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Why Are Capital Costs Ignored by Colleges and Universities
and
What Are the Prospects for Change?

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WHY ARE CAPITAL COSTS IGNORED BY COLLEGES AND UNIVERSITIES

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An important part of the cost of education in US colleges and universities is ignored in the economic information used by policy makers, the public, and the colleges themselves. They try to understand and manage the educational enterprise with only crude and incomplete information about the costs of the plant and equipment services used in education. At Williams, as a convenient if extreme example, the cost of producing a year of education for a student in 1991 appears to be \$33,600 but accounting for the use of capital, it is a bit more than \$51,000. Put differently, leaving some \$18,000 of capital costs' out of calculation of the educational cost of a student's year at Williams has the same effect, almost to the dollar, as would leaving out all personnel costs -- the total costs of the faculty, administration, and hourly workers, including their fringe benefits (\$18,051 per student).

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1 A \$300 million plant at 10% interest rate and 2% depreciation spread over 2000 students. This is conservative: total return on endowment has been 12% in the recent past and the plant size and real depreciation are probably understated.

The distorted view of actual costs that comes from neglecting capital at a school like Williams is especially severe because, oddly, the degree of neglect and distortion depends primarily not on how much capital a school uses in its activities, but on the accident of how it pays for that plant and equipment. Williams' costs are understated a great deal because the school owns its capital stock, outright. If Williams were to sell its campus to a private real estate entrepreneur, lock, stock and barrel, and rent it back at a competitive rate, its apparent current costs per student would rise by almost 60% and reflect its true costs. But of course nothing real would be changed, economically. So inconsistency in the treatment of capital costs among schools compounds the problems of their understatement, per se; it is impossible to compare educational costs meaningfully except among schools that have very similar financial arrangements in using their plant and equipment.

None of this is news, of course, to economists. In his early work on the costs of higher education, Schultz 119601 made explicit correction for the absence of capital cost data and it became routine in studies of educational costs to estimate and add in imputed capital costs (see O'Neill, 1971; James, 1978, etc.).

It is, though, still important to ask, "So what? -- the cost figures are quirky, but what real difference does that make?" There are, I think, five pieces to the answer:

1. We simply don't know the real costs of higher education -- as those costs enter into issues of public policy, into comparisons among schools, into tracking educational costs over time.

2. We can't make informed choices about how best to do what we have to do -- how many people to use with how much space and equipment; what it really costs, for instance, to equip everyone with a personal computer or a space in a parking garage.

3. Redundant, duplicated facilities and equipment -- between departments and between campuses -- are hard to avoid if we don't know what that added convenience really costs us; library collections and research equipment include a lot of convenience-costs of unknown size that carry faint incentives to economize.

4. Gifts are accepted -- or, more generally, long term commitments are made to projects and programs -- with an incomplete recognition of their real future cost implications.

5. It's hard to recognize capital costs that vary over the day or week or season -- like classrooms outside the popular period from ten o'clock to two -- so chronic shortages (from ten to two) will coexist with idle facilities (at other hours).

Neglect of capital costs appear, for one or more of these reasons, to be non-trivial.

So the questions of the title remain: Why don't nonprofit enterprises explicitly and routinely recognize the considerable cost (and contribution to production) of their physical capital stocks and what, after all this time during which the distortion has been recognized, is likely to come of it?

A. Why Don't Nonprofits Recognize Capital Costs?

Intermediate microeconomic theory -- as taught to undergraduates and in the nation's MBA programs -- provides an effective way to organize understanding of the role and costs of capital in higher education. The theory of the firm distills out the essential elements of technology, costs, and prices that characterize production processes, including those of colleges and universities. Though it is easy to misapply the economic model of the for-profit firm -- to be glib and careless in

transferring it to nonprofit activities -- used with modesty and care it can serve many purposes well.

1. The Tradition -- Capital Costs in the For-Profit Firm

The past couple of decades have seen significant clarification of the theory of productive capital in for-profit firms with the work of Haavelmo (1960) and Jorgenson and Grilliches (1967) and, with particular respect to capital utilization, my own efforts of a few years ago (1982) Capital costs are conceptually slippery for two related reasons: because a firm's capital stocks are *durable*, purchased in one period for use well into the future, and because capital services enter the production process from *within* the firm, unlike the typical flow of current inputs to production that are purchased from outside agents. A firm buys a year's labor services and fuel and raw materials from outside suppliers, but it gets the complementary flow of capital services from the durable buildings and machinery that it owns itself. Those characteristics need generate no special conundrums in modeling the production technology but they do create problems in measuring capital costs and responding to them.

The costs of using plant and equipment that is already owned by the firm have, broadly, two dimensions.² The first is the value of the capital stock used in production: the number of "machines," K , in a stylized example, times the price paid, P , for each machine³ measures the value of the firm's capital stock, $P_m K$. The other dimension of capital cost recognizes its durability

² A third dimension that is not of immediate relevance to this discussion is the utilization of a capital stock, most simply the proportion of the total 8760 hours a year it is used in production. That issue does, though, motivate some collegiate schemes like Dartmouth's "trimester" system and the extensive use of campuses in attractive settings like Williams' for "summer conferences."

³ This raises a familiar but sticky issue since most accounting records will show the "historical costs" of capital -- its value at the prices originally paid -- but what is relevant is replacement or market cost, what the capital is worth now.

and the fact that it wears out and becomes obsolete (depreciates) over time and use.

Scarce resources are tied up in capital assets (factories and classrooms and libraries and lab equipment) for a long time. Income is foregone by the owner of those capital assets since those resources would have been earning interest income if they'd been invested, instead, in financial assets. The cost of lost earnings -- the "opportunity cost" of owning long lived plant and equipment instead of financial assets -- is usually the largest cost of using capital in production. If, for instance, the interest rate is 10% percent per year, the yearly opportunity cost of a plant worth \$1 million is \$100,000.

Real deterioration or depreciation is the other and typically smaller component of capital cost -- the fact that when it's used in production,, the capital stock is partially worn out and becomes obsolete and that, too, is a cost of using capital. With the conservative figure of 2% real depreciation each year,⁴ a \$1 million plant loses \$20,000 of its value through wear and tear.

Putting depreciation (d) and opportunity cost (r) together, the total cost of using K of capital in production for a year will be, algebraically, $(r + d)P_m K$: with 2% depreciation and a 10% rate of interest, the cost of the \$1 million plant is \$120,000 a year. That's the full, economic cost of using capital services in production. It is the "user cost" or "rental rate" of capital, the price that would have to be charged to rent a unit of capital for a year in a highly competitive environment.

⁴ The figure normally used by economists (Schultz, O'Neill, James) though Dunn's much more detailed analysis makes a strong case that as much as 4.5% of replacement value may depreciate each year when both "renewal" and "adaption" (obsolescence) are recognized [Dunn].

2. Transplanting Capital Costs

That specification of capital costs is quite universal -- it describes the economic costs of using capital in production whether in a for-profit or a nonprofit enterprise.⁵ So it effectively structures the understanding of total capital cost in colleges and universities.

But accounting for those capital costs in a nonprofit firm hits a serious snag. Accounting traditions were developed primarily for for-profit firms and applied to nonprofits like colleges and universities only secondarily. What makes sense for a nonprofit firm, in this case, seems quite strange in the for-profit tradition. Intuition, nurtured by for-profits, makes it very awkward to do the right thing about capital costs in nonprofit firms. Furthermore, part of capital costs -- depreciation, the smaller part -- more easily and often is recognized in nonprofit accounts' while the larger part -- opportunity cost -- continues to cause problems.

The hitch comes from the fact that in western capitalist economies, the distinctly different roles of (a) owner of the productive capital stock and (b) entrepreneur/organizer of the firm have been merged in the private archetypal firm so their functionally quite different rewards -- the costs of capital services and the residual profits that reward entrepreneurial risk -- have been mixed up too. Ownership of capital carries with it rights and responsibilities -- and rewards -- of management. In the typical for-profit firm like that of Economics 101, these roles are joined in a single owner (or a group of stockholder-owners), so Econ 101 instructors routinely insist that their

⁵ Despite some caveats necessitated by restricted funds.

⁶ Though it falls short of a full accounting of depreciation, an effort is often made by nonprofit hospitals, foundations, and some colleges; a similar (and similarly inadequate) depreciation accounting has been mandated -- as discussed below -- for colleges and universities starting this year [FASB].

students disentangle these two things. The “accounting profits” earned by an owner-entrepreneur are shown to be an amalgam of, on the one hand, payments to the owner for the use of his capital $((r + d)P_m K)$ and, on the other hand, any additional or “economic profits” he might earn as entrepreneur -- residual payment for his organizing-managing-risk-taking function. It’s unlikely that that distinction lasts in the minds of the students much beyond the final exam, but the effort at clarity satisfies the instructor.

But if capital costs are mixed in with entrepreneurial profits in the accounting concepts of the private, for-profit firm, what happens to capital costs when those accounting concepts are transplanted to nonprofit firms? The answer has been that they have largely disappeared along with the accounting profits of which they were part. No accounting conventions exist to report the costs of capital separately from entrepreneurial profits because separation wasn’t needed in the capitalist for-profit firm. The owner got the residual: economic profits, capital costs, and all.

With no way to recognize the opportunity cost of owned productive capital in its own right -- even mixed in with profits -- the treatment of capital costs in college and university accounting has depended on the accident of its financing. Specifically,

- if capital is not owned by the school but is rented from outside agents, its full cost $((r + d)P_m K)$ will be recognized as a cost of production because it is explicitly paid to an outside agent.

- if capital is owned by the school but is financed by borrowing, its opportunity cost will be recognized because interest costs $(rP_m K)$ are, again, explicitly paid to an agent outside the institution. The depreciation component of its capital costs $(dP_m K)$ need not be recognized.

- if capital is owned by the school but was purchased from its own funds, neither its depreciation nor its opportunity costs will be recognized as a current cost $((r + d)P_m K = 0)$. This is why the Williams illustration in the introduction is an extreme case of cost distortion.

But if the theory of the for-profit firm -- with its implied accounting logic and the accumulated weight of tradition -- has eliminated most of capital costs from the economics of production in nonprofit firms, it also provides the conceptual structure through which to put them back.

3. Capital Costs in a Nonprofit Firm

A nonprofit firm has three relevant characteristics that differentiate it from the for-profit firm and tangle any simple effort to transplant the logic of for-profit accounts to nonprofit firms. They are important to why a nonprofit is a nonprofit.

First, the nonprofit firm has no “owners” (entrepreneurial or stockholder), either inside or outside, separable from the firm itself; no one who has, in capitalist tradition, invested in the capital stock and therefore become entitled to be paid its returns. This underlies the “non-distributional constraint” that Hansmann saw as distinguishing nonprofit from for-profit firms: nonprofits can and do earn profits, but they can’t distribute them to anyone (Hansmann, 1986).

Second, the nonprofit firm usually earns neoaive economic profits when those are defined as they are for the typical for-profit firm, as proceeds from the sale of its products less the costs of their production: total revenue minus total costs in Econ 101. In colleges and universities, this is manifested in the fact that the sticker price (tuition) is typically a good deal less than the average

cost of production. Each student-customer is subsidized: with a tuition charge of \$20,760, Williams students got a subsidy of at least \$29,000 in 1991.

But third, the nonprofit firm very often does earn profits; it can run at a loss in conventional terms but accumulate regular “surpluses” because its sales revenues are augmented by other non-product sources of income -- notably gifts, endowment earnings, and indirect cost recovery. So its total or “global” income often exceeds total expenditures. These sources of income are, of course, absent from the typical for-profit firm.’

So for a nonprofit firm, then, current accounting stymies incorporation of capital costs in three ways: (a) there normally is no conventional profit to act as a carrier for the cost of capital services, (b) though there often are positive global profits, they can’t legally be distributed outside the firm but (c) the capital stock is owned by the firm itself so any explicit payment of capital service costs involve the disconcerting practice of the firm’s making payments to itself, increasing both its expenditures and its income, the one as a cost of its production and the other as a return on its invested wealth.

Despite the Looking Glass nature of the accounting procedures by which a nonprofit firm can accurately reflect the cost of capital services, how it should be done seems clear. To recognize the opportunity cost of capital, the nonprofit firm would estimate the current value of its physical capital stock ($P_m K$), it would estimate yearly earnings lost by diverting a dollar of that wealth from financial investments (r), and it would include the resulting opportunity costs of capital ($rP_m K$) in both its current production costs and its asset income. To recognize depreciation costs, it would estimate yearly real depreciation ($dP_m K$) and add to current production costs any excess of that over current maintenance spending.

⁷For a more detailed discussion, see Winston (1991).

What may be jarring about the treatment of capital costs is the addition of the same, imputed, opportunity cost to both spending and income. “Why not,” it is reasonable to ask, “leave things alone?” If the neglect of these capital costs misstates the income and expenditures of a nonprofit firm by equal amounts, the bottom line -- their difference -- won’t be affected.”

But that is a question framed for the for-profit firm where the bottom line is profits, literally the difference between income and expenditures. Which isn’t affected. But of greater importance to the nonprofit firm is the composition of costs and income. Where do the resources to pay for education come from, for instance, and where do they go? What is the total cost of education? How and how well are various resources used in producing education? Do the inevitable tradeoffs between use of capital and non-capital resources -- computers and teachers, for instance -- reflect their costs to the institution? To society? These are questions that simply can’t be answered without an accounting of capital costs. They are far different from questions about profit levels.

But even the procedure that would correctly measure the opportunity cost of capital is not as unconventional as it might appear. Rental income from owner-occupied houses is routinely estimated and imputed to home owners as both income and expenditures in the national income accounts. That convention involves the same thing as does a correct accounting of capital costs in a college, and for the same reason: it captures the value of an economically significant flow of capital services that are hidden within the accounting-ownership unit. So we impute the value of that flow of capital services. The same entity both spends and receives the imputed flow -- it spends as a user of capital services and receives as an owner of the capital stock. Samuelson and Nordhaus put it this way:*

“*Rent* income of persons [in the national accounts] includes rents received by landlords. In addition, if you own your own house, you are treated as *paying rent to yourself*. This is a so-called imputed item and makes sense if we really want to measure the housing services

8 A more official statement is found in U.S. Department of Commerce, 1987, p.2.

turn out to be as encouraging as it first appears. Despite the clarity with which they recognize at least part of the problem (“Omitting depreciation produces results that do not reflect all costs of services provided.” [FASB, p. 13.]), their new standards will not alter the reported Operating Budgets or “Educational and General” spending or Current Fund spending on the basis of which “the costs of higher education” will usually be judged by managers and policy makers and scholars. Instead, the depreciation costs that FASB requires are to be hidden away as an obscure accounting adjustment to “Plant Fund Balances.” Nor does the Board give any guidance on how to measure depreciation, leaving the method up to the individual institution with the requirement only that it be based on historical asset costs and that it be made explicit.⁹ It appears that when all colleges are in full compliance with the FASB depreciation reporting requirement it will still be just as necessary as it is now to estimate and impute both the depreciation and opportunity costs of capital if one wants to know the costs of higher education.”

It should be noted, in fairness, that some schools have long and voluntarily accounted for some depreciation costs, one way or another [Collins and Forrester, Ch. 81. Like Islamic banking where capital costs have to be zero by doctrinal mandate, colleges have found ways to acknowledge depreciation costs simply to avoid kidding themselves. Local option, of course, makes comparisons between schools even more dicey.

A final reason to be pessimistic about future recognition of capital costs is, simply, that very large dollar figures are involved for colleges that own their own capital stocks. The

⁹ They acknowledge that using historical values for capital assets creates inherent inaccuracies, but since that problem plagues all of capital asset valuation -- of for-profit and nonprofit alike -- they sensibly argue that the nonprofit context is not an appropriate one in which to take that issue on.

¹⁰ It is significant that neither the FASB discussion of depreciation nor the much longer analysis done for the National Association of College and University Business Officers (NACUBO) by Collins and Forrester has even a passing reference the larger part of capital service costs represented by their opportunity costs.

recognition of capital costs in reported financial data, however it might improve our understanding, would increase publicized costs -- the 60% increase in Williams' costs is not extreme for a wealthy private institution. In itself, therefore, the very importance of capital costs in higher education will discourage their recognition as it makes that candor politically so unattractive to administrators.

But, of course, the *fact* will remain. Those real capital costs are being incurred in the production of higher education at the same time that colleges are earning implicit returns on their capital stocks. And decisions are being made about efficient use of capital and other resources and schools' efficiency is being judged. And all of this is done in the absence of explicit information about the very considerable costs of capital.

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