Land Values and External Obsolescence

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Abstract

External obsolescence is perhaps one of the trickiest aspects of implementing the cost approach in appraisal. Because it is driven by factors outside the property, it is important for appraisers to make sure that these factors do not also impact the land value estimate used to derive a final indication of value. In other words, external obsolescence is prone to double counting. This paper argues that the external obsolescence can only arise when the existing structure is not the site's highest and best use. As a result, external factors that affect the property's value are attributable to the land if the current use is its highest and best use and are external obsolescence of the building otherwise.

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1. Introduction

Estimating the external obsolescence of a structure is perhaps one of the trickiest aspects of implementing the cost approach in appraisal. Because it is driven by factors outside the property, it is difficult to distinguish between external obsolescence of the improvements and reductions in value of the land. If the appraiser is not careful, it would be easy to accidentally double count these outside influences, with their effects showing up both in the land value estimate and the estimated value of the improvements.

In this article, I show that external obsolescence arises when and only when the existing structure is not the site's highest and best use. As a result, external factors that affect the property's value are attributable to the land when the current use is optimal and to external obsolescence of the building otherwise. By paying careful attention to the highest and best use of the site, the appraiser can more accurately allocate the impact of external factors to the land and building value estimates.

This has several important implications for practicing appraisers. First, it provides the analyst a simple and theoretically rigorous test for determining whether external obsolescence should be applied in the cost approach: Is the current use – both in terms of property type and scale – the property's highest and best use? If the answer is "yes," then no external obsolescence of the structure is present, and all value change due to the external factor is attributable to the land.

Second, this analysis can help validate the magnitude of estimated external obsolescence if it is present. As shown below, as long as land value is positive, external obsolescence is simply the difference between the value of the land in its optimal use and its value in the current use.

When an appraiser uses traditional methods to estimate external obsolescence, the resulting figure can be compared with this benchmark to verify its reasonableness.

Finally, this analysis provides external confirmation of the land value estimate that may have been derived from another source. If the property's current use is its highest and best use and a large estimate of external obsolescence is required in the cost approach, it may imply that the external land value estimate needs to be reevaluated.

2. Defining and Measuring External Obsolescence

The *Dictionary of Real Estate Appraisal* defines external obsolescence as "A type of depreciation; a diminution in value caused by negative external influences and generally incurable on the part of the owner, landlord, or tenant."[1] Williams discuss three sources of external obsolescence: locational (e.g., a neighborhood whose values are transitioning into a new highest and best use), environmental (e.g., a noxious nearby use) and economic (e.g., the rents a location can command change due to changing economic conditions such as oversupply).[2] Because each of these external factors can also affect land values, it can be challenging to determine how much they actually affect structure values, as opposed to the land itself.[3]

The Appraisal of Real Estate suggests two methods for estimating external obsolescence.[4] First, the appraiser might use paired data analysis to directly compare similar

[1] Appraisal Institute, *The Dictionary of Real Estate Appraisal*, 6th ed. (Chicago: Appraisal Institute, 2015), 83.
[2] Thomas P. Williams, "Estimating Economic Obsolescence in Supply-Saturated Office Markets," *The Appraisal Journal* (April 1996): 148-154.
[3] Throughout this article, I use the term "external factors" to refer to anything outside the property that might affect the property's value, either by affecting the value of the land or the value of the structure. In contrast, the term "external obsolescence" refers *only* to situations where the external factor affects the value of the structure. Thus, some but not all external factors may result in external obsolescence.
[4] Appraisal Institute, *The Appraisal of Real Estate*, 15th ed. (Chicago: Appraisal Institute, 2020), 591-597.

properties with and without external obsolescence, when sufficient data is available. Second, one might estimate external obsolescence by capitalizing the income loss due to the external factor, either through direct capitalization or discounted cash flow analysis.

Some authors have proposed more specific methodologies for estimating external obsolescence due to special influences such as over-supply within a market[5] or market-wide downturns.[6] At the end of the day, however, each of these methods essentially involves estimating the total value loss due to the external factor and then allocating it between the land and the building in a relatively arbitrary way. The purpose of this article is to provide guidance as to when this value loss is attributable to the land and when it is attributable to the structure.

Perhaps the most practically relevant and theoretically satisfying treatment of external obsolescence can be found in *In Defense of the Cost Approach: A Journey into Commercial Depreciation*.[7] In this excellent book, the author provides straightforward techniques for estimating external obsolescence and clearly demonstrates that it is inappropriate to simply allocate the impact of external factors based on a land-to-cost or other arbitrary ratios. All of the book's examples, however, are developed assuming an accurate external land value estimate. The present analysis therefore augments this book by providing a benchmark for validating that this external land value estimate is reasonable given the parcel's highest and best use, as discussed above.

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[5] MacKenzie S. Bottum, "Estimating Economic Obsolescence in Supply-Saturated Office Markets," *The Appraisal Journal* (October 1988): 451-455. See also MacKenzie S. Bottum and Scott D. Evans, "Supply-Saturation-Induced External Obsolescence: Two techniques for Quantifying Value Loss," *The Appraisal Journal* (October 1993): 545-552.

[6] Mark Galleshaw, "Market-Wide External Obsolescence," *The Appraisal Journal* (October 1991): 519-525.

[7] E. Nelson Bowes, *In Defense of the Cost Approach: A Journey into Commercial Depreciation* (Chicago: Appraisal Institute, 2011).

At the heart of this analysis is the residual theory of land values, wherein the value of a parcel is the difference between its market value and fair compensation to the other factors of production. A direct implication of this theory is that the sources of external obsolescence all, in the first instance, affect land values, with structure values affected only as a byproduct. Indeed, the urban economic theory that underlies much of appraisal practice is built on the primacy of land values. Thus, to understand external obsolescence, we must first understand how these outside factors affect land values.

3. Land Values and Highest and Best Use

Appraisers and others involved in real estate are generally quite familiar with the dictum that a parcel's land value is determined by its value under its highest and best use as though vacant, regardless of its current use. An important implication of this idea, however, is less well understood: if the building/structure present on the parcel maximizes the land's value – that is, if the current use is the parcel's highest and best use – then any loss in value due to external factors is attributable to the land, not the building. In other words, external obsolescence of the structure arises if and only if that building is the *wrong* building for the site.

To see this, consider a vacant parcel of land with two potential uses that are legally permissible, physically possible and financially feasible: office and retail. The details of these uses are summarized in the first column of Table 1. If the property is developed as an office building, its annual net operating income (NOI) would be $360,000. Assuming a market capitalization rate of 8 percent, the office's total market value would be $4.5 million ($360,000 ÷ 0.08). If it costs $2.5 million to build the office building (and assuming it would be built without any physical deterioration or functional obsolescence), this implies that the land is worth $2

million if it is developed as on office building (the $4.5 million overall value less the $2.5 million in construction costs). This breakdown of land and building values is depicted in Figure 1.

Alternatively, the owner could develop the site as a retail building. This use would generate annual NOI of $280,000 and assuming the same 8 percent market cap rate, the property's total market value as a retail building would be $3.5 million ($280,000 ÷ 0.08). Assuming the retail improvements would cost $1 million to build, the land's value in a retail use would be $2.5 million ($3.5 million – $1 million). Because a retail use brings the highest total economic return to the land's owner, the parcel's highest and best use is retail. Indeed, if these two uses were proposed by different developers, the land would be sold to the retail developer because of her willingness to pay more for the parcel.

Suppose that the owner develops the land for retail as outlined above and then consider what happens when factors external to the property change. The question we want to address is when such factors will be captured in the land value estimate and when an adjustment for external obsolescence should be applied to the estimated value of the structure.

For example, suppose a change in retail demand at this location causes rents (and hence NOI) to fall by 10 percent.[8] This scenario is depicted as "Scenario 1" in Table 1, where we see that the property is now worth $3.15 million ($252,000 ÷ 0.08). In other words, market conditions have caused the property's value to drop by $350,000.

[8] In this example, I assume that the external factor affecting the parcel is a change in market demand. All of my analysis would remain the same if the change in rents (property value) were due to a different external factor such as a change in traffic patterns, environmental concerns or some other externality.

In this case, *all* of the lost value is attributable to the land. To see this, note that the cost of constructing the retail building has not changed (it is still $1 million), so if the land were vacant it would be worth $2.15 million ($3.15 million – $1 million) to a retail developer. This is still more than what the land is worth as an office (which we assume has not changed), so the property's highest and best use remains retail. Since the land's value is, by definition, its value under its highest and best use as though vacant, the land value is $2.15 million, or $350,000 less than it was before rents fell, as shown in Figure 2. Thus, the entire value loss is attributable to the land, and the "external" factors affecting the property do not result in any external obsolescence to the building.

This will be true as long as retail remains the property's highest and best use. Suppose, however, that retail rents fall even more dramatically, so that the property's annual NOI falls to $224,000; this shown through "Scenario 2" in Table 1 and illustrated in Figure 3. In this case, property's total value falls to $2.8 million ($224,000 ÷ 0.08), making the land worth $1.8 million ($2.8 million - $1 million) in a retail use if the property were vacant. This is now lower than what that land would be worth in an office use (still $2 million). As a result, the parcel's highest and best use is now *office*, meaning that the land value is $2 million, its value under the parcel's highest and best use as though vacant. The remaining value loss of $200,000 is attributable to the building in the form of external obsolescence (denoted in Figure 3 as *EO*).

These two scenarios demonstrate a simple but important fact: a building only suffers from external obsolescence when the property is not in its highest and best use. As long as the current use is the highest and best use, any external factors that change the property's value will affect the land value, not the structure value.

4. External Obsolescence and Development Scale

On the surface, it might seem that this concept would suggest that external obsolescence rarely occurs given that many if not most appraisal assignments involve parcels that are already in their highest and best uses. It is important to note, however, that if market conditions change such that the property is no longer developed to the right *scale*, this too can be a form of sub-optimal use. That is, if the current structure is not the same size as the one that would be built if the property were vacant, external obsolescence will occur as well.[9]

To see this, consider the residential example outlined in the "Baseline Scenario" in Table 2. In this example, the subject property is an older 1,000 square foot single-family home. The home's effective age is 30 years out of an economic life of 50 years. Based on its condition and age, the house would rent for $1.10 per square foot per month. Assuming a gross rent multiplier (GRM) of 100, the property's market value using the income approach is $110,000 ($1.10 psf × 1,000 sf × 100).

Suppose that the cost of new construction is $150 per square foot. In this case, the existing house would cost $150,000 to construct new. Using the age-life method, we can estimate the property's physical deterioration to be $90,000 ($150,000 × 30 ÷ 50), so that the property's remaining physical value is $60,000. Assuming no functional obsolescence, what remains to be estimated in order to apply the cost approach is (1) the value of the land and (2) any external obsolescence of the building.

[9] Some might argue that an incorrect size of building should be categorized as functional obsolescence. If this "mis-sizing" is entirely "internal" to the property, I would agree. In most instances, however, problems of scale arise because market conditions change the optimal floor-area ratio for a site. These changes in market conditions are external to the site and therefore their impact should be categorized as external obsolescence.

The land value is determined by the parcel's highest and best use as though vacant. Suppose that because of changes in market conditions from when the property was first developed, if this were a vacant lot its optimal structure would be a 1,500 square foot house that would rent for $2.00 per square foot per month.[10] This structure would cost $225,000 to build ($150 psf × 1,500 sf) and, recalling that the gross rent multiplier is 100, the property's market value would be $300,000 ($2.00 psf × 1,500 sf × 100). Given this, the implied value of the land under its highest and best use as though vacant – and hence the land's correct value – is $75,000.

From this it is straightforward to determine the structure's external obsolescence. The remaining physical value of the existing building is its $150,000 construction cost less the physical deterioration of $90,000, or $60,000.[11] Subtracting this from the total market value of the parcel shows that the land value's under the current use is $110,000 – $60,000 = $50,000. But as we saw above the actual land value is $75,000, its value under the highest and best use as though vacant. The difference, $25,000, is therefore attributable to the structure in the form of external obsolescence. Once again, the external obsolescence exists only because the current use is different from the property's highest and best use. In this example, however, the suboptimal use is due to the *size* of the structure, not its intended purpose.

It is worth noting that when the "sub-optimality" of the existing structure is due to the wrong scale of the building, a rise in market rents can actually serve to *increase* the structure's external obsolescence. To see this, consider what happens in the example above if market rents for a new structure were to rise by 20 percent to $2.40 per square foot; this situation is depicted

[10] An astute reader will wonder how this relates to the rent on the existing structure. For internal consistency, I have assumed that the existing structure's rent is the highest and best use (HBU) rent reduced to account for the property's effective age. Specifically, Current Rent = HBU Rent × [1 – (Effective Age ÷ Economic Life) × (Cost New of HBU ÷ Value of HBU)] = $2.00 psf × [1 – (30 ÷ 50) × ($225,000 ÷ $300,000)] = $1.10 psf.

[11] For simplicity, I have assumed that the structure has no functional obsolescence. If it did, this would be subtracted here as well.

by the "Market Rents Rise" scenario in Table 2. In this case, the optimal structure (highest and best use as vacant) will be worth $360,000 ($2.40 psf × 1,500 sf × 100). The increase in rents has no impact on construction costs, so the entire value increase is attributable to the land, raising the parcel's land value to $135,000.[12]

Of course, the parcel is not vacant; it has an existing structure. The increase in rent causes the market value the property in its existing use to rise to $150,000 ($1.50 psf × 1,000 sf × 100).[13] Given the remaining physical value of the structure (which remains unchanged at $60,000), the value of the land under its current use would be $90,000. Nevertheless, the land's actual value is $135,000, its value under its highest and best use as though vacant. The difference between these two values, $135,000 – $90,000 = $45,000, is the structure's external obsolescence, or its value loss due to having the "wrong" structure on the site.

It may seem unusual to have external obsolescence increase when market rents rise. This happens because the existing structure is not the structure that would be built if the land were vacant. As market rents increase, the "penalty" or value loss from having the wrong structure on the site increases as well. Because this value loss has nothing to do with the land, it is rightly attributed to the structure in the form of external obsolescence.

This phenomenon is directly related to "teardowns." If rents continued to rise, land value would rise as well and external obsolescence would increase until the structure value became negative. Eventually, the structure's external obsolescence would become sufficiently large that

[12] Notice that the parcel's land value rises by more than 20 percent. This is because the overall value increase is magnified into its land value because of the of the property's "land leverage;" see Raphael W. Bostic, Stanley D. Longhofer and Christian Redfearn, "Land Leverage: Decomposing Home Price Dynamics," *Real Estate Economics* (Summer 2007), 183-208.

[13] Once again, the new rent of the property is related to its highest and best use rent as outlined note 10 above.

it would pay the owner to tear it down and replace it with a new, correctly sized home (in this case, one that is 1,500 square feet).[14]

5. Practical Implications and Conclusions

The purpose of this article has been to highlight the underlying source of external obsolescence. A structure suffers from external obsolescence if and only if the current use is not the property's highest and best use, whether this is based on the functional use or the scale of the building within a given use.

This idea can be applied in a wide variety of situations where allocating the impact of external factors between land and structure values might otherwise be difficult. For example, in many cases externalities can have opposite impacts on two different potential uses. Consider a single-family home on an arterial street. As traffic on the street increases, it may lower the value of the parcel as a single-family home but increase its value in a retail or office use. Such a change will simultaneously increase the value of the land (assuming the office or retail use is now the highest and best use) but decrease the value of the existing single-family structure. The techniques outlined here can help an appraiser estimate these effects more accurately and transparently.

Alternatively, consider how the imposition of rent controls might affect the value of an apartment property. To the extent that the rent controls do not change the property's highest and best use, the entire loss in value from this change in the legal environment will be attributable to

[14] It is worth noting that in cases like this external obsolescence could exceed the remaining physical value of the structure so that the total structure value is negative. Suppose in the example above that the cost of tearing down the existing structure is $15,000. In this case, the structure value could never fall below -$15,000; if it did the property owner would simply tear down the existing structure and rebuild the optimal one.

the land value. If, on the other hand, the parcel's highest and best use changes, at least part of the value loss will be attributable to the structure in the form of external obsolescence.

Finally, suppose that a parcel is affected by a nearby environmental catastrophe. As long as the land still has some positive value after this event, the external obsolescence of the structure will simply be the difference between the land values in the highest and best use and the current use. If, however, the land becomes worthless because of the catastrophe, all remaining value loss will accrue to the structure in the form of external obsolescence.

To restate this article's central thesis, external obsolescence arises when and only when the existing structure is not the site's highest and best use. This simple fact can help practicing appraisers in three ways. First, it allows an appraiser to quickly and simply determine whether external factors are affecting the structure value and, hence, whether an estimate external obsolescence will be needed. If the current use is the property's highest and best use in both type and scale, no external obsolescence can be present. All external factors will be captured in the estimated value of the land.

Second, if external obsolescence is present, this analysis provides a reference point for the magnitude of the estimated external obsolescence. In theory, as long as land value is positive in all potential uses external obsolescence must be equal to the difference between the value of the land in its optimal use and its value under the current use. When an appraiser uses traditional methods to estimate external obsolescence, the resulting figure can be compared to this benchmark to help validate the reasonableness of the estimate.

Finally, the ideas here can help the appraiser determine whether the independent land value estimate derived by other means is internally consistent. If the property's current use is its highest and best use and the appraiser cannot reconcile the cost approach without applying

significant external obsolescence to the structure, this raises the question of whether the land value estimate is correct, since all external influences in this instance must be attributable the land.

6. Exhibits

Table 1

	Potential Uses		***Scenario 1***		***Scenario 2***	
	Office	Retail	Office	Retail	Office	Retail
Net Operating Income (*NOI*)	$360,000	$280,000	$360,000	$252,000	$360,000	$224,000
Cap Rate (*R*)	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
Market Value ($V_O = NOI / R$)	$4,500,000	$3,500,000	$4,500,000	$3,150,000	$4,500,000	$2,800,000
- Construction Cost (*C*)	$2,500,000	$1,000,000	$2,500,000	$1,000,000	$2,500,000	$1,000,000
= Land Value in Use if Vacant ($V_{L\,use}$)	$2,000,000	$2,500,000	$2,000,000	$2,150,000	$2,000,000	$1,800,000
Total Value (V_O)		$3,500,000		$3,150,000		$2,800,000
- Land Value in Highest and Best Use (V_L)		$2,500,000		$2,150,000		$2,000,000
= Building Value ($V_B = V_O - V_L$)		$1,000,000		$1,000,000		$800,000
External Obsolescence ($EO = V_{L\,office} - V_{L\,retail}$)						$200,000

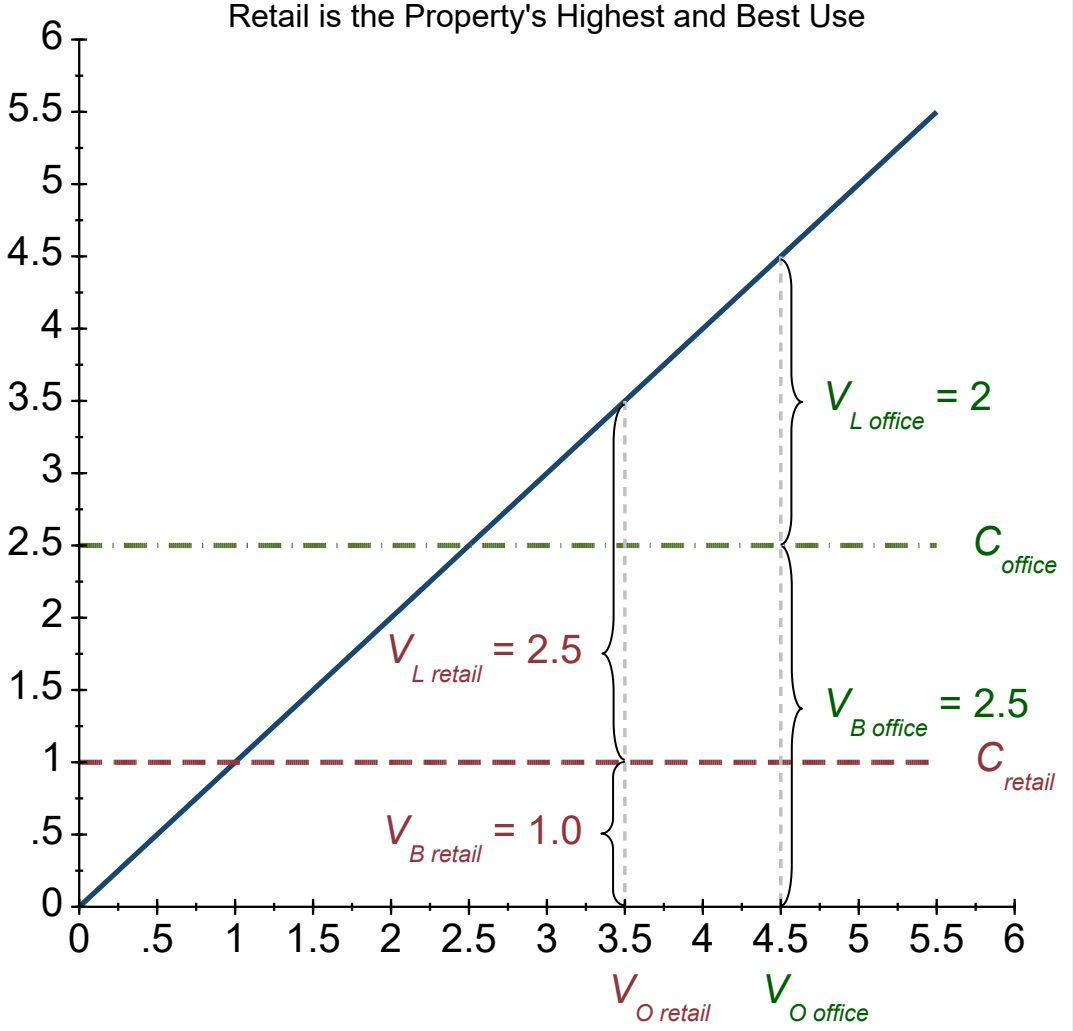
Table 2

	Baseline Scenario		***Market Rents Rise***	
	Current Structure	HBU as Vacant	Current Structure	HBU as Vacant
Building Size	1,000 sf	1,500 sf	1,000 sf	1,500 sf
Effective Age	30 years	0 years	30 years	0 years
Economic Life	50 years	50 years	50 years	50 years
Rent PSF	$1.10 psf	$2.00 psf	$1.50 psf	$2.40 psf
Monthly Rent	$1,100	$3,000	$1,500	$3,600
Gross Rent Multiplier (GRM)	100	100	100	100
Total Value (V_O = Rent × GRM)	$110,000	$300,000	$150,000	$360,000
Construction Costs	$150 psf	$150 psf	$150 psf	$150 psf
Construction Cost New (SF × Cost PSF)	$150,000	$225,000	$150,000	$225,000
– Physical Deterioration	$90,000	$0	$90,000	$0
= Remaining Physical Value (RPV)	$60,000	$225,000	$60,000	$225,000
Land Value under Current Use ($V_{Lc} = V_O - RPV$)	$50,000	$75,000	$90,000	$135,000
External Obsolescence ($V_L - V_{Lc}$)	$25,000		$45,000	
Remaining Physical Value	$60,000	$225,000	$60,000	$225,000
– External Obsolescence	$25,000	$0	$45,000	$0
= Structure Value (V_B)	$35,000	$225,000	$15,000	$225,000
+ Land Value (V_L)	$75,000	$75,000	$135,000	$135,000
= Total Value (V_O)	$110,000	$300,000	$150,000	$360,000

Notes: V_O denotes the overall value of the property, V_B the value of the structure, V_L the value of the land (under its highest and best use), V_{Lc} the value of the land under the current use, and RPV the remaining physical value of the structure (construction cost new less physical deterioration).

Figure 1

Retail is the Property's Highest and Best Use



Notes:

$V_{O\ use}$ is the overall value of the property in the given use (office or retail)

$V_{L\ use}$ is the value of the land in that use

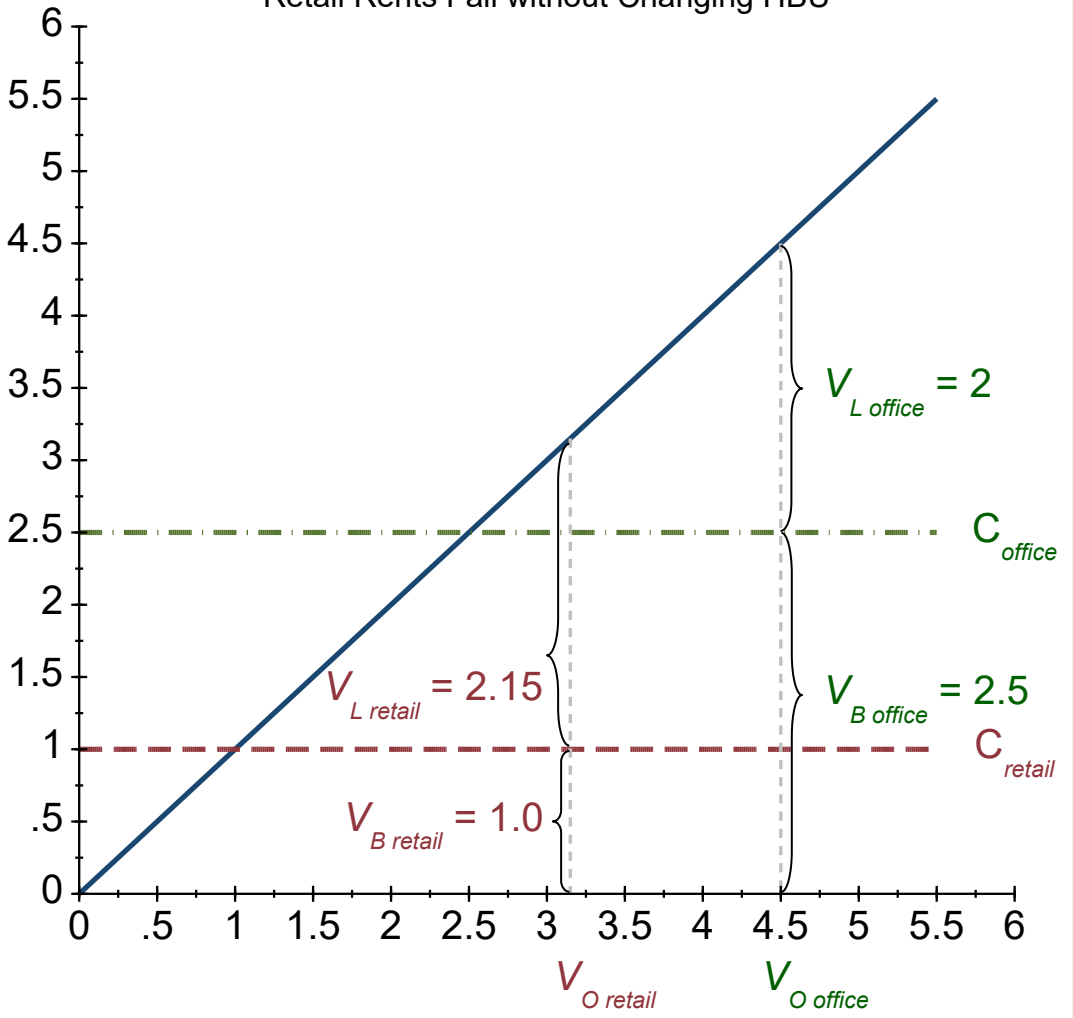
$V_{B\ use}$ is the value of the building in that use

C_{use} is the construction cost new of the building in that use

Retail is the highest and best use of this parcel because the value of the land under this use ($V_{L\ retail} = V_{O\ retail} - V_{B\ retail}$) is higher than its value in an office use.

Figure 2

Retail Rents Fall without Changing HBU



Notes:

$V_{O\ use}$ is the overall value of the property in the given use (office or retail)

$V_{L\ use}$ is the value of the land in that use

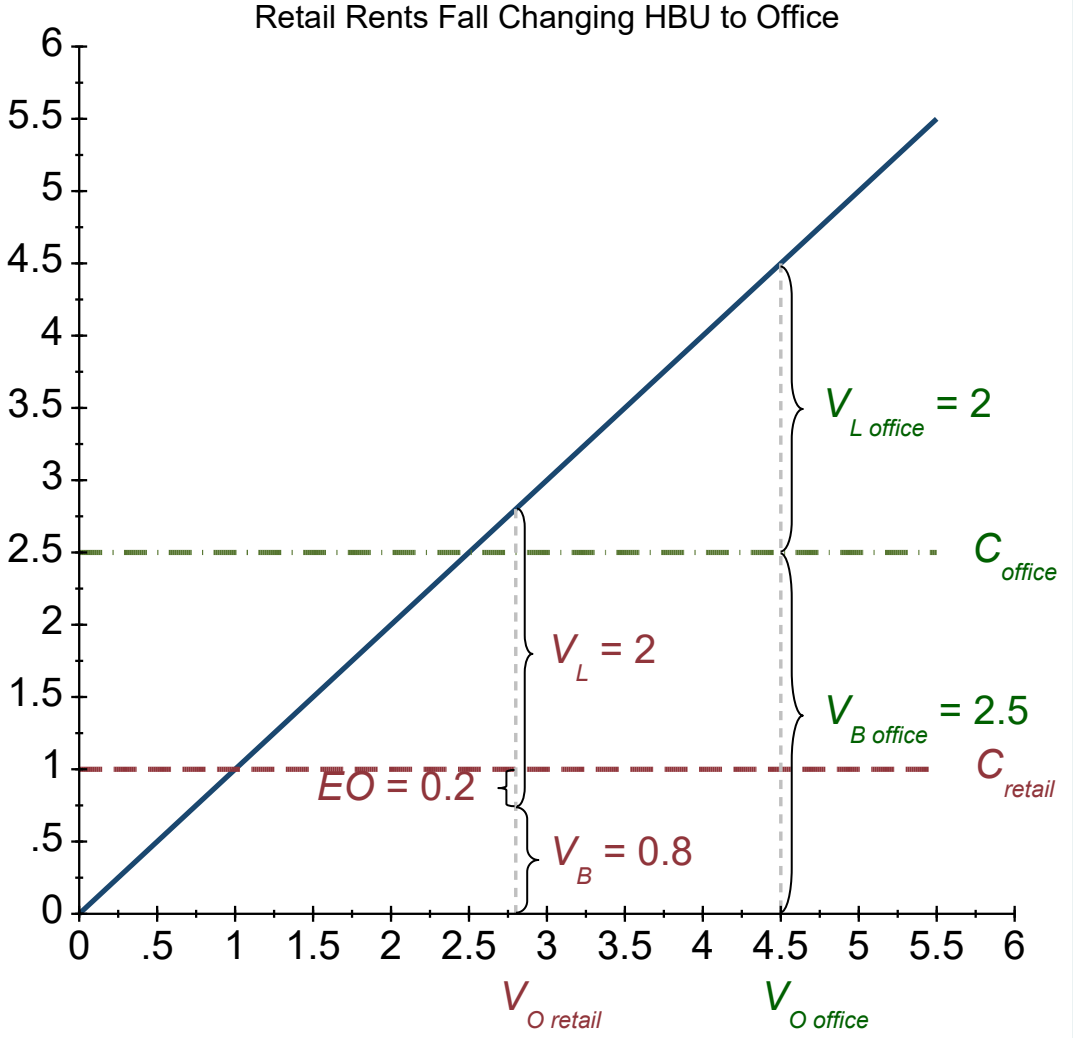
$V_{B\ use}$ is the value of the building in that use

C_{use} is the construction cost new of the building in that use

When rents decline for the retail use, its overall market value in this use falls as well. Nevertheless, because the highest and best use of the parcel remains retail, all of the value loss is attributable to the land value.

Figure 3

Retail Rents Fall Changing HBU to Office



Notes:

$V_{O\,use}$ is the overall value of the property in the given use (office or retail)

V_L is the value of the land

V_B is the value of the building

C_{use} is the construction cost new of the building in that use

EO is the building's external obsolescence

If retail rents fall enough that retail is no longer the property's highest and best use, additional value loss accrues to the building in the form of external obsolescence.