



Land Values in Chicago, 1913–2010

A City's Spatial History Revealed

Gabriel M. Ahlfeldt and Daniel P. McMillen

More than any other single variable, the change in land values across time and over space provides important insights into the shifting spatial structure of a city. Whereas a typical property sale reflects the combined value of the land and buildings, the land value alone represents the actual current worth of a location and suggests expectations about the future. Even if a parcel bears the burden of an outmoded construction, the price of the land reflects the present discounted value of the stream of returns that could be earned from the highest and best use of the parcel. Rapidly rising land prices in an area of a city are a clear indication that people expect the neighborhood to be in high demand for some time to come, signaling investment opportunities to developers. Changes in land values may also serve to alert city officials that an area may require zoning changes and investments in infrastructure.

Land value is also an important component in the cost approach to property assessment, which is one of the three commonly used assessment methods (including the sales comparison and income approaches). The cost approach has three major components: (1) the cost of building the existing structure if it were new at the time of assessment; (2) the depreciation of the building

Land value in downtown Chicago has remained at a premium for a century.

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to its current condition; and (3) the price of the land parcel. Adding (1) to (3) and subtracting (2) generally produces a good estimate of overall property value. In standard property transactions, however, land values are not easily separated from the value of structures. Sales of vacant land, which more clearly indicate a site's value, are relatively rare in large, built-up urban areas; as a result, relatively few studies of vacant land sales exist (see Ahlfeldt and Wendland 2011; Atack and Margo 1998; Colwell and Munneke 1997; Cunningham 2006). Teardowns can sometimes be used to measure land values, because land represents the entire value of a property when the existing building is demolished immediately following a sale

(McMillen 2006; Dye and McMillen 2007).

However, teardowns tend to be concentrated in certain high-value neighborhoods, and the data on demolitions can be hard to obtain.

Among U.S. cities, Chicago is uniquely fortunate to have a data source, *Olcott's Land Values Blue Book of Chicago*, which reported estimates of land values for every city block and for blocks in many Cook County suburbs for most of the 20th century. *Olcott's* provided a critical input to the cost assessment procedure: After determining the building cost and depreciation, the overall value of a property can be assessed by multiplying the parcel size by the land value provided in the *Blue Book* series. This article is based on a sampling of data from the *Olcott* volumes (box 1). It includes a series of maps that provide a clear picture of the spatial evolution of Chicago during the 20th century, similar in spirit to the classic book, *One Hundred Years of Land Values in Chicago* (Hoyt 1933).

BOX 1

Data Sources for Chicago Land Values

Olcott's *Land Values Blue Book of Chicago* covers the City and much of suburban Cook County with a series of 300 maps, each printed on one page of a book. The city itself comprises 160 individual maps with an impressive level of detail. Most block faces have a value representing the price per square foot for a standard 125-foot-deep lot. Land use is also indicated. Large lots and most industrial land have prices quoted by the acre or occasionally by the square foot for an unspecified lot depth. The data represent land values for 1/8- x 1/8-mile square grids, which closely follow Chicago's street layout and thus resemble city blocks. Each year's data set includes 43,324 observations for the entire city.

The Lincoln Institute of Land Policy has provided funding to digitize the data contained in *Olcott's Blue Book* for a series of years spanning much of the twentieth century: 1913, 1926, 1932, 1939, 1949, 1961, 1965, 1971, 1981, and 1990. A more thorough description of the procedure used is presented in Ahlfeldt et al. (2011). Digitizing the maps involves bringing them into a GIS environment. Average land values are calculated for 1/8- x 1/8-mile squares overlaid on the maps. The full data set has more than 600,000 data points across the 10 individual years.

Olcott's stopped publication in the early 1990s, and the last year of digitized data is 1990. To supplement *Olcott's* records for recent years, the authors obtained data on all vacant land sales in the city from 1980 to 2011. More than 16,000 sales were successfully geocoded, and they display the dramatic increase in land prices during the period prior to the collapse of the housing market at the end of 2006. These combined data sets provide a unique opportunity to analyze the changing spatial structure of an entire city over an extended time.

Spatial Variation in Land Values

Despite its flat terrain, Chicago has never been a truly monocentric city. Lake Michigan has long been an attractive amenity for its scenic value, its moderating effect on the climate, and the series of parks lining its shore. The Chicago River also has had a significant influence on the location of both businesses and households. Development to the north of the Central Business District (CBD) was delayed because the bridges over the main branch of the river had to open so often for river traffic that commuting to the Loop business area was unpredictable and time consuming. The north and south branches of the river attracted both industrial firms and low-priced residential developments for laborers while repelling high-priced homes designed for CBD workers. The locations of major streets, highways, and train lines also had significant effects on development patterns. Thus, there is ample reason to expect that the rate of change in land values varies across the city.

The maps in figure 1 show this spatial variation in land values in Chicago over time. In 1913, land values were highest in a large area around the CBD, and they were also quite high along the lakefront and along some of the major avenues and boulevards leading out of the downtown area. In 1939, this pattern was generally similar, along with the rise of the north side relative to the south side of the city: Land values were very high all along

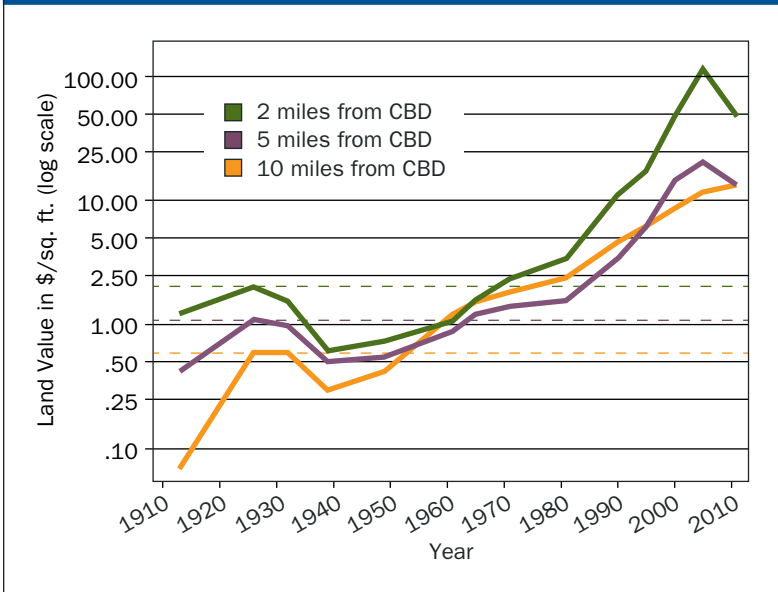
FIGURE 1
A Century of Land Values in Chicago



Note: Dark brown = very high land value, fading into light yellow = very low land value.

Source: Authors' calculations using *Olcott's* data for years prior to 1995 and vacant land sales for 1995–2005.

FIGURE 2
Land Values Relative to Distance from the CBD



Source: Authors' calculations.

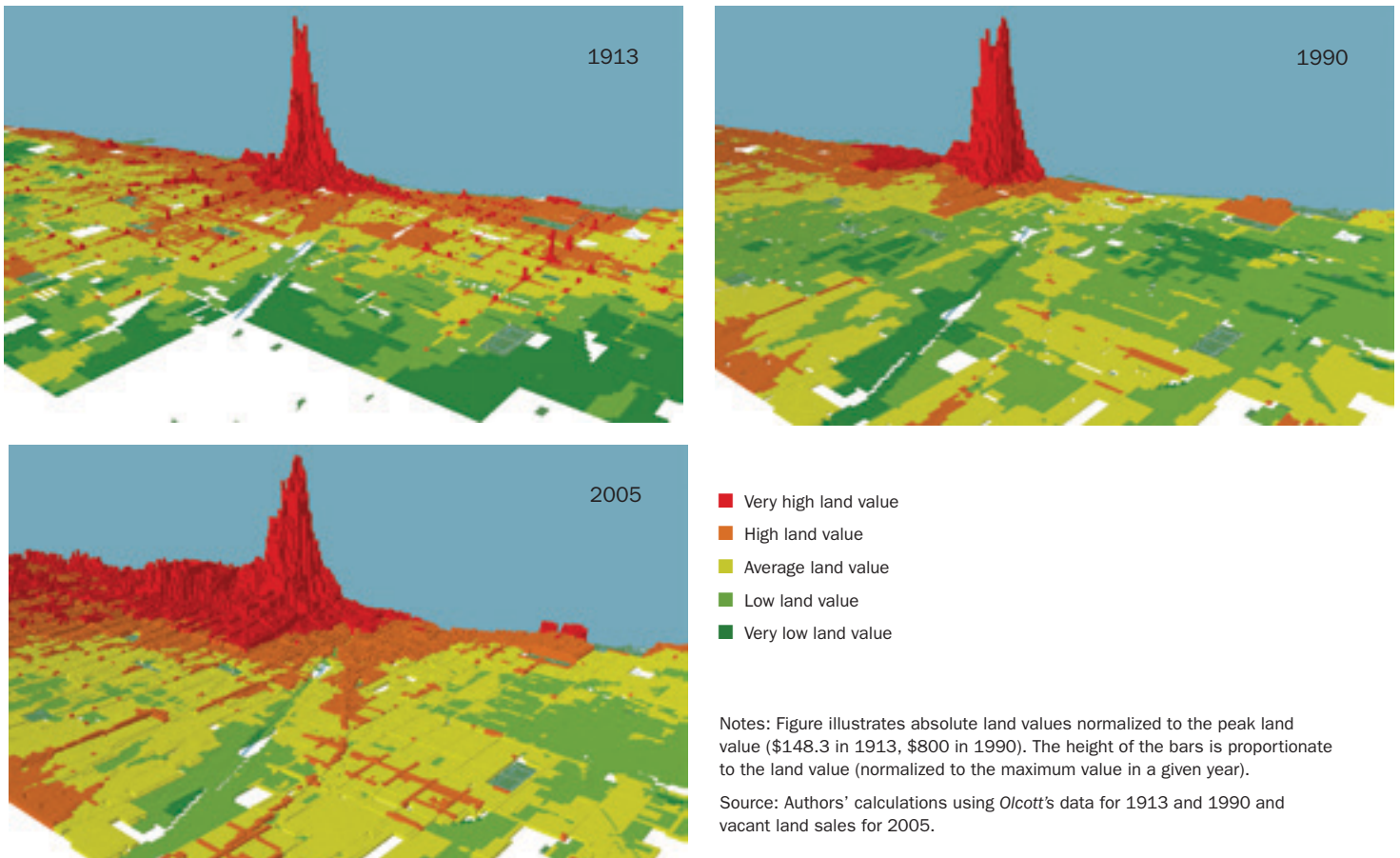
the northern lakefront and extending well inland on the north side. The area at the edge of the city due west of the CBD (the Austin neighborhood) also had relatively high land values in 1939.

By 1965, the pattern of land values had changed markedly. Very high land values were confined to a relatively small area in the CBD. The high-value area of the west-side Austin neighborhood was much smaller in 1965 than in 1939, and nearly all the formerly high-value areas had shrunk in size.

By 1990, however, the situation changed dramatically. The area with very high values extended much farther north and inland than previously. Areas on the south side had relatively high land values in 1990, particularly around the South Loop (near the CBD) and Hyde Park (along Lake Michigan south of the CBD).

After 1990, the pattern of continued redevelopment of the city is based on an analysis of actual

FIGURE 3
Land Value Surfaces in 1913, 1990, and 2005



sales of vacant land. The expansion of the high-value area to the north and west of the CBD is remarkable, and the near south side also enjoyed a resurgence during this time.

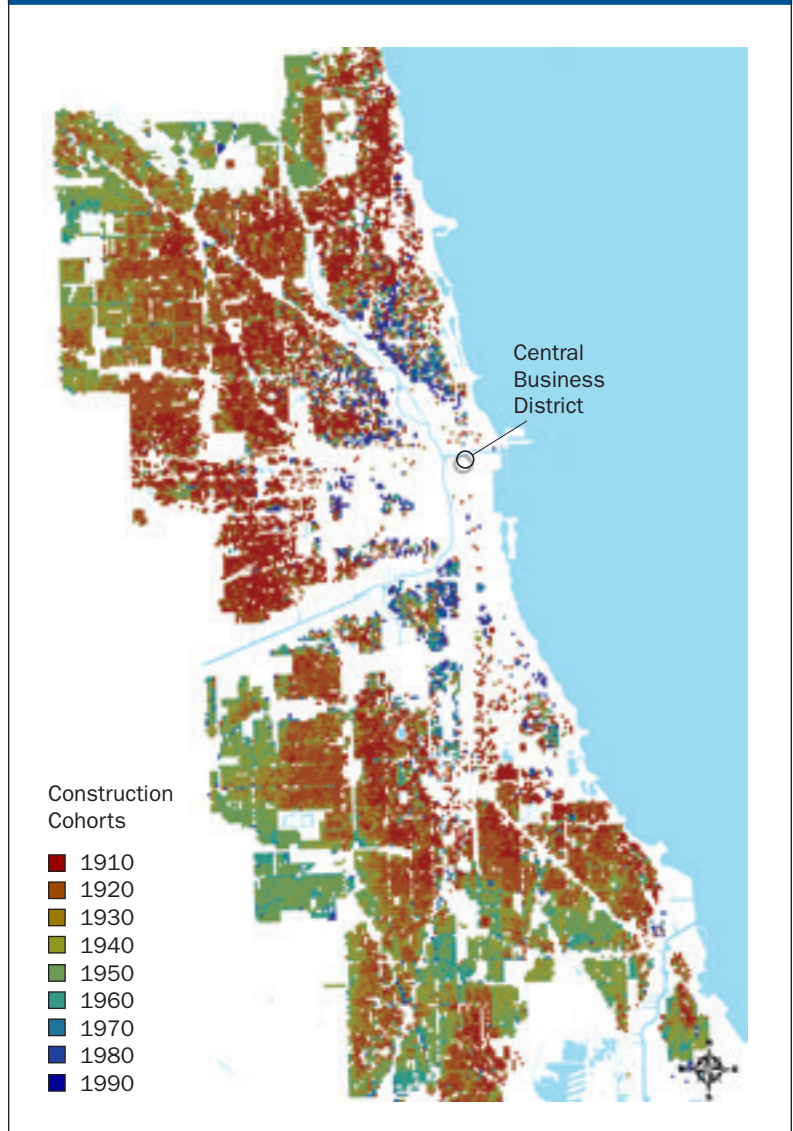
Figure 2 addresses how the recent recession affected the growth of land values in Chicago by expressing land values as a function of distance from the CBD. The plots show the change in average (log) land values over time for tracts with centroids falling within 2-, 5-, and 10-mile rings around the CBD. In 1913, average land values were far lower 10 miles from the CBD than in the closer rings. By the 1960s, there was little difference between land values across these distances. Since then, average values grew much more in the 2-mile ring than in more distant locations. During the Great Recession, land values declined rapidly in the 2-mile ring, less rapidly in the 5-mile ring, and not at all in the 10-mile ring. Thus, the areas that had the highest rates of appreciation during the period of extended growth also had the highest rates of decline during the recession.

Figure 3 provides a different perspective on the spatial variation in land values over time. The three panels show smoothed land value surfaces for 1913, 1990, and 2005. The 1913 and 1990 surfaces are estimated using *Olcott's* data, while the 2005 estimates are based on sales of vacant land. In all three years, land values are far higher in the CBD than elsewhere. In 1913, there are a large number of local peaks in land values at the intersections of major streets. These areas were relatively small commercial districts that served local residents in a time before car ownership was commonplace. In 1990, the land value peak in the CBD is accompanied by a much lower plateau just to the north along the lakefront. In 2005, the plateau has grown to a large area that extends well into the north side and inland along the lakefront. The region of high land values has also extended south along the lakefront, with a local rise much farther south in Hyde Park.

Persistence of Spatial Patterns

Historical land values are interesting not only because they reveal how an urban area has changed over time, but also because the past continues to exert substantial influence on the present. Cities are not rebuilt from scratch in every period. Buildings last a long time before they are demolished,

FIGURE 4
Construction Date Cohorts in 2003



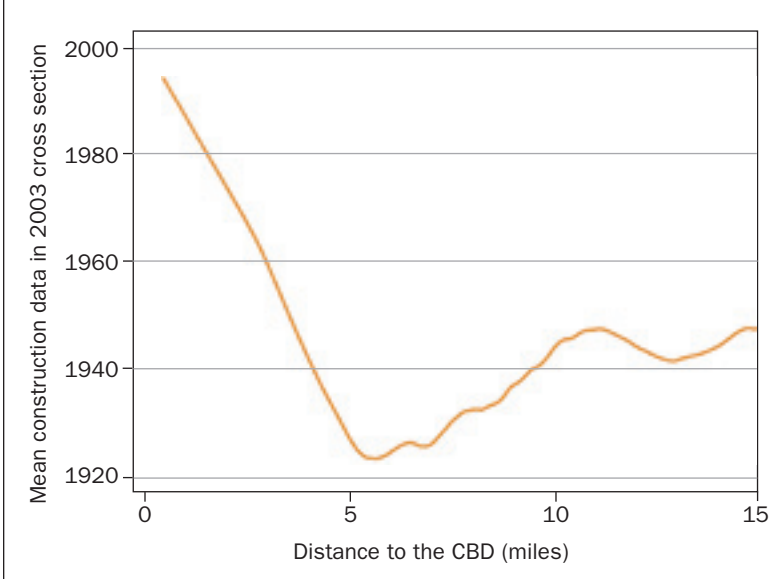
Notes: Construction date cohorts are defined based on the mean construction date of buildings within 330x330 ft. as existing in 2003.

Source: Authors' calculations using 2003 assessment roll for Chicago.

and sites that were attractive in the past tend to remain desirable for a long time. One of the unique features of the *Olcott's* data set is that it allows us to compare land values from 100 years ago to current land values and land uses.

Figure 4 shows the average date of construction for the 1/8- x 1/8-mile squares. The recent recentralization of Chicago is evident in the donut shape of building ages around the CBD. The newest buildings are close to the CBD, while the oldest buildings are in the next ring. Buildings in the most

FIGURE 5
Average Construction Dates by Distance from the CBD



Source: Authors' calculations.

distant region were most likely built between 1940 and 1970.

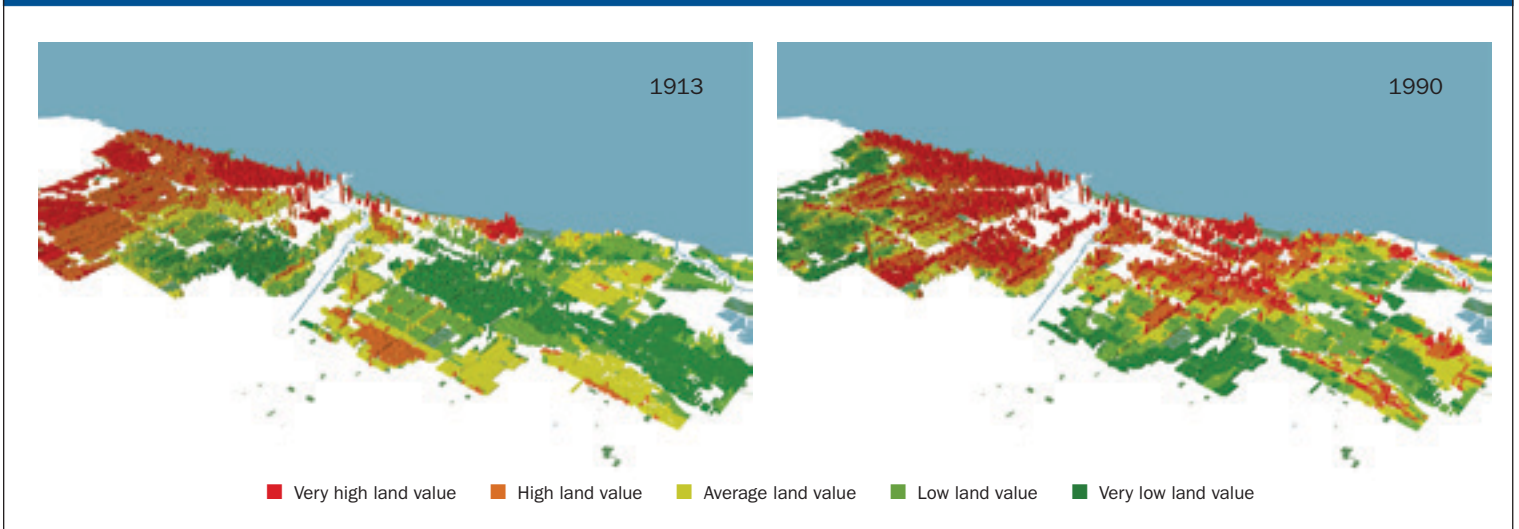
Figure 5 summarizes this relationship by comparing the mean construction date to distance from the CBD. The oldest buildings are in a ring just over 5 miles from the CBD.

A good measure of structural density is the ratio of building area to lot size. Economic theory

predicts that structural densities will be high where land values are high. Structures last for a long time. How well do past values predict current structural density? Figure 6 compares the structural density of buildings in the 2003 Cook County assessment rolls to land values in 1913 and 1990. This data set includes the building area of every small (six units or fewer) residential structure in Chicago.

The height of the bars indicates the structural densities: Tall bars have relatively high ratios of building areas to lot sizes. The color of the bars indicates land values: Red bars have relatively high land values. Thus, we should expect to see a large number of tall red bars and low green bars. In general, the two panels do indicate a positive correlation between structural density and land values. The correlation is particularly evident on the north side and along the lakefront. The correlation with 1990 is less clear on the south and west sides. Several elevations in the density surface are not matched by correspondingly high land values. One explanation for these results, which are in line with the reorientation of high-priced areas toward the north side, is that the relatively high densities in these areas are artifacts of a past when those blocks were relatively more valuable and when there were incentives to use the land intensively. The 1913 panel of figure 6 suggests that land

FIGURE 6
Intensity of Land Use in 2003 vs. 1990 and 1913 Land Values



Note: In this figure, the height of the bars is proportionate to density (the ratio of total floor space to land area).

Source: Authors' calculations using *Olcott's* data and the Chicago assessment roll.

values are actually more closely correlated with building densities for 2003 than are the 1990 values. The root of this apparently anomalous result is that building density reflects the economic conditions at the time of construction, and most of the buildings in that part of the city date from long ago. The past continues to exert a major influence on the present.

Conclusion

Olcott's data provide a clear picture of the changes in Chicago's spatial structure during most of the 20th century. Never a truly monocentric city, Chicago began the century with very high land values in the CBD, along the lakefront, and along major avenues and boulevards leading out of the downtown area. Values were also high in neighborhood retail areas at the intersections of major streets. By 1939, the north side of Chicago had already begun to display its economic dominance. The city then suffered an extended period of decline, with the CBD holding the only major cluster of high land values in the 1960s. Since then, the city has undergone a remarkable resurgence. High land values now extend over nearly the entire north side, and land values have also rebounded in parts of the south side. Our analysis also shows the strong role that history continues to play in the current spatial structure of the city. A result of this persistence is that land values from a century ago are better than current land values at predicting the density of the current housing stock. **L**

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The Chicago River's influence on development patterns remained strong throughout the 20th century.

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