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The Hidden Patterns Behind Property Value

Why understanding urban economics can make you a better appraiser — and help you see what others miss

by Jim Amorin, MAI, SRA, AI-GRS

The best appraisers don't just crunch numbers. They understand the why behind the what — those invisible economic forces shaping every property value.

Standing in front of a proposed new development, I found myself discussing land values with a frustrated developer. The site sat 15 miles from downtown, and he couldn't understand why I'd valued it at a third of what comparable downtown parcels fetched.

"It's the same size, same zoning," he insisted. "Why such a huge difference?"

That's when I pulled out a napkin and sketched what's known as a bid-rent curve, one of several urban economic models that have transformed how I approach valuation over my 38-year career. Within minutes, this new developer better understood that distance from the center means lower land values, not because of some arbitrary formula, but because of fundamental economics.

This moment crystallized something I've learned: The best appraisers don't just crunch numbers. They understand the why behind the what — those invisible economic forces shaping every property value.

The bid-rent function is one of those forces. Let's explore that and several other influential urban economic models to consider how they apply to real-world valuation practice.

Bid-rent theory: Bidding for access

William Alonso figured out bid-rent function in 1964, but most appraisers have never heard his name. His theory explains why a parking lot in Manhattan can be worth more than a shopping center in rural Kansas.

$$R(x) = Y - t \cdot x - C$$

Where:

- $R(x)$ = the maximum rent (or land price) a user is willing to pay at distance x from the city center
- Y = total income (or economic yield) of the user
- t = transport cost per unit of distance
- x = distance from the city center (central business district)
- C = other fixed costs of living or production

The concept is beautifully simple: Land value peaks at the city center and drops as you move outward. Why? Because businesses and residents are essentially bidding for accessibility. A retailer thriving on foot traffic will pay top dollar to be central. A warehouse? It'll gladly take cheaper land on the outskirts.

Understanding these dynamics helps in highest and best use judgments: If a location doesn't have the threshold population to support a certain use, that use isn't feasible.

Central place theory: Small towns and big cities

Why are small towns spaced the way they are, and why do big cities stand far apart? Walter Christaller's central place theory (1933) tackled these questions of settlement hierarchy. The theory assumes a flat plain with evenly distributed population and that people will travel to the nearest center offering the goods or services they need.

$$R = \sqrt{(A / (\pi \cdot k))}$$

Where:

- R = radius of the market area (distance consumers are willing to travel)
- A = total area served by the central place
- π = pi (≈ 3.1416)
- k = Christaller's constant, which varies by system pattern:
  - k = 3 — marketing principle (hexagons oriented for market efficiency)
  - k = 4 — transportation principle (optimized for network routes)
  - k = 7 — administrative principle (complete hierarchy coverage)

Two key concepts are threshold and range: Threshold is the minimum market size (people or income) needed for a business to survive, and range is the maximum distance people are willing to travel for a good. Low-order goods like groceries have a small range and small threshold — they're bought frequently, so we find many small stores close by. High-order goods like luxury cars or specialized medical services have a large range and high threshold, which means fewer customers willing to travel farther, so these are only in big cities.

Christaller showed that small villages providing central places for everyday needs dot the landscape relatively close to each other, whereas large cities providing higher-order functions are rarer and farther apart. Empirically, we do see patterns roughly along these lines in flat regions — for instance, towns in the American Great Plains historically appeared about 10 to 15 miles apart because that's how far farmers would travel for supplies.

Central place theory offers a framework for market area analysis. Appraisers, especially in commercial or retail valuation, consider how far customers will come and what competition exists. Christaller's concept of threshold informs, for example, why a big-box retailer will only locate where it can draw from a large enough population.

If valuing a regional shopping center, you should consider that it likely serves a multi-town radius — essentially acting as a higher-order central place. Conversely, a neighborhood convenience store has a small trade radius, perhaps a mile or two. Understanding these dynamics helps in highest and best use judgments: If a location doesn't have the threshold population to support a certain use, that use isn't feasible.

Consider the distribution of shopping centers around a metro area. Large regional malls are spaced such that each captures a broad hinterland without overlapping too much. Between them are smaller strip malls or grocery-anchored centers filling in local needs. This tiered structure is essentially central place theory in action. When delineating a trade area for a retail property or evaluating competition, appraisers implicitly use these principles.

Zipf's rank-size law: The city hierarchy

There's a remarkably consistent empirical pattern in city sizes: many small towns, fewer medium cities and a couple of giants. The rank-size rule — Zipf's law for cities — states that the population of a city is inversely proportional to its rank. The largest city is about twice the size of the second largest, three times the size of the third, and so on.

$$P_n = P_1 / n$$

Where:

- P_n = population of the city ranked n
- P_1 = population of the largest (rank 1) city in the system
- n = rank of the city (1 = largest, 2 = second largest, etc.)

The U.S. is a good example: The population of New York City (approximately 8.5 million) is about twice that of Los Angeles (approximately 3.9 million) and about three times that of Chicago (approximately 2.7 million). At the state level, Zipf's law often fails if there's a primate city. This also appears to hold true internationally. For example, in France, Paris (approximately 2.1 million) is far more than double the next largest city, Lyon (roughly 472,000), showing a primacy effect rather than a balanced rank-size distribution.

For appraisers, Zipf's law provides macro context fostering an appreciation of urban hierarchy. When doing portfolio valuations or advising investors, you must recognize the difference between Tier 1 cities, Tier 2 cities and so on. The largest city often has disproportionate economic activity and investment relative to smaller cities.

Capitalization rates in a dominant world city like New York or London might be much lower (prices higher) than in the country's secondary cities because of liquidity and perceived lower risk, partly a reflection of that city's top rank. If a country is instead primacy dominated, that might indicate overconcentration of economic functions, which could inform investment caution in lower-rank cities.

Floor area ratio: The density equation

In zoning and development, a key metric is floor area ratio (FAR), which is the ratio of a building's total floor area to the area of its lot.

FAR = Total Building Floor Area / Total Lot Area

For example, an FAR of 1.0 on a 10,000-square-foot lot means you can build 10,000 square feet of floor space. Cities use FAR limits to control density and the bulk of buildings.

FAR directly ties to land value potential. A high FAR allowance (say, 10.0 in a downtown) means a developer can build a high-rise, while a low FAR (say, 0.5 in a suburb) means only a small structure or house. Because land value largely comes from the property's potential income-generating building area, FAR is often proportional to land prices.

For instance, suppose a city lot is 10,000 square feet and zoning allows FAR 2.0. That means up to 20,000 square feet of building area. If zoning were changed to FAR 4.0, suddenly 40,000 square feet is allowed, and a developer could build a mid-rise, likely paying considerably more for the land given the higher potential. Conversely, a downzoning that cuts FAR in half would typically erode land value since the future project size is limited.

Appraisers must be keenly aware of zoning and FAR when valuing development sites or even improved properties that have unused development rights. For a vacant land appraisal, the difference between an FAR of 1.0 and 5.0 is substantial, roughly translating to five times the revenue potential if the market can absorb it. We often value by comparing price per allowable buildable square foot.

Even for improved properties, if current improvements don't use the full FAR, there may be extra value in the unused development potential. A small strip mall on a lot where high-rise apartments could be built (high FAR unused) might trade for much more than its current income suggests because of that future redevelopment upside. Appraisers capture this through highest and best use analysis.

Reilly's law of retail gravitation: Where shoppers go

How do we determine the trade area boundary between two cities or shopping centers? Reilly's law of retail gravitation (1931) offers a simple formula: The break point between two competing centers lies at a distance where the attraction of both is equal. Reilly analogized retail attraction to gravity, wherein a city's "mass" is its population or retail offering, and distance is the deterrent.

$$BP = D \,/\, (1 + \sqrt{(P_2 \,/\, P_1)})$$

Where:

- BP = distance from City 1 (the larger city) to the break point, where customers are equally likely to visit either city
- D = distance between the two cities
- P_1 = population of City 1 (usually the larger center)
- P_2 = population of City 2

If two towns are 30 miles apart and Town A has 60,000 people and Town B has 20,000, Reilly's law predicts the break point to be about 19 miles from A and 11 miles from B. People living closer than 19 miles to A will shop in A; beyond that they'll shop in B. This quantifies what might otherwise be guessed.

In retail property valuation and feasibility analysis, defining the trade area is crucial. Reilly's law gives a starting point: the likely geographic boundary of a shopping center's customer base relative to competitors.

In highest and best use analysis, this can inform market feasibility. If someone proposes a

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new retail center between two cities, you might quickly see that it lies within the gravitational pull of the larger city, implying it could struggle unless it offers something novel.

Modern applications often substitute drive time for physical distance, but the same principles apply. Non-retail uses have analogous gravity ideas. Hospitals, for instance, have service areas influenced by size and specialties; larger hospitals draw patients from farther away.

Hansen accessibility index: Measuring connectivity

What makes a location accessible? In 1959, William G. Hansen introduced an index to quantify accessibility in urban areas. Hansen defined *accessibility* as the "potential of opportunities for interaction," or essentially how many jobs or opportunities can be reached from a location, weighted by the ease of reaching them.

$$A_i = \sum_j (B_j / C_{ij}^{\beta})$$

Where:

- A_i = accessibility at location i
- B_j = magnitude of opportunities at destination j (e.g., employment, retail space, population)
- C_{ij} = travel cost, time or distance between i and j
- β = distance-decay parameter, representing how quickly accessibility declines with distance
- $\sum_j$ = summation over all destination zones j

In simple terms, an accessibility index could be computed as follows: For each neighborhood, sum up all the employment reachable within, say, a 30-minute drive, but count nearby jobs more and faraway jobs less. A highly accessible place (like a central location) can put hundreds of thousands of jobs within reach quickly; a remote exurb can put very few within reach over the same time.

Hansen's original study demonstrated that areas with higher accessibility to employment tended to see more residential development, a pioneering empirical link between transportation and land use. Today, variants of Hansen's index are ubiquitous in transport planning.

Accessibility is a core determinant of location value. Hansen's index gives a way to think about locational advantages quantitatively: A site that scores twice as high in job accessibility likely sees higher demand for housing (all else being equal), because people value shorter commutes.

As an appraiser, you might not compute the exact index, but conceptually it's what we gauge when we say that "this site is well connected." A suburban office park at a freeway interchange has high accessibility to a regional labor pool (many workers can get there easily from various directions); that's a plus in valuation. A rural property down winding local roads has low accessibility generally reflected in lower value.

In appraisal reports, you often see descriptions like "within 5 miles of X jobs and Y population" or "easy access via highways to the metro area." These are qualitative nods to accessibility. Some advanced analysts do calculate accessibility metrics and map them.

For example, if you're valuing a proposed shopping center, you might state that "approximately 50,000 people reside within a 10-minute drive," which is a proxy for the opportunity set accessible to that site. If another site has 100,000 people in 10 minutes, it clearly has a locational advantage that should reflect in land value.

We can also see Hansen's concept in Walk Score and similar indices used in residential marketing today; those scores aggregate how many amenities are within walking distance (weighted by distance). Apartments with high Walk Scores often fetch higher rents because that accessibility is valued.

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Bringing it together

Urban economic models aren't just academic curiosities; they provide frameworks for understanding the forces that shape property values. For appraisers, the practical application usually comes through sharpened insight rather than formula calculation. Understanding these models helps us anticipate changes and see big-picture market dynamics. When valuing property, we operate at the confluence of economic, spatial, social and environmental forces. These models help decode the invisible patterns.

As the profession evolves, appraisers who combine technical proficiency with conceptual understanding will be best positioned to adapt and thrive. These are not theories to memorize but rather lenses through which to view markets, helping you recognize patterns others overlook and explain your conclusions with greater confidence and clarity. ▲

ABOUT THE AUTHOR

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