Predictive Analytics:
Real Estate's Next Crystal Ball?

Still in its infancy as a tool for commercial real estate, the practice of modeling future outcomes offers tantalizing potential as a resource. Formidable hurdles to broad application are ahead, yet innovators in the field are creating solutions that could ultimately enhance decision-making in investment, site selection, development and leasing. This edition of the Yardi Thought Leadership Series will explore the long-term promise of predictive analytics in commercial real estate, the major challenges and cutting-edge initiatives.

Topics discussed include:

- Predictive analytics' track record in business strategy
- Opportunities and challenges to incorporating the tools in commercial real estate
- Innovative applications of predictive modeling

Data has been called "the new oil," and predictive models are giving an unprecedented dimension to business strategy. One exciting subset is predictive analytics, which can be defined as the use of historical data, algorithms and machine learning to identify the likelihood of future outcomes. The field is on track to be a $3.6 billion industry by 2020. Predictive analytics' applications are most commonly associated with risk management, identifying inflection points, determining key relationships and improving processes.

Though predictive analytics is a 21st-century phenomenon, its origins can be traced back hundreds of years to early milestones in statistical modeling and more recent breakthroughs in information technology. In our own time, sectors of the economy as diverse as residential real estate, finance and retail have embraced predictive analytics. The single-family residential industry is already on board. In a 2017 survey, 74 percent of residential real estate executives named predictive analytics as the top emerging technology for brokerage by 2022, according to Imprev, a residential real estate marketing firm.

In commercial real estate, the role of predictive analytics offers a compelling, if highly complex, picture. The capacity to accurately model asset values or the potential returns of future development would clearly offer an immense competitive advantage. Observers have also argued that predictive tools would give landlords and tenants valuable new insights into the local conditions that shape leasing decisions. Researchers in the field cite the ability to test anecdotal evidence and professional intuition against rigorous mathematical evidence.

In many of these fields, practical applications of predictive analytics are still works in progress,

Predictive analytics is widely used in such industries as finance, retail and single-family residential real estate. Experts believe that the models could provide a competitive advantage in commercial real estate, as well.

if highly promising ones. While emphasizing its potential, experts in the field acknowledge that broad adoption of these tools by the industry is likely some years away.

The applications of predictive analytics in business areas that already apply it in a sophisticated manner offer a glimpse of its potential in commercial real estate. Housing data is one of the first segments of real estate to benefit from sorting, in large part because it offers a variety of categories with "yes/no" responses that are well suited to sorting models.

In the financial sector, quantitative traders harness the massive amounts of financial data to inform investment decisions. Investment managers use predictive models to connect the dots between data sets and trends in security prices, according to Chris Ricciardi, a senior vice president at AlphaCore Capital.

These tools analyze stocks by means of complex formulas that draw on thousands of data points and a complex weighted average. Traders rely on the output of the calculations to rate stocks "buy" or "sell." Quantitative traders contend that the ability to quickly look at thousands of data points for vast numbers of stocks offers a competitive advantage; the sharp rise in the volume of capital invested in funds using predictive analytics is highly suggestive.

However, a combination of high correlation and low feedback can make commercial real estate problematic to model, according to Mikael Nyberg, managing director for strategy and innovation at Moody's Analytics, who leads the firm's global practices for portfolio management and valuation, balance sheet management, insurance, regulatory and compliance, and stress testing.

In order to better understand the risks associated with commercial real estate, Moody's recently partnered with leasing data provider CompStak. Because many properties trade infrequently—once a decade or less—that creates scenarios in which large numbers of assets are on the market at approximately the same time. That, in turn, makes it difficult to accurately reckon risk associated with individual properties. Nyberg argues that a better understanding of how micro-markets are segmented is essential to accurate risk modeling.

Is the Price Right?

As the appraisal profession increasingly implements advanced analytics in pricing properties, predictive models may prove to be a powerful tool. The Massachusetts Institute of Technology's Real Estate Innovation Lab is exploring a potential role for predictive analytics in this area. The projects are informed by the experience of the Innovation Lab's director, Andrea Chegut, one of the many professionals who have experienced the shortcomings of conventional appraisal methods.

A decade ago, while working as a securities analyst at the outset of the financial crisis, Chegut realized that limitations on the availability of data made it difficult to assess the effects of a systemic shock. Such "erroneous shocks" have always been a major limitation to predictive models. The wider or more diverse the data set, the better it can detail the possible outcomes of a historically uncommon event.

To address this issue, Chegut is overseeing several initiatives that collect and analyze massive data sets. For one project, the Innovation Lab team is compiling some 3,000 unique pieces of information for every commercial property in Manhattan. Another Innovation Lab project aims to predict the effect of innovation and human capital on

geography. The team keeps a running record of every startup company in New York City, tallying granular details about floor location and talent recruitment. Having categorized the data, the team can then create models for pricing and social change by using a method of sorting.

The team continuously builds out its predictive models to include more variables for sorting. Observation of broader trends can be particularly valuable for pricing emerging categories of assets, such coworking spaces and vertical marijuana farms.

In another variation on the idea of incorporating statistical models into valuation, Bowery Analytics applies data on the New York City market to better represent each parcel's unique nature. Rental rates for space on Fifth Avenue might be two to five times the rates for comparable spaces on Sixth Avenue, noted Noah Isaacs, Bowery's co-founder. But to reliably estimate what the market is willing to pay for an asset, appraisals should consider a property's capacity to generate income and even intangibles like goodwill, he contends.

Isaacs believes that every asset category in every micro-market will eventually require a similar model. It is important to identify the handful of variables that show highest correlation with the desired outcome, whether it is sales volume from a retail location or ease of distribution from an industrial property.

Building Potential

Development, too, offers intriguing potential uses for predictive models. New York City firm Envelope emerged from a collaboration between SHoP Architects and Sarah Williams, director of the Civic Data Design Lab at the Massachusetts Institute of Technology. The firm's three-dimensional urban mapping platform integrates proprietary geospatial datasets, sophisticated algorithms and iterative scenario analysis to help real estate professionals visualize and assess development opportunities quickly and efficiently.

One element of the work demonstrates solutions for transforming written information into a mathematical format that can be used for predictive models. Envelope translated New York City's 4,000-page zoning resolution and digitally translated it into a series of "if/then" statements. The team also accounted for adjacency rules and restrictions to generate a map of Manhattan's air rights. The goal is creating the capacity to predict how development will affect surrounding areas and the city as a whole.

A pitfall of relying too heavily on models based on government data is the potential for the inaccuracy of public records, according to Bill Staniford, the firm's chief strategy officer. To mitigate that concern, he has implemented a system that regularly compares government data to information from outside sources.

New York City is a frequent testing ground for applications of predictive analytics in commercial real estate.

Site Insights

For brick-and-mortar retailers, selecting a site for leasing or purchase is central to a store's viability. Rapidly changing dynamics in the retail sector, notably the rise of online shopping, is bringing a new scrutiny to selecting locations. Here, too, experts say that analytical models can inform strategy.

LocateAI, an advisory service specializing in the selection of retail locations, uses retailer's data as the basis for determining what aspects of a location correlate to a store's success. The analysis helps the retailer client to forecast the performance for a specific site or identify potentially high-performing locations, explained Joe Lee, the firm's founder.

Since real estate data is becoming more open, finding less frequently used information sources, like retail store performance comps, might be needed to identify undervalued assets. This, in turn, would require incorporating data from non-real estate industries. With few companies reporting site-by-site financials, obtaining the volume of data necessary to yield conclusions is difficult for the average real estate analyst.

It seems highly likely, if not inevitable, that predictive modeling will influence a wide range of data-driven decisions in the years to come. The methods are well established in a variety of industries, and those on the forefront of its application in real estate are demonstrating

Sophisticated algorithms and proprietary data are a hallmark of predictive modeling, like the 3D urban mapping program created by Envelope.

considerable ingenuity. At this point, the field would benefit from stepped-up industry support in the form of advanced research and scalable pilot projects. One possible sticking point in the broader adoption of predictive modeling is concern by industry leadership about overreliance on the methods.

Yet those at the cutting edge of the field in commercial real estate insist that their goal is not to supersede professional experience but rather to add a new dimension to the industry's time-honored tools. As with so many other areas touched by technology today, the biggest challenge to using predictive models effectively in real estate may be striking the best possible balance between analytical rigor and human intuition.

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