dissimilar items can not properly be compared with one another.”

³² Zeff (1982; 546) attributed the replacement (or reproductive) cost or specific price level adjustment solution to Paton (1918). We will deal with replacement cost in more detail in the following chapter.

³³ For additional material on current value accounting, see Baxter (1975), Whittington (1980) and Zeff (1982).

“Maintenance of *nominal* capital, which may be kept intact by maintenance of the same mere money amount, is short sighted when money is depreciating in value. Maintenance of *material* capital, which may be maintained by constant ownership of the same amount of material quantities, may be poor business policy if the same goods in the same quantities are not required for business needs, and it may not be capital maintenance according to sensible interpretation, because the original goods being maintained in kind and quantity may be decreasing in general economic desirability (i.e., value) over a period of time. Hence, maintenance of value, not of mere physical equivalence, insures preservation of the same economic power over goods and services, and such preservation, which is maintenance of *real* capital, is much more worthwhile.” Henry W. Sweeney (1927; 185).

Sweeney’s preference for the maintenance of real financial capital is very similar to Hayek’s (1941) preference for maintaining real financial capital intact over Pigou’s (1941) preference for maintaining physical capital (or material capital to use Sweeney’s phrase) intact. However, it is a somewhat tricky business to implement (correctly) the Sweeney and Hayek view; we will address this issue in chapter VII below.³⁴

Given that Sweeney’s attacks on the inadequacies of historical cost accounting³⁵ were quite convincing in periods of high inflation and hence show that there are problems even when inflation is low, it is somewhat disappointing that historical cost accounting has not been fundamentally reformed in virtually all countries. Fitzgerald, Stickler and Watts made the following observations on the durability of historical cost accounting even when most OECD countries were experiencing substantial inflation:

“Presumably in response to the high rates of inflation experience, legal requirements have been introduced in Brazil and Chile for the adjustment of historical cost statements to reflect general price level changes. In Argentina, historical cost statements are accompanied by statements similarly adjusted. However, the replacement of historical cost statements with statements adjusted for the effects of *general price-level* changes is prohibited by law or by the accountancy profession in forty-three countries. The replacement of historical cost statements with statements adjusted for the effect of *specific price* changes is similarly prohibited in forty-six countries. It is required in none and minority practice in only one country—the Netherlands.” R.D. Fitzgerald, A.D. Stickler and T.R. Watts (1979; 12).

In section 5 below, we will review accounting treatments of capital gains. However, before we do this, it is first necessary to review what economists and accountants have classified as “productive activity”.

4. The Basic Forms of Productive Activity

“In economics, it is difficult to prove originality; for the germ of every new idea will surely be found over and over again in earlier writers.” Irving Fisher (1930; ix).

Over the years, several general forms of productive activity have been identified:

³⁴ As we shall see in chapter VII, both types of adjustment are necessary in order to define income under inflationary conditions, which follows the strategy suggested by Sterling: “It follows that the appropriate procedure is to (1) adjust the present statement to current values and (2) adjust the previous statement by a price index. It is important to recognize that *both* adjustments are necessary and that neither is a substitute for the other. Confusion on this point is widespread.” Robert R. Sterling (1975; 51).

³⁵ MacNeal (1939) also provided some convincing attacks on the conventions of historical cost accounting, which were also ignored by the accounting profession; see Zeff (1982).

- *Farming* or *harvesting* nature's bounty;
- *Manufacturing* or *physically transforming* less valuable commodities into more valuable commodities;
- The *transportation* of commodities from one location to a more valuable location;
- The *selling* and *marketing* of commodities to final demanders; i.e., the *retailing* of commodities;
- The provision of *personal services*;
- The *storage* or *holding* of goods from one time period to a future time period when they will be more valuable and
- The redistribution of *risk*.

The first four types of productive activity are not controversial and were identified long ago by Smith³⁶ in 1776 and Marshall³⁷ in 1898. Services are also regarded as being productive today, but the last two types of productive activity are regarded as being more controversial. Our focus in this section is on the question whether the sixth type of activity is productive, or put another way, we ask whether *holding gains* can be regarded as being productive.

Galliani (1751)³⁸ noticed the similarity between currency trading and the intertemporal trading of money while Böhm-Bawerk³⁹ noticed the analogy between transportation and

³⁶ “A capital may be employed in four different ways: either, first, in procuring the rude produce annually required for the use and consumption of the society; or, secondly, in manufacturing and preparing that rude produce for immediate use and consumption; or, thirdly, in transporting either the rude or manufactured produce from the places where they abound to those where they are wanted; or, lastly, in dividing particular portions of either into such small parcels as suit the occasional demands of those who want them. In the first way are employed the capitals of all those who undertake the improvement or cultivation of lands, mines, or fisheries; in the second, those of all master manufacturers; in the third, those of all wholesale merchants; and in the fourth, those of all retailers. It is difficult to conceive that a capital should be employed in any way which may not be classed under some or other of those four.” Adam Smith (1963; 278).

³⁷ “Production, in the narrow sense, changes the form and nature of products. Trade and transport change their external relations.” Alfred Marshall (1898; 183). Marshall elaborates as follows: “Man cannot create material things. ... All that he can do in the physical world is either to readjust matter so as to make it more useful, as when he makes a log of wood into a table; or to put it in the way of being made more useful by nature, as when he puts seed where the forces of nature will make it burst out into life. It is sometimes said that traders do not produce: that while the cabinet-maker produces furniture, the furniture-dealer merely sells what is already produced. But there is no scientific foundation for this distinction. They both produce utilities, and neither of them can do more: the furniture-dealer moves and rearranges matter so as to make it more serviceable than it was before, and the carpenter does nothing more. The sailor or the railway-man who carries coal above ground produces it, just as much as the miner who carries it underground; the dealer in fish helps to move on fish where it is of comparatively little use to where it is of greater use, and the fisherman does no more.” Alfred Marshall (1898; 132-133).

³⁸ “Hence arose exchange and interest, which are brothers. One is the equalizing of present money and money distant in space, made by an apparent premium, which is sometimes added to the present money, and sometimes to the distant money, to make the intrinsic value of both equal, diminished by the less convenience or the greater risk. Interest is the same thing done between present money and money that is distant in time, time having the same effect as space; and the basis of the one contract, as of the other, is the equality of the true intrinsic value.” Ferdinando Galliani (1751), reprinted in Monroe (1930; 302).

³⁹ “If the difference of the place at which goods are available is a sound economic reason for exchanging fungible goods that are in other respects entirely similar, and if the advantage and convenience of the present place may justify the claim and allowance of a premium, just as much may the difference of the

storage activities. Over the years, many accountants (such as Edwards and Bell⁴⁰ and Chambers⁴¹) and economists (such as Lerner⁴² and Debreu⁴³) have argued that the sixth type of productive activity is just as valuable as the other two types. However, when the sixth type of activity is labeled as “speculative activity” instead of “storage activity”, many economists and accountants have objected to treating the sixth type of productive activity in exactly the same manner as the first five types. Specifically, these economists and accountants argue against the inclusion of *holding gains* or *capital gains* on assets held by a business unit over an accounting period. In the following section, we look at their arguments in some detail.

5. Accounting Theory and the Treatment of Capital Gains

In this section, we shall present some of the arguments that have been advanced by economists and accountants to deny treating speculative gains or capital gains on assets held through an accounting period as net revenues or components of business income in a manner that is symmetric to the treatment of transformation and transportation activities. We shall consider six types of objection.

The *first objection* states that capital gains on assets held through the accounting period are capital losses to someone else and hence there is no net gain to the community. Consider the following quotations by the accountants Schmidt and Crandell:

“Only in one case can appreciation be real profit to the business man, viz., when he uses money credit to buy goods for speculation outside of his regular business needs. If his selling prices thereafter are higher than the money lent plus interest and costs after selling the goods, the difference will be his realized speculative gain. This kind of profit is especially high in times of rising general price levels. But this kind of private profit is no profit to the community, because the lender of money loses the same buying power on his money that the borrower gains.” Fritz Schmidt (1931; 291).

“What treatment should be accorded the speculative gains and losses realized from trading among individuals in securities? It is obvious that these sorts of transactions cannot increase the national wealth,

time at which similar goods are available be a sound reason for their exchange, and a guarantee that there will be premium on the –more valuable–present goods. This premium, and nothing else, is Interest.” Eugen von Böhm-Bawerk (1891; 295).

⁴⁰ “A business firm can strive to earn profit by combining factors of production having one value into a product which has a greater value, and it can attempt to make gains by holding assets while their prices rise.” Edgar O. Edwards and Philip W. Bell (1961; 272).

⁴¹ “It therefore does not seem to be realistic to suppose that holding gains or cost savings are a class apart from sellers' margins. They all, if positive, make the firm better off, that is, able to command more goods and services than before.” R.J. Chambers (1965; 740).

⁴² “There is another kind of speculation, which we may call simple or productive speculation. A man who does not consider himself to have any influence on the market price but who believes that the price is going to rise or is going to fall quite independently of his own actions, and who buys or sells in an attempt to make a profit, is a simple or productive speculator. If he guesses right he makes a profit, if wrong he makes a loss ... The same thing applies to the man who transports a good from one place to another ... these are perfectly legitimate production activities.” Abba P. Lerner (1946; 69-70).

⁴³ “The idea that a good or a service available at a certain date (and a certain location) is a different commodity from the same good or service available at a different date (or a different location) is old.” Gerard Debreu (1959; 35).

hence the national income cannot be affected thereby. Whatever one gains the other loses.” William T. Crandell (1935; 399).

The argument that the capital gains made by one business unit must be offset by capital losses made by some other consumer or business unit does not seem to be correct. Consider the case of a one person economy that controls a single business unit. Any capital gains made by the business unit that result from an optimal intertemporal allocation of resources are not offset by capital losses.⁴⁴

The *second objection* to the inclusion of capital gains in income is more subtle: speculative holding activities do not enhance the productive powers of the economy and hence any increase in revenues resulting from these activities should not be recognized as a benefit to the economy. In fact, focusing on speculative gains may be bad for the economy because it will cause managers to not focus on the other types of productive activities⁴⁵ (transformation and transportation). Consider the following quotations which are representative of this point of view:

“Some theoretical explanation of the reasons why appreciation cannot be profit is needed at this point. For this purpose we must consider the enterprise as a part of the national production machine. It will then be clear that a maintenance of total productivity as of a certain moment will only be possible, if the productive instrumentalities of all individual enterprises concerned are preserved intact. The maintenance of productive power as a whole is not possible if accounting is based on an original value basis. The reason is that pure appreciation would then appear as profit whenever a change of value has taken place between the purchase and selling dates for the materials and wages that compose a product.” Fritz Schmidt (1931; 289).

“The appreciation in value of capital assets and land must not be treated as an element in national income. Depreciation due to physical wear and tear and obsolescence must be treated as a charge against current income, but not the depreciation of the money value of an asset which has remained physically unchanged. Appreciation and depreciation of capital were included in the American statistics of national income prior to 1929, but now virtually the same convention has been adopted in all countries.” Colin Clark (1940; 31).

“Enhancement of asset values as a result of increased market prices does not, without realization of such appreciation through sale, constitute a basis for recognition of revenue to the business enterprise. However, the realization of gain on the sale of a capital asset does not necessarily imply any contribution by the seller to the social product during the period of realization. Because such gains are irrelevant to production of the period, capital gains (and losses) are excluded from calculations of national income and product. It is seen then that, whereas standards of accounting for revenue provide for recognition of capital gains once they have been realized, such gains find no place at all in the accounting for the economy.” Gilbert P. Maynard (1952; 190).

“The essence of the difference between financial capital maintenance and all concepts of physical capital maintenance is in the treatment of the effects of price changes while assets are held. Under financial capital maintenance, all such effects are included in income Under physical capital maintenance, the effects of price changes are excluded from income on the grounds that, if positive, they do not enable an enterprise

⁴⁴ More generally, the reader should refer to Lerner’s (1946; chapter 8) analysis of the benefits to society from competitive speculation.

⁴⁵ “Net realizable value is considered significant because it purports to reveal an alternative available to a firm in which the firm, as a periodic (year end) opportunistic calculator, ever seeks to exploit by selling the assets. However valid this might be in the minds of many profit seekers, it tends to misdirect the energies of management from production and the creation of values to the trading function alone. Such misdirection could well result in limited production and thus a lower standard of living.” Norton M. Bedford and James C. McKeown (1972; 336).

to increase its operating capability or, if negative, they do not force a reduction.” Bryan Carsberg (1982; 62).

“12.67. Holding gains are sometimes described as ‘capital gains’. The term ‘holding gain’ is widely used in business accounting and is preferred here because it emphasizes the fact that holding gains accrue purely as a result of holding assets over time without transforming them in any way.” *System of National Accounts 1993*, Eurostat (1993; 273).

The above authors have implicitly ruled out storage and holding activities as being productive like transformation and transportation activities.⁴⁶ However, we can follow Galliani and Böhm-Bawerk and argue that holding activities are completely analogous to transportation activities. Since transportation activities are regarded as being productive, so should holding activities.

The *third objection* to the inclusion of capital gains in the period by period income statements of a business unit has been made by accountants and it is an objection only to the inclusion of unrealized capital gains (i.e., no sale of the asset which has experienced a capital gain over the accounting period has been made) in income, not to the inclusion of realized capital gains (i.e., the appreciating asset has been sold during the accounting period). The objection is that unrealized capital gains should not be included in the period’s income due to their hypothetical and unverifiable nature. Consider the following quotations:

“Appreciation, Capital Gains and Losses. A part of the ultimate net income of an enterprise can be assigned in some cases to natural growth and other increases in value. In the case of timber tracts, orchards and similar properties, natural increase, commonly called accretion, is an important factor in financial history. In other cases enhancement of property values due to changing business and general economic conditions, a general rise in the price level, or other factors which result in an increase in effective value over actual cost, usually referred to as appreciation, are of marked significance. At what point, in the succession of events that lead to final fruition of these gains in cash, should the accountant recognize the change? Eventually, if no cognizance is taken of it before, the gain will be realized in cash when the property itself, or the product resulting from its use, is sold. Until such time as the gain is validated by sale, the increased value is commonly characterized as unrealized and the gain as ‘unearned’ or ‘unrealized income’.” William T. Crandell (1935; 389).

“The various codifications of accounting doctrine during the past two decades have been in general agreement that revenue should be recognized in the accounts only when certain tests of realization have been met. In the vast majority of cases, revenue realization is marked by a discrete event, that of sale and delivery of goods or services. Thus accountants draw a distinction between the earning or accrual of revenue throughout the productive processes and the realization of revenue, giving recognition in the accounts only to the latter The national income accountant is concerned with the creation of product, not alone with its subsequent sale.” Gilbert P. Maynard (1952;189).⁴⁷

⁴⁶ However, other parts of the *System of National Accounts 1993* explicitly recognize storage and holding gains on storage activities as being productive: “Many goods have to be stored in a properly controlled environment and the activity of storage can become an important process of production in its own right whereby the goods are “transported” from one point of time to another. In economics, it is generally recognized that the same goods available at different times , or locations, may be qualitatively different from each other and command different prices for this reason.” Eurostat (1993; 130-131).

⁴⁷ This quotation illustrates one of the three main differences between business accounting and social (or national income) accounting: the former emphasizes the *realization* of revenues or the sale of products while the latter emphasizes the *creation* of production of products. The other two main differences are: (i)

“There is another important respect in which business and social accounting differ which is worthy of comment here. Although business accountants are fully aware of the tentative nature of their measurements of income, they place great emphasis upon the objectivity and verifiability of the business data to which they grant recognition in the accounts.” Gilbert P. Maynard (1952; 193).

The accountant’s objection to the inclusion of unrealized capital gains as a contribution to the income of an accounting period due to their hypothetical nature is a valid one. However, the traditional accounting solution to the unrealized capital gains problem is to assume that no capital gains occur in any accounting period unless a realization occurs in some period (i.e., the asset is sold) in which case, all of the capital gains that accrued over the many accounting periods that the asset was held are imputed to the period of sale. This historical cost treatment of capital gains can create tremendous distortions (particularly in inflationary environments) to both the periodic income statements and balance sheets of the business unit.⁴⁸ Thus the accountant's treatment of unrealized capital gains (i.e., to exclude them from the income statement) is just as hypothetical (and more misleading in an inflationary environment) as including them in periodic income.⁴⁹ However, the historical cost accountant’s objection to the hypothetical nature of period by period valuations of the capital stock components held by the business unit could be used to justify a separate treatment of unrealized capital gains on income statements

social accounting usually does not recognize capital gains (realized or unrealized) in income statements whereas business accounting recognizes realized capital gains and (ii) business accounting uses a historical cost accounting treatment of depreciation whereas social accounting uses a current price approach to depreciation.

⁴⁸ This point is quite old as the following quotations indicate. “Then why not recognize appreciation also, as it accrues, instead of waiting until a sale is made If this appreciation were not recognized in 1914 the item of appreciation would become revenue in 1915; and net revenue would not be correctly stated in either period.” William A. Paton (1918; 43). “The insistence of accountants upon the importance of differentiating between realized and unrealized income has probably proved a wise one. But the artificial showing that it causes should be clearly understood. For, as a consequence, a period may be credited with income that it did not earn, and be charged with a loss that it did not suffer.” Henry W. Sweeney (1933; 334). “Some limitations of accounting profit as a managerial tool can now be briefly indicated Capital gains are counted only when realized. This means that some of the events of past periods, notably price changes and the gains and losses associated with them, are treated as though they were events of the current period. If an asset has been held for five years and then sold, all of the gains and losses arising over the five year period are credited to the year of sale.” Edgar O. Edwards and Philip W. Bell (1961; 116). “In effect, present accounting data are predicated on the assumption that holding activities do not represent a purposeful means by which management can enhance the market position of the firm. To the extent that the firm attempts to make gains in this fashion, traditional accounting data fail to inform management, owners, and outsiders as to the progress the firm has made during the current period. A second consequence of not counting gains when they arise is that when such gains are in fact realized, the gains earned over the entire time span during which the assets were held by the firm are attributed entirely to the period in which the gains are realized.” Edgar O. Edwards and Philip W. Bell (1961; 222). “The third consequence of the failure to report capital gains and losses as they occur is the badly distorted balance sheet values which result.” Edgar O. Edwards and Philip W. Bell (1961; 223).

⁴⁹ MacNeal (1939) also makes this point very forcefully. However, historical cost accountants can claim that their procedure of excluding unrealized capital gains from periodic income is more “objective” and “verifiable” than any procedure that includes them in periodic income.

rather than simply lumping them in with the more objective (transformation and transportation) sources of income.⁵⁰

A *fourth argument* against the inclusion of capital gains in income statements runs as follows: for most businesses, capital gains or losses are an unintended consequence of their normal productive activities and moreover, in the long run, these gains and losses will tend to cancel. Hence it is not worth the bother of including these gains and losses as income, particularly when income may be taxed and hence a large unrealized capital gain may lead to a large tax bill which in turn may lead to a curtailment of the firm's normal productive activities. However, this line of thought led to a difficulty: what if the normal activity of a business unit was speculative (e.g., a commodities trader or a land speculator)? These business units would seem to be excluded from paying any income taxes on their earnings from speculative activities. To get around this difficulty, Plehn and other economists introduced the concept of *recurrence of income*:

“Income is essentially wealth available for recurrent consumption recurrently (or periodically) received. Its three essential characteristics are: receipt, recurrence, and expendability.” Carl C. Plehn (1924; 5).

It will, I think be readily admitted that of those particular gains and profits which are recurrent, expendable receipts are the ones about whose income character there is seldom any doubt. Thus the gains and profits of a merchant are his income. The possible or even probable irregularity or uncertainty which distinguishes them from some other incomes does not seem to militate against their inclusion in income, provided they are expected to be recurrent. The same is true of the gains and profits of dealers in capital assets, for the lands, stocks and bonds, houses and the like are their stock in trade But it is when gains and profits lack one or two of the three characteristics of income, or have them in less than complete form, that a question arises. The one that is most often lacking is recurrence. Thus gains and profits from transactions outside of one's regular vocation or line of business, like the profit from the sale of a home, are of doubtful income character.” Carl C. Plehn (1924; 10).

“The British income tax places very heavy stress upon the annual character of income. For an explanation of this conception, which results in the exclusion from taxable income of gains of an irregular nature, one must go back as far as the fifteenth century, when, with an agricultural society where few fortuitous gains developed, the idea of receipts as being annual in character became deeply impressed upon the minds of the people. It became the habit to think of one's regular receipts as his income, and to consider irregular receipts as additions to capital.” Robert Murray Haig (1921; reprinted 1959; 69).

Thus if a business unit *regularly* makes profits on its speculative activities, the resulting profits are regarded as income but any capital gains on *occasional* speculative activities are not regarded as income according to the recurrence criterion for income. Of course, the problem with this concept is that it is difficult to draw the boundaries of recurrence:

“When is income recurrent? Professor Plehn expressly says it need not be perfectly regular. But how irregular can it be and still be ‘recurrent’? The big profit on the sale of an old homestead may well occur twice in a lifetime. Does it not then ‘recur’? If we extend the picture through two or more lifetimes ‘recurrence’ becomes altogether likely. In the case of corporations whose life goes on indefinitely every windfall, or extraordinary profit, may some day be duplicated. Evidently the ‘recurrency’ concept turns out to be too elusive to pass muster as a basis for analysis.” Irving Fisher (1924; 666).

⁵⁰ The same logic would justify a separate listing for historical cost depreciation expense since it too is hypothetical.

More fundamentally, if holding gains are regarded as being valid additions to income in some contexts, then why should they be excluded in other contexts? When we view speculative activities as being the intertemporal counterpart to transportation activities, it is obvious that a case can be made for including them as a valid form of productive activity: goods are transported across time to periods where they will be more highly valued instead of being transported across space to locations where they will be more highly valued.

The *fifth objection* to the inclusion of capital gains in income is related to the last objection: (ex post) holding gains are so variable and transitory, that their inclusion in measures of national output and hence income just leads to a lot of meaningless noise in the accounts. This is probably the most persuasive objection. The obvious solution to this objection is to *smooth* volatile asset prices in order to eliminate the transitory fluctuations. However, this solution leads to a potential *lack of objectivity and reproducibility* of the smoothed estimates of asset prices. Different smoothing methods will generate different trended asset prices.

The final *sixth objection* to the inclusion of capital gains in income is well explained by Hicks, who objected to the inclusion of *unanticipated* capital gains on the grounds that they are not relevant to economic choices made by producers and consumers with respect to the purchase or holding of durable goods. Thus Hicks distinguished between *ex ante* and *ex post* income concepts:

“All the definitions of income we have hitherto discussed are *ex ante* definitions—they are concerned with what a person can consume during a week and still *expect* to be as well off as he was. Nothing is said about the realization of this expectation. If it is not realized exactly, the value of his prospect at the end of the week will be greater or less than it was expected to be, so that he makes a ‘windfall’ profit or loss. If we add this windfall gain to any of our preceding definitions of income (or subtract the loss), we get a new set of definitions, definitions of ‘income including windfalls’ or ‘income *ex post*’. There is a definition of income *ex post* corresponding to each of our previous definitions of income *ex ante*; but for most purposes it is that corresponding to Income No. 1 which is the most important. Income No. 1 *ex post* equals the value of the individual’s consumption *plus* the increment in the money value of his prospect which has accrued during the week; it equals Consumption *plus* Capital accumulation.” J.R. Hicks (1946; 178).

Hicks then went on to criticize his definition of ex post Income No. 1 as follows:

“This is a very convenient property, but unfortunately it does not justify an extensive use of the concept in economic theory. *Ex post* calculations of capital accumulation have their place in economic and statistical *history*; they are a useful measuring rod for economic progress; but they are of no use to theoretical economists, who are trying to find out how the economic system works, because they have no significance for conduct. The income *ex post* of any particular week cannot be calculated until the end of the week, and then it involves a comparison between present values and values which belong wholly to the past. On the general principle of ‘bygones are bygones’, it can have no relevance to present conditions. The income which is relevant to conduct must always exclude windfall gains; if they occur, they have to be thought of as raising income for future weeks (by the interest on them) rather than as entering into any effective sort of income for the current week. Theoretical confusion between income *ex post* and *ex ante* corresponds to practical confusion between income and capital.” J.R. Hicks (1946; 179).

Thus if our purpose is to construct user costs of capital that correspond to market rental prices for units of durable goods (whether used in consumption or production), then it

seems that Hicks' is correct: it is the ex ante (or beginning of the period) point of view that is most relevant to the construction of user costs and hence unanticipated capital gains should not be included in the user cost formula.⁵¹ Of course, this leaves open the difficult problems involved in empirically estimating ex ante capital gains.

Our own opinion on this controversial literature is as follows:

- If our goal is to form period by period approximate rental prices for assets that are held by production units for several periods, then only *anticipated holding gains* should be included in the user cost formula.⁵²
- If our goal is to measure the period by period *ex post performance* of a business unit, then one can make a case for either treatment of holding gains; i.e., exclude unanticipated holding gains from the income measure because the production unit did nothing to earn these gains: they fell from heaven. On the other hand, if we want a measure of the financial position of the production unit at the end of the period, then unanticipated holding gains and losses certainly impact this financial position and hence they could be included.

References

- Anthony, R.N. (1973), "Accounting for the Cost of Equity", *Harvard Business Review* 51, 88-102.
- Baxter, W.T. (1975), *Accounting Values and Inflation*, London: McGraw-Hill.
- Bedford, N.M. and J.C. McKeown (1972), "Comparative Analysis of Net Realizable Value and Replacement Costing", *The Accounting Review* 47, 333-338.
- Berkow, W.F. (1964), "Need for Engineering Influence Upon Accounting Procedure", *The Accounting Review* 39, 377-386.
- Böhm-Bawerk, E. V. (1891), *The Positive Theory of Capital*, W. Smart (translator of the original German book published in 1888), New York: G.E. Stechert.
- Canning, J.B. (1929), *The Economics of Accountancy*, New York: The Ronald Press Company.
- Carsberg, B. (1982), "The Case for Financial Capital Maintenance", pp. 59-74 in *Maintenance of Capital: Financial versus Physical*, R.R. Sterling and K.W. Lemke (eds.), Houston: Scholars Book Co.

⁵¹ For additional material on ex ante versus ex post estimates of depreciation and income, see Hicks (1942) and Hill and Hill (2003).

⁵² This is consistent with the position of Hill (1999) (2000) (2005) and Hill and Hill (2003) on this subject.

- Chambers, R.J. (1956), "Some Observations on 'Structure of Accounting Theory'", *The Accounting Review* 31, 584-592.
- Chambers, R.J. (1965), "Edwards and Bell on Business Income", *The Accounting Review* 40, 731-741.
- Clark, C. (1940), *The Conditions of Economic Progress*, London: The Macmillan Press.
- Crandell, W.T. (1935), "Income and its Measurement", *The Accounting Review* 10, 380-400.
- Daniels, M.B. (1933), "The Valuation of Fixed Assets", *The Accounting Review* 8, 302-316.
- Debreu, G. (1959), *Theory of Value*, New York: John Wiley and Sons.
- Diewert, W.E. (1977), "Walras' Theory of Capital Formation and the Existence of a Temporary Equilibrium", pp. 73-126 in *Equilibrium and Disequilibrium in Economic Theory*, E. Schwödiauer (ed.), Reidel Publishing Co.
- Edwards, E.O. and P.W. Bell (1961), *The Theory and Measurement of Business Income*, Berkeley, CA: University of California Press.
- Eurostat, International Monetary Fund, OECD, United Nations and World Bank (1993), *System of National Accounts 1993*, Luxembourg, New York, Paris, Washington DC.
- Fisher, I. (1897), "The Role of Capital in Economic Theory", *The Economic Journal* 7, 341-367.
- Fisher, I. (1924), "Comment on President Plehn's Address", *The American Economic Review* 14, 64-67.
- Fisher, I. (1930), *The Theory of Interest*, New York: The Macmillan Co.
- Fitzgerald, R.D., A.D. Stickler and T.R. Watts (1979), *International Summary of Accounting Principles and Reporting Practices*, London: Butterworths.
- Galliani, Ferdinando (1751), "Money" reprinted as pp. 281-307 in A.E. Monroe (1930), *Early Economic Thought*, Cambridge MA: Harvard University Press.
- Gilman, S. (1939), *Accounting Concepts of Profit*, New York: The Rolland Press Co.
- Griliches, Z. (1963), "Capital Stock in Investment Functions: Some Problems of Concept and Measurement", pp. 115-137 in *Measurement in Economics*, C. Christ and others (eds.), Stanford California: Stanford University Press; reprinted as pp. 123-

- 143 in *Technology, Education and Productivity*, Z. Griliches (ed.), (1988), Oxford: Basil Blackwell.
- Haig, R.M. (1959), "The Concept of Income: Economic and Legal Aspects", pp. 54-76 in *Readings in the Economics of Taxation*, R.A. Musgrave and C.S. Shoup (eds.), Homewood, Illinois: Richard D. Irwin (Haig's chapter was originally published in 1921).
- Hayek, F.A. v. (1941), "Maintaining Capital Intact: A Reply", *Economica* 8, 276-280.
- Hicks, J.R. (1946), *Value and Capital*, Second Edition, Oxford: The Clarendon Press.
- Hicks, J.R. (1942), "Maintaining Capital Intact: a Further Suggestion", *Economica* 9, 174-179.
- Hill, P. (1999); "Capital Stocks, Capital Services and Depreciation"; paper presented at the third meeting of the Canberra Group on Capital Stock Statistics, Washington, D.C..
- Hill, P. (2000); "Economic Depreciation and the SNA"; paper presented at the 26th Conference of the International Association for Research on Income and Wealth; Cracow, Poland.
- Hill, P. (2005), "Depreciation in National Accounts", Canberra II Group on Capital Measurement paper, March.
- Hill, R.J. and T.P. Hill (2003), "Expectations, Capital Gains and Income", *Economic Inquiry* 41, 607-619.
- Hotelling, H. (1925), "A General Mathematical Theory of Depreciation", *Journal of the American Statistical Association* 20, 340-353.
- Ijiri, Y. (1979), "A Defense of Historical Cost Accounting", pp. 62-74 in *Readings in Inflation Accounting*, P.T. Wanless and D.A.R. Forrester (eds.), New York: John Wiley and Sons.
- Leontief, W.W. (1941), *The Structure of the American Economy 1919-1929*, Cambridge MA: Harvard University Press.
- Lerner, A.P. (1946), *The Economics of Control*, New York: The Macmillan Company.
- Lutz, F. and V. Lutz (1951), *The Theory of Investment of the Firm*, Princeton, N.J.: Princeton University Press.
- MacNeal, K. (1939), *Truth in Accounting*, Philadelphia: University of Pennsylvania Press.

- Marshall, A. (1898), *Principles of Economics*, Fourth Edition, London: Macmillan, (First Edition: 1890).
- Mason, P. (1933), "Illustrations of the Early Treatment of Depreciation", *The Accounting Review* 8, 209-218.
- Matheson, E. (1910), *Depreciation of Factories, Mines and Industrial Undertakings and their Valuations*, Fourth Edition, (First Edition 1884), London: Spon.
- Maynard, G.P. (1952), "Business Income and National Income: A Contrast of Concepts", *The Accounting Review* 27, 189-194.
- Middleditch, L. (1918), "Should Accounts Reflect the Changing Value of the Dollar?", *The Journal of Accountancy* 25, 114-120.
- Paton, W.A. (1918), "The Significance and Treatment of Appreciation in the Accounts", pp. 35-49 in *Twentieth Annual Report of the Michigan Academy of Science*, G.H. Coons (ed.) Ann Arbor: Michigan Academy of Science. Reprinted in *Asset Appreciation, Business Income and Price-Level Accounting: 1918-1935*, S.A. Zeff (ed.), New York: Arno Press.
- Paton, W.A. (1931), "Economic Theory in Relation to Accounting Valuations", *The Accounting Review* 6, 89-96.
- Pigou, A.C. (1935), "Net Income and Capital Depletion", *The Economic Journal* 45, 235-241.
- Pigou, A.C. (1941), "Maintaining Capital Intact", *Economica* 8, 271-275.
- Plehn, C.C. (1924), "The Concept of Income, as Recurrent, Consumable Receipts", *The American Economic Review* 14, 1-12.
- Preinreich, G.A.D. (1938), "Annual Survey of Economic Theory: The Theory of Depreciation", *Econometrica* 6, 219-241.
- Schmidt, F. (1931), "Is Appreciation Profit?", *The Accounting Review* 6, 289-293.
- Smith, A. (1963), *An Inquiry into the Nature and Causes of the Wealth of Nations*, Volume 1, Homewood Illinois: Richard D Irwin (first edition: 1776).
- Sterling, R.R. (1975), "Relevant Financial Reporting in an Age of Price Changes", *The Journal of Accountancy* 139 (February), 42-51.
- Sweeney, H.W. (1927), "Effects of Inflation on German Accounting", *Journal of Accountancy* 43, 180-191.

- Sweeney, H.W. (1931), "Stabilized Depreciation", *The Accounting Review* 6, 165-178.
- Sweeney, H.W. (1933), "Income", *The Accounting Review* 8, 323-335.
- Sweeney, H.W. (1936), *Stabilized Accounting*, New York: Harper and Brothers.
- Taylor, J.S. (1923), "A Statistical Theory of Depreciation Based on Unit Cost", *Journal of the American Statistical Association* 18, 1010-1023.
- Walras, L. (1954), *Elements of Pure Economics* [first edition published in 1874], W. Jaffé (translator), Homewood, Illinois: Richard D. Irwin.
- Whittington, G. (1980), "Pioneers of Income Measurement and Price-Level Accounting: A Review Article", *Accounting and Business Research* Spring, 232-240.
- Woodward, P.D. (1956), "Depreciation– the Development of an Accounting Concept", *The Accounting Review* 31, 71-76.
- Wright, F.K. (1964), "Towards a General Theory of Depreciation", *Journal of Accounting Research* 2, 80-90.
- Zeff, S.A. (1982), "Truth in Accounting: The Ordeal of Kenneth MacNeal", *The Accounting Review* 57, 528-553.