

Using the Cloud for Risk Management

By Dr. Chris Marrison

What possible relevance can cloud computing have for commercial real estate? It turns out, quite a lot. Commercial real estate is a complex asset class and computers can deal with complex problems. Cloud computing makes it possible to deal with very complex problems such as understanding the risk in commercial real estate portfolios.

There are two aspects of cloud computing that are relevant here. One is the ability to host software solutions on the cloud, thereby avoiding the need to install and maintain them in-house. This has cost advantages and means that the user can access the system immediately, without a prolonged implementation project. The second aspect of the cloud is the ability to make massive computational power available on demand. The traditional approach to assessing the risk of commercial real estate financing is to use intuition supported by some nominal or stressed cash flow projections. More recently, with new regulations, there are requirements to quantify the risk in commercial real estate financing. Typically, the risk is quantified in terms of the probability of an investor not being

able to pay the debt and the subsequent loss given a default.

A simple approach to risk quantification has been to make scorecards that take a series of factors such as loan-to-value and debt-service-coverage-ratio and weigh them to create a score, which is then related to the risk. This has the advantage of being relatively simple. Scorecards, however, do not capture the multi-year complexity of commercial real estate deals, they do not capture the devil in the details and the assignment of the weights can be a mystery. Most importantly, scorecards do not tell the user anything new. They just formalize what the lender already knows so that the numbers can be reported elsewhere.

Through the cloud, the increase in the computational power now makes it possible to do a much better, and more useful, job in quantifying, differentiating and structuring the risk in commercial real estate deals. There are many aspects of CRE deals that require expert judgment such as the assessment of how a particular property will perform relative to the market, or how well an individual investor will be able to manage the property.

On the financing side, however, there are significant aspects that can be usefully quantified such as how well the lease structure will match the loan structure in different market conditions or the extent to which swaps, covenants or reserves can be used to mitigate the risk in certain conditions.

The effect of these financing details is often dramatic and they can be quantified by using a cash flow model to project property and loan performance in many thousands of possible conditions, e.g., what happens if in three years interest rates go up, a tenant defaults and it takes six months to get a new tenant at the prevailing market rate.

The result of this simulation analysis is a profile, year by year, of the spikes in default. These spikes indicate how the financing structure can be changed to best match the property and borrower characteristics. This information can be used to guide structuring and pricing, as well as reporting the risk in quantitative terms. This simulation approach uses an open cash flow model that has intuitive terms such as void periods and refinancing thresholds, rather than requiring mysterious weights.

The main disadvantage of this approach is that running the full set of cash flows over multiple years in thousands of possible scenarios requires a lot of computational power. Depending on the complexity of the deal, on modern servers it can take three to four minutes to get a set of results. This is reasonable when analyzing a single deal and the time required steadily decreases as computers advance and get faster.

However, when looking at a bank's portfolio of thousands of deals, the calculation time could potentially be several days for a detailed stress test looking at the stress on each lease over time. Until recently the approach has been to run the deals in parallel, i.e., to have several computers running at the same time.

Typically a bank might have 30 such computational servers, bringing the calculation

time down to a couple of hours. A couple of hours for a detailed portfolio analysis is generally acceptable, and can be reduced further by installing more hardware, but that implies a significant capital expenditure for a set of installed servers that may be idle until the end-of-month run.

By accessing virtually unlimited servers on-demand, portfolio analysis becomes much faster and more cost effective. For example, with a burst of 200 servers, a portfolio of 1,000 deals takes 18 minutes to run with an "infrastructure-as-a-service" cost of a few hundred dollars. Moreover, once the calculations are finished, the cloud computers can be shut down until the next time they are required (this ability to tune on-the-fly the computational supply with demand is known as elasticity).

With the immediate availability and elasticity provided by the cloud, and the massive computational power, there is a great reduction in the upfront capital costs required to run detailed actionable analysis on commercial real estate portfolios.

In summary, the top five benefits of using the cloud for risk management in commercial real estate are:

- The ability to analyze CRE financing structures with unprecedented detail and differentiation.
- The ability to use intuitive cash flow models without mysterious weights.
- The ability to cut apart the structure and price for new deals.
- Fast calculation times for large portfolios under different market assumptions.
- Immediate availability and elasticity, without a large implementation process, management, and cost.

With Cloudburst risk managers can have fast, detailed, cost effective risk analysis for CRE portfolios.

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