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Estimating Economic Obsolescence – Why the Inutility Formula is of Limited Utility

Mark Chaplin, CFA, ASA and Patrick Prendergast

This article addresses what the Inutility Formula is, and just as importantly what it is not. Economic Obsolescence ("EO") can be due to a variety of factors. The Inutility Formula can be used in certain circumstances to quantify EO; however, it cannot quantify all forms of EO.

Background

In any appraisal assignment, an appraiser must address the following three forms of depreciation: physical deterioration, functional obsolescence, and economic obsolescence. This article will only address economic obsolescence ("EO") and focus on a formula that many appraisers are using today, the Inutility Formula.

EO is defined as the following:

> "…the loss in value of a property caused by factors external to the property. These may include such things as the economics of the industry; availability of financing; loss of material and/or labor sources; passage of new legislation; changes in ordinances; increased cost of raw materials, labor, or utilities (without an offsetting increase in product price); reduced demand for the product; increased competition; inflation or high interest rates; or similar factors."[1]

Assume you are appraising a facility that currently manufactures 700 widgets a day. Also, assume that it was designed to manufacture up to 1,000 widgets a day. Many appraisers might assume that the 30% excess capacity is due to economic factors and would estimate EO based on the Inutility Formula. The problem is they could be overlooking other factors that should be considered. Perhaps the number of widgets produced fluctuates with the season. They may be currently operating at 70%, but need that excess capacity when the demand increases after the season changes. The business may also be generating plenty of cash flow operating at 70% and the preference might be to not run the facility at 100% since it may put downward pressure on the price at which the product could be sold. These are just a couple examples of factors that could lead an appraiser to undervalue an asset if they are only using the Inutility Formula in estimating EO.

The Inutility Formula is typically shown as follows:[2]

Inutility as a percent = [1- (Capacity B/Capacity A) ^ x] •100

Capacity A = Rated or designed capacity

Capacity B = Actual production

x = exponent or scale factor

The scale factor (x) is included to recognize the degree of fixed versus variable costs as you scale up or down. If all costs for any given capacity were variable (which is almost never the case), the scale factor would be 1. In the vast majority of cases, the scale factor is less than 1 because of the economies of scale in cost one achieves when building a larger facility with greater capacity.

The Inutility Formula can be used to measure a form of EO such as reduced demand for a product due to external factors. However, it is limited to the design and physical output of fixed assets. This manifests itself as a reduction of value to the fixed assets for the unneeded capacity, when the asset is overbuilt (some appraisers may also characterize this as a form of

functional obsolescence). It does not address the broader elements of EO that affect the business such as the economics of the industry.

What it is

The Inutility Formula is an algebraic transformation of the Cost to Capacity Formula which (using the same variables) is as follows:[3]

C2/C1= (Capacity B/Capacity A) ^ x

Where C2 is the desired cost of Capacity B, and C1 is the known cost of Capacity A (in this case, the design cost).

This formula has two types of variables 1) Cost (which in the valuation world is replacement cost new), and 2) Capacity (volume of product or throughput). It is nothing more than a ratio to adjust the Cost (up or down) for a given desired volume of product. For purposes of this discussion, the exponent should not be the focus, and we have set it to 1. This does not change the fact that the Cost to Capacity Formula is a simple ratio between cost and capacity. Hence, for a known design cost (C1), one can compute the desired cost (C2) at the actual/desired capacity. This can be restated as the following:

Inutility as a percent = [1- (C2/C1)] • 100

Rearranging to solve for C2 results in:

C2 = C1 • [1 - (Inutility as a percent/100)]

Ultimately, the Inutility Formula is an adjustment to replacement cost new due to unneeded capacity. When conducting a valuation of tangible property, inutility penalties should always be considered. If the situation warrants a penalty for overcapacity, then an adjustment should be made.

However, one should be careful in applying an inutility penalty. Before applying such a penalty, ask these questions:

1. Is the asset/facility scalable? It's possible that you cannot reduce the replacement cost new of an asset/facility because it would not function.
2. Is the asset/facility operating in a cyclical industry and/or is redundancy required? With regards to cyclicality, EO should be considered when there is an expectation of permanence associated with the level of utilization of an asset/facility, rather than just temporary changes – such as periodic ebbs and flows related to seasonality or extraordinary but transitory market disruptions.
3. What is the theoretical capacity of the asset/facility? Does it operate 24/7? What if it only operates 4 days a week for one shift and the company is making a sufficient profit at that rate of utilization? Would it be appropriate to apply an inutility penalty because the asset/facility could produce more product if it were operated everyday with more shifts? Perhaps over-production of the product may flood the market with product resulting in lower pricing, or perhaps there are cost concerns about adding extra shifts. In other words, higher utilization may result in lower economic returns.

The key question to address is whether the same size asset/facility would be built new on the valuation date considering the expected market demand for the product as of that date. If the answer is "no" due to declining demand for the product, then an inutility penalty should be applied in the form of a reduction of RCN for the unneeded capacity.

What it isn't

Note the Inutility Formula is not a function of cash flow, earnings, margin, or any other financial metric. While a material drop in utilization of an asset/facility from one period to the next may be an indication of the presence of EO, it is not a measure of it. The Inutility Formula does not address the economics of a business. Adjustments founded on modifying the productive capacity to meet current market demand are entirely focused on the fixed costs of production and achieving a specific unit volume. There may be additional EO that can only be fully quantified using the income and/or market approach at some level. For example, reduced pricing and increased marketing and delivery costs resulting from growing competitive pressures have a significant impact on the extent of EO. Ultimately, EO manifests itself in an insufficient level of income produced by an asset/facility for a certain reason.

Hence, utilization should not be used as a proxy to estimate EO due to insufficient expected income generated by an asset/facility. Such use could lead to outcomes that are inconsistent with what the principles of economics and finance would imply: value is based on an expectation of future economic benefits. There are plenty of examples where an asset/facility is fully utilized (under any computation of theoretical capacity) but is generating insufficient cash flow to support its investment; hence, EO is present (e.g. most utility plants). On the other hand, there are many situations where an asset may be intentionally used upon occasion, but generates sufficient cash flows to warrant its investment (hence, no EO penalty is appropriate).

Examples

Full Asset Utilization ≠ No EO

Within the automotive industry in 2009 and 2010, numerous valuations were performed for impairment purposes due to the state of the industry at that time. In many cases, the facilities were operating close to full capacity to fulfill contracts they had with other automotive companies. If one had used the Inutility Formula to estimate EO on these valuations, there would have been no penalty to apply to the assets. However, an analysis of the cash flows would have suggested otherwise. These companies were not producing adequate earnings to support the value of their assets, which is what triggered the impairments (the carrying values or net book values were overstated). Use of the income approach to quantify EO in these instances resulted in significant write-downs that would have been overlooked if only the Inutility Formula was considered.

Seasonal Asset Use

One may also run into issues with the Inutility Formula when valuing equipment operating within an industry marked by seasonal demand fluctuations. For example, consider a company that produces bread and bakery products (hot dog buns, rolls, hamburger buns). The demand for this type of product would typically increase during the warmer months when more people are barbequing. If an appraiser is valuing this type of company during the winter months, they may find that the equipment is only running around 50% at that time. If they were to apply the Inutility Formula without considering seasonality, the assets might be significantly undervalued. In this type of business, the "excess capacity" may be needed to meet the higher demands for product during the warmer months. A cash flow analysis of the business could certainly indicate that sufficient cash flows were being generated by the assets over the course of the year.

Intermittent Asset Use

Another example where the use of the Inutility Formula would result in a vastly different value conclusion would be a situation where an asset is used intermittently, but generating plenty of income. Consider the data collection market where a company produces RFID labels. A company may own less expensive RFID printing presses that are utilized to serve most their clients. They may also own a couple more expensive printing presses that they only use for their customers that require the utmost levels of quality. If these assets are utilized close to full capacity, the print quality would reduce at a much faster pace so the company decides to only use them for certain customers. If an appraiser only focusses on the fact the higher quality assets are used 50% to 60% of the time, the valuation would result in a significant reduction in value if the Inutility Penalty was used. When the company purchased the more expensive equipment, it did take into consideration the cash flows that would

be generated by the equipment by only using it sparingly for certain customers demanding the highest-quality product, and determined there was economic support for this purchase. The income approach should be used in this situation to determine whether an EO penalty should be applied, and not the Inutility Formula.

Scalability of Asset

A cell tower would be a good example of a type of asset that is not scalable. No matter how much traffic is being carried on the radios at a cell site, the tower itself needs to be built a certain way, with a certain amount of material, and it may need to be able to support peak demand needs. It's height and other characteristics are dictated by terrain, cell size, signal propagation characteristics, numbers of antenna platforms, number of sectors, anticipated wind-loads, backhaul/transport considerations, etc. So, if the demand for the cell tower is low, it would be inappropriate to apply the Inutility Formula to estimate the value since you would most likely not build a smaller version of the tower. A smaller tower would not meet the needs of the network. Similarly, if one were assessing the value of a railroad, one could not build a smaller version and still connect point A with point B. If the demand for a cell tower or a railroad is low, you need to consider whether the cash flows being generated by the lower demand can support the value of the equipment, not its utilization.

Conclusion

The Inutility Formula may be used to quantify only a form of EO. In those cases, a reduction to replacement cost new is the outcome due to the appraiser's conclusion that the asset/facility is overbuilt in terms of capacity. Analyzing obsolescence merely on a percentage of capacity basis disconnects it from the very essence of what EO is, namely, a constrained ability to earn economic returns, due to factors external to the current use or condition of the asset. Thus, application of an inutility penalty does not preempt the need to assess whether sufficient cash flows will be generated by an asset/facility and further EO adjustments may be warranted.

About the Authors

Mark Chaplin is a director in the Detroit (Southfield) office and part of the Machinery and Equipment service line. Mark's primary responsibilities include valuing fixed assets (property, plant & equipment) for financial and tax reporting, purchase price allocation, fixed asset due diligence, fresh start accounting, property tax consulting, bankruptcy/liquidation studies, and impairment issues for various types of businesses.

Mark has more than fifteen years of dedicated valuation experience in a wide range of industries, including automotive manufacturing facilities, automotive assembly facilities, chemical plants, water treatment plants, wastewater systems, information technology systems, telecommunication / fiber optic systems, data center equipment, healthcare equipment, food processing machinery, industrial manufacturing machinery, high-tech test equipment, printing & publishing facilities, and retail store furniture and fixtures. Mark has been involved with valuation of both domestic and international business assets, with personal experience visiting facilities in Belgium, Brazil, Canada, France, Germany, Italy, Mexico, United Kingdom, and throughout the United States.

Some of Mark's recent engagement highlights include directing the valuation of tangible assets for one of the largest water and sewer systems in the United States for financial reporting purposes in accordance with Government Account Standards Board ("GASB") 69 - Government Combinations and Disposals of Government Operations; directing the valuation of tangible assets for one of the largest ethylene production facilities in the world for tax purposes; directing the valuation of more than 150 worldwide production, warehouse, and testing facilities for a leading automotive supplier which included organizing approximately thirty site inspections; performed long lived asset impairment tests at over twenty manufacturing facilities for several clients; directing the valuation of tangible assets for a global automotive supplier in connection with several recent acquisitions, and leading the fresh start valuation of tangible assets for several large global automotive suppliers.

Mark received his B.A. in finance from Michigan State University. Mark is also a Chartered Financial Analyst (CFA) Charterholder and an Accredited Senior Appraiser. He is a member of the CFA Society of Detroit, CFA Institute, and American Society of Appraisers.

Patrick Prendergast is a managing director in the Philadelphia office and leader of the Machinery and Equipment valuation service line. He has over 34 years of valuation experience. Patrick has organized, staffed and managed major valuation projects in the specialized industries of satellite telecommunications, utilities, metals manufacturing and chemicals, among others. He is experienced in acquisition valuation services, such as pre-acquisition review, divestiture and analysis, transaction structuring and purchase price allocation for tax and financial reporting purposes, including ASC 350, 360, 805 and 820 (formerly SFAS 142, 144, 141R, and 157) compliance strategies.

Patrick has developed and implemented valuation procedures to address specific machinery and equipment issues, such as technical, functional, and economic obsolescence, economic impairment and liquidation scenarios. In so doing, Patrick is responsible for developing methodologies and controls within Duff & Phelps in connection with the valuation of machinery and equipment. Pat has performed engagements for financing purposes (asset collateralization). He is well-versed in the valuation concepts of "in-use," "in-exchange" and forced and orderly liquidation. He has completed various engagements concerned with estimating insurable values as well as providing valuations in support of litigation. In connection with Sarbanes-Oxley compliance, Patrick has coordinated teams whose mandate was to inventory, reconcile, and improve a client's fixed asset accounting records. In addition, he has performed asset useful life studies for purposes of supporting depreciation used in financial reporting.

Patrick joined Duff & Phelps in conjunction with the merger of Standard & Poor's Corporate Value Consulting (CVC) with Duff & Phelps. CVC was formerly PricewaterhouseCoopers LLC's valuation group where Patrick was a partner. Prior to joining CVC, Patrick worked as a process engineer for a major chemical-process design company.

Patrick received his M.B.A. in finance from New York University and his BChE in chemical engineering from Manhattan College. In addition, he has completed all coursework at Immaculate University and passed all requisite standardized tests (Praxis I and II) for a secondary school teacher certification in mathematics in the state of Pennsylvania.

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[1]Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets
[2]Second Edition (American Society of Appraisers, 2005), 67
[3]Ibid, 98