1-5-2000

Ownership Costs of Depreciable Assets

Glenn A. Helmers

University of Nebraska-Lincoln, gelmers1@unl.edu

Follow this and additional works at: http://digitalcommons.unl.edu/agecon_cornhusker

Part of the Agricultural Economics Commons

http://digitalcommons.unl.edu/agecon_cornhusker/838

This Article is brought to you for free and open access by the Agricultural Economics Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Cornhusker Economics by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
Ownership Costs of Depreciable Assets

The distinction between fixed vs. variable assets has long been a troublesome concept in understanding economic and financial behavior. The traditional distinction between fixed vs. variable costs is that fixed costs are unaffected by use, while variable costs are directly related to use. While this concept is useful, problems occur in classifying assets according to fixity as well as implementing it. It has become increasingly recognized that "fixed cost" components such as depreciation and interest on investment are actually impacted by use. This is one reason that for assets such as farm machinery, the terminology of "ownership-operating" costs is replacing "fixed-variable" costs. Adding to the complexity is the increasing understanding and use of another cost concept termed "setup" costs which does not fall into a fixed-variable classification.

Sometimes certain assets are universally defined as fixed and others as variable, but fixity is best understood as situation unique. In some ways this is similar to the behavioral differences arising among individuals when faced with "sunk" costs. This phenomenon is where seemingly irrational decisions may be made because of a previous investment or expenditure.

A fixed asset is best defined as: 1) where its costs do not change as the asset is used, and 2) not having an alternative economic use. We will examine the first aspect here. The second is interesting because it helps to understand, for example, supply responsiveness in hog production when technical change occurs in hog production methods.
We can demonstrate how the calculation of ownership costs of an asset is impacted by the level of its use with a farm machinery example. Fixed costs are traditionally defined to include depreciation, interest on investment, repairs, taxes (property), and insurance. We will examine only the first two. The issue is how to calculate depreciation and interest on investment if use does impact remaining values (or used prices) of a machine. This is in contrast to where remaining values are only affected by age. It is generally agreed that both use and age impact remaining values of machinery. A machine 5 years old and never used is ordinarily not as valuable as when purchased. Yet it is more valuable than an identical machine which has been used for 5 years.

Traditional cost budgeting of machinery using age as the only factor affecting remaining values has an inherent contradiction when decisions about the use of the asset are made. On the one hand, given a lifetime of machine hours, using age alone in calculation of depreciation and interest on investment implies a given use per year. Yet such calculations classified as "fixed" costs suggest that additional use is "free" because it is a "fixed" asset.

Suppose we take an extreme position that only use affects remaining machine values. Assuming a $210,000 original cost (O.C.), a $10,000 salvage value (S.V.), 2,000 hours of useful machine life, and a 5% interest rate (i). Depreciation (D) is then defined per hour as:

\[ D = \frac{O.C. - S.V.}{\text{lifetime hours}} = \frac{210,000 - 10,000}{2000} = \$100/\text{hr}. \]

Using this, depreciation becomes an operating cost affected solely by use. If the machine was not used for a particular task, it would have a higher remaining value than if it were used for that task. Further, there is no economic incentive to intensively use the machine within a year due to depreciation because the depreciation cost accrues on a per hour basis.

Interest (I) is calculated using the mid value (Jan. 1 basis) multiplied by the interest rate (i) as:

\[ I = \frac{O.C. + S.V. + D}{2} (i) \]

Suppose the machine is used 200 hours per year. Then:

\[ I = \frac{210,000 + 10,000 + 200,000}{2} (0.05) = \$6500/\text{yr} = \$650/\text{hr}. \]

If used up in one year (2000 hours),

\[ I = \frac{210,000 + 10,000 + 100,000}{2} (0.05) = \$31,250/\text{yr} = \$312.5/\text{hr}. \]

It can be noted that from an interest on investment perspective, there is an economic incentive to intensively use a machine. Depending upon the magnitude of this force and other factors, it leads to selecting a smaller machine and using it more intensively than a larger machine.

Hence, in addition to depreciation, it can be argued that even interest on investment is also an operating cost because its cost is affected by use. Again, the above reflects an extreme case where remaining or used values of machinery are only affected by use, not age. It demonstrates that not only the terminology changes ("fixed" costs are now termed "ownership" and perhaps even "operating"), but the decision of what size and how intensively to use a machine is affected.

Glenn A. Helmers, (402) 472-1788
Professor, Agricultural Economics