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Private Credit Risk
Part 2:
Commercial Real Estate Debt

Emilian Belev, CFA, ARPM
Head of Enterprise Risk Analytics

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Agenda:

- The risk drivers specific to CRE-backed debt
- The mechanics of default of real estate loans
- Data requirements
- Forecasting probability of default
- Examples of three different types of CRE loans combined with properties in three different real estate markets
- Applications to other areas of risk management
- Summary

Drivers of Risk for Private CRE Debt

- If the loan features a floating rate, the cash flows throughout the loan payments will be volatile throughout the loan life
- The mark-to-market value of the mortgage is not of primary importance since there is not a ready market for such investments, and therefore not of a major concern for rational investors entering such deals
- Potential early prepayment is not a concern either since many of these loans have a “make whole” loan prepayment penalty embedded in the contracts
- Default – the major source of risk. It can be due to either shortage of income of the borrower to cover the payments due on the loan, or shortage of the value of the collateral to satisfy the outstanding loan balance

Mechanics of CRE Debt Default

- If the borrower lacks sufficient liquid resources to meet periodic loan payments, they will default on the mortgage.

- Sometimes, when the value of the property falls below the outstanding loan amount the borrower will hand the keys to the lender, especially if they believe that the property capacity to bring in income or recover its value has been impaired beyond a transitory level

- Often times, there are other clauses in a CRE debt contract that are not directly affected by the financial ability of the borrower to repay the debt, but by convention metrics – like debt to income - that should not be violated or the so-called technical default will be triggered

- A robust set of analytics should be able to forecast the probability of all these measures, as well as derivative metrics that related to the extent of the ensuing loss to the investor from the violation of the debt contract provisions, whether financial or technical

Data Requirements

- There are two types of data requirements that are reasonably expected to inform the analysis of CRE-back debt
- The first one relates to the market of the underlying real estate collateral and has to do with the amount of income that the respective property or properties generate, as well their value
- In this respect Northfield has accumulated data for the stochastic behavior of more than 2000 rent markets globally and has developed a risk model about the volatility of their value
- In addition, Northfield's partner Aspequity has developed a valuation model than can estimate the fair value of an illiquid asset provided a probability distribution of its cash flow payoff outcomes
- The second type of inputs relate to the loan contract itself

Data Requirements (cont'd)

- The inputs that are required with respect to the loan contract relate to variables that allow the determination of the periodic payment to service the loan, the periodic outstanding loan balance, and derivative metrics that relate to monitoring the conformity with the technical default requirements.

- The typical inputs that relate to financial default include: the location of the property or portfolio thereof, the property types involved, the interest rate level and type – floating or fixed, the type of amortization – full, interest-only, or involving a balloon payment at the end, maturity, frequency of payment, etc.

- The inputs that allow measuring the potential for technical default may involve the same metrics that are involved in measuring the potential for financial default but may be other and would depend on the specific mortgage contract

- Next, we describe how all of these inputs are harnessed in an automated and robust framework to serve the risk management of CRE-back debt

Forecasting Probability of Default

- Forecasting probability of default involves estimating the chances of the borrower not to honor the loan payments in any given period given their capacity to repay
- It also involves forecasting the potential for default that may be triggered by the value of collateral going “underwater” –i.e. lower than the outstanding principal loan balance
- The analysis should also be able to estimate various metrics that are involved in determining whether technical default has taken place
- Our capabilities cover all of these requirements in an automated and scalable fashion
- The specifics are outlined next

Forecasting Probability of Default (cont'd)

- The property or portfolio of properties that services as collateral has two functions related to supporting the ability of the borrower to service their CRE debt.
- The first one is that it provides cash flows from incoming rent receipts that should allow the borrower to meet their dues on the mortgage
- The second one is that the value of the property should always stay above the outstanding loan balance to avoid adverse incentives that the borrower hands over the keys of the property to the lender
- The first task requires the forecasting of the probability distribution of the cumulative cash flows form the property or portfolio thereof, and the second involves forecasting the probability distribution of the property value or CRE portfolio that serves as collateral

Forecasting Probability of Default (cont'd)

- The ability to forecast the capacity of cumulative property cash flow to meet the cumulative mortgage payments rests on several prerequisites:
  - Having information about the statistical properties of the specific rent market
  - The ability to forecast the cash flow paths that form the probability distribution of the cumulative cash flows from the property
  - The ability to forecasts the payment schedules of any type of mortgage
- These prerequisites are seamlessly met:
  - Northfield covers the history of the rent time series of more than two thousands CRE market globally.
  - Northfield's partner Aspequity has developed a simulation engine that can produce the cumulative multi-period cash flow distribution of any investment as long as it is provided the single period statistical properties of the cash flows. The Aspequity engine builds the probability distribution based on more than 10^{50} cash flow paths.
  - It is also able to forecast the deterministic pattern of cumulative cash flows of a fixed rate mortgage, or the probability distribution of cumulative cash flows of floating rate mortgages.

Forecasting Probability of Default (cont'd)

- The ability to forecast collateral value over multiple periods depends on two prerequisites:
  - A robust method for estimating the current and the forecasted fair value of the CRE property or a portfolio thereof
  - A single-period risk model for the value of CRE properties

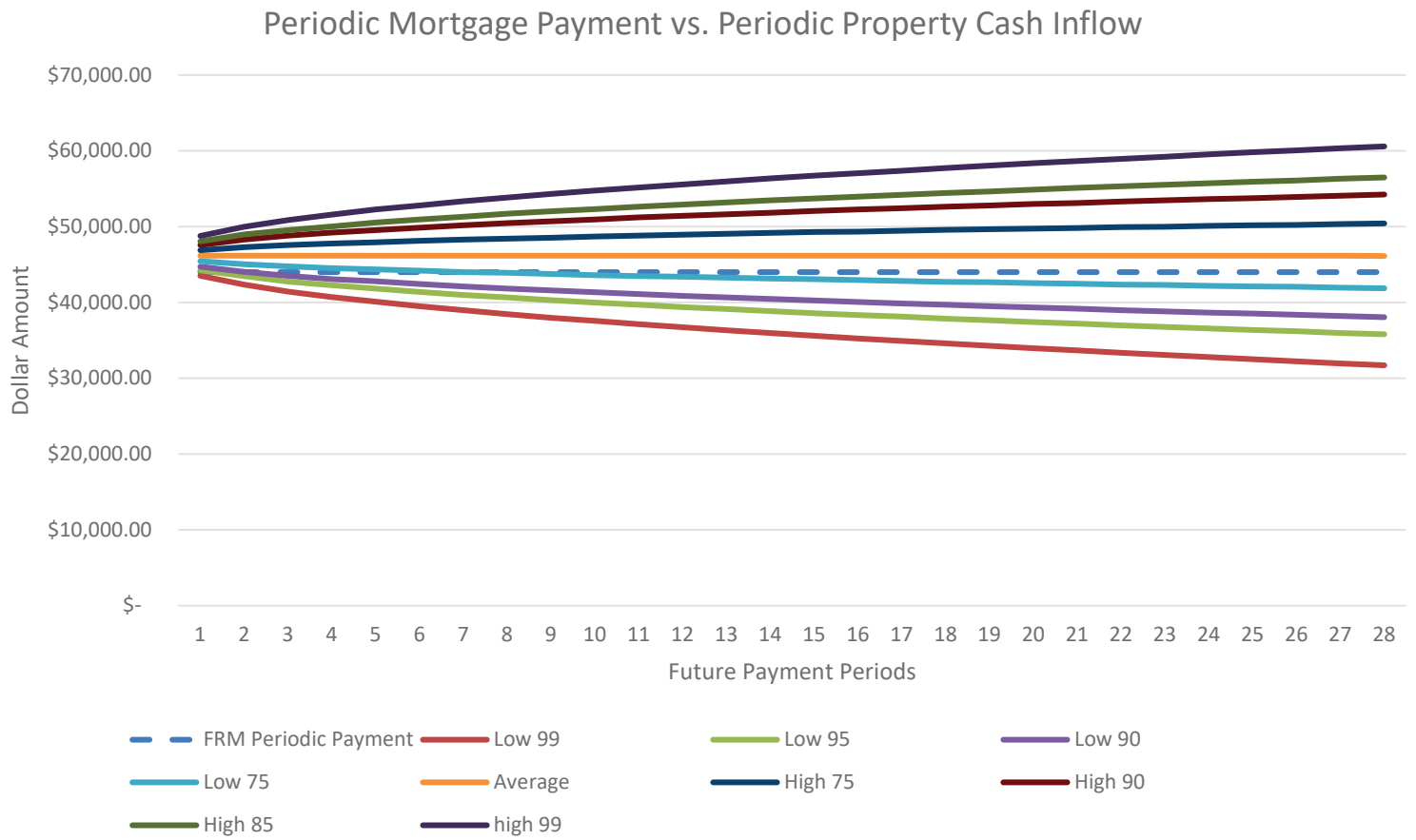
- These prerequisite are addressed by :
  - The EXPLO valuation model developed by Aspequity that does not rely on assumptions of market efficiency or liquidity, making it very appropriate for valuation of private asset like directly owned commercial real estate
  - Northfield has developed an award-winning real estate risk model (ARES 2015 Best Practitioner Award), that applies to all global markets including thousands of metropolitan areas, regions, countries, and all property types

Illustration of Forecasting Probability of Default

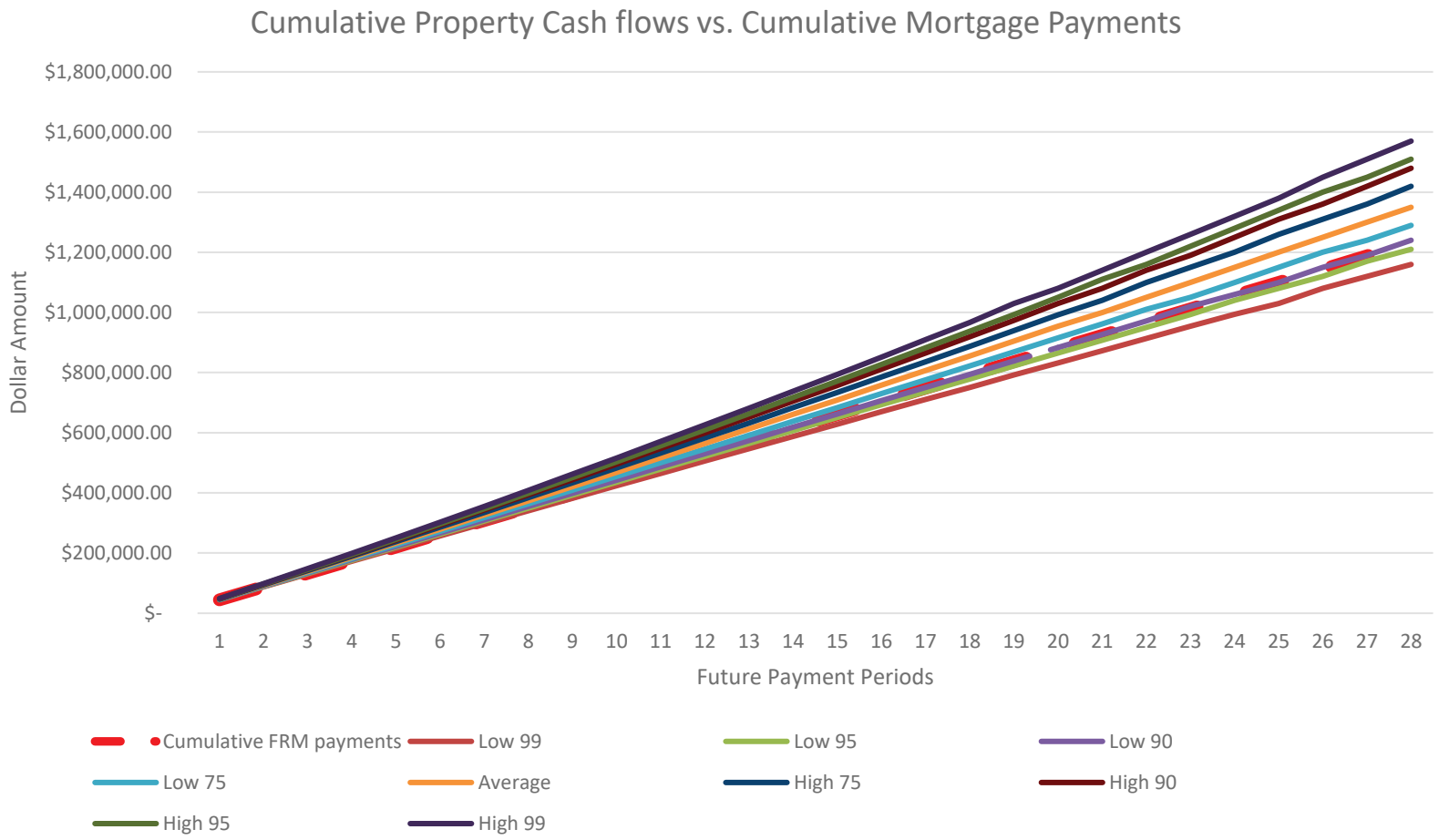
- The following examples are based on real estate properties based in three different markets:
  - New York City Office
  - Houston Industrial
  - Mixed metropolitan areas and property types

- The examples also selectively reflect three different standard type of mortgages:
  - A standard fully amortized Fixed Rate Mortgage (FRM)
  - A floating rate Interest Rate Mortgage (IO)
  - A fixed rate Balloon Mortgage where half of the principal is redeemed at the maturity of the mortgage
  - All mortgages have a value of $1,000,000, LTV = 66%, APR = 6%, quarterly payments, and a maturity of 7 years

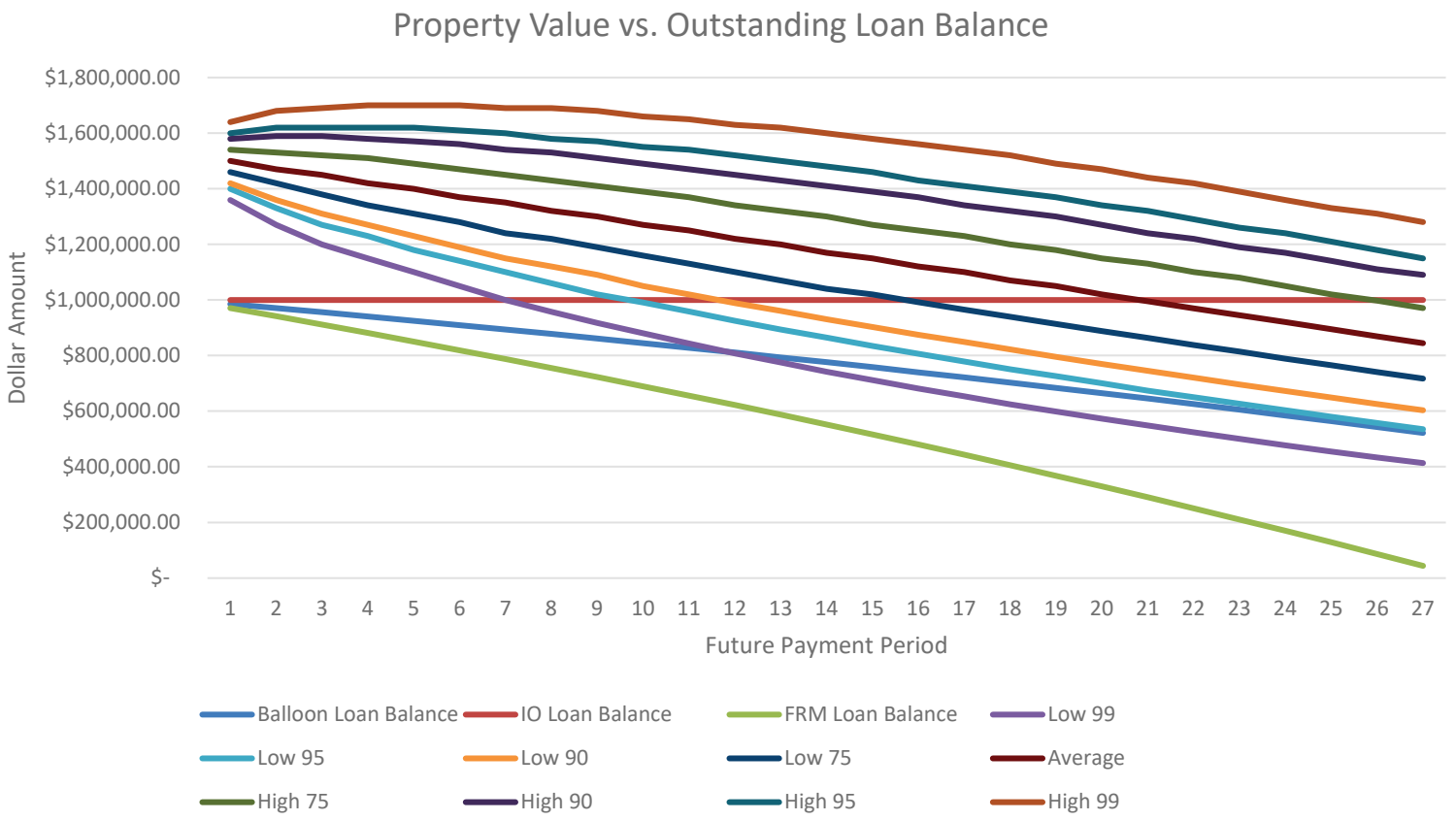
Periodic Income vs. Liability



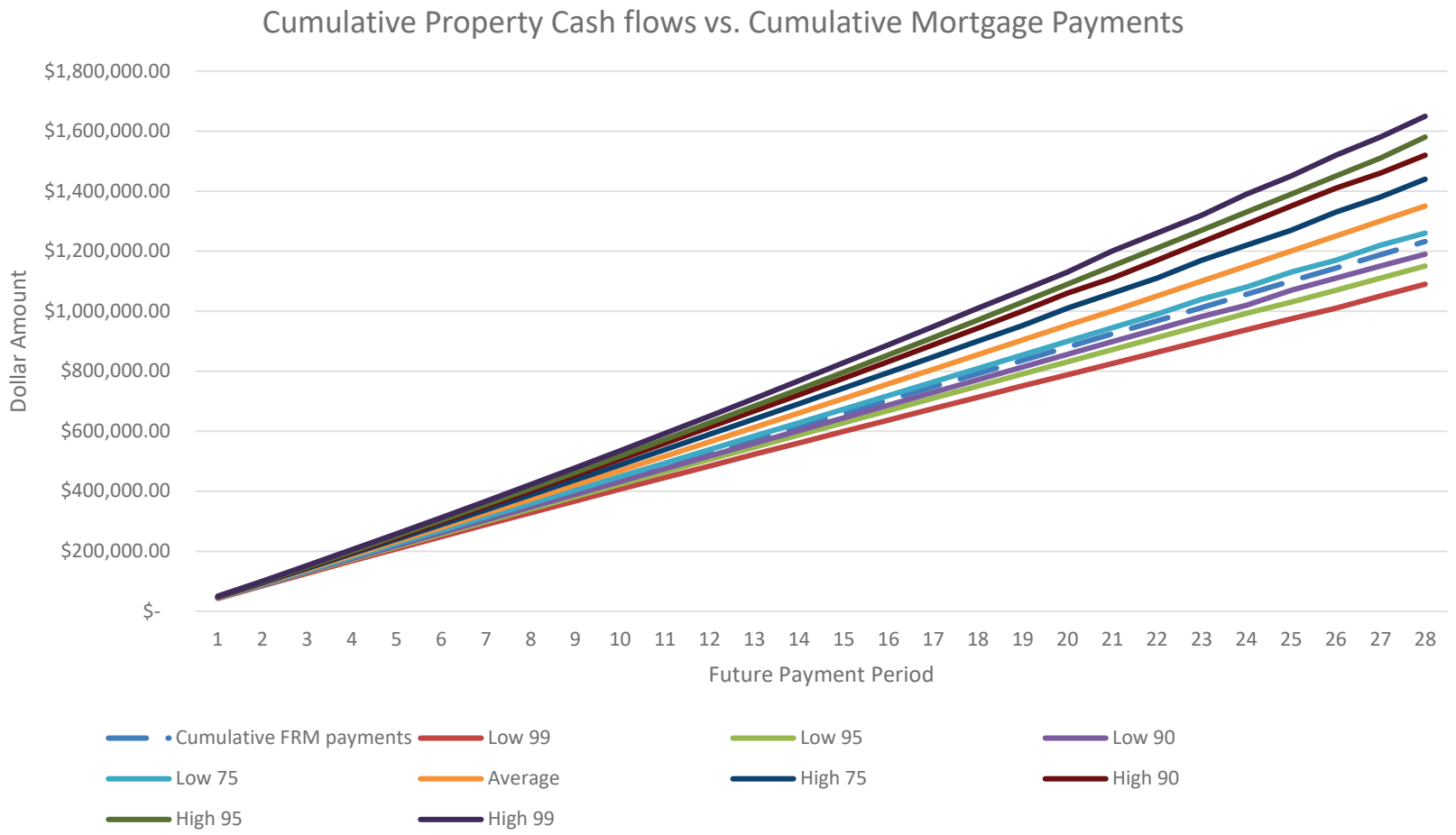
Payment Default Probability: Houston Industrial



Underwater Default Probability: Houston Industrial



Payment Default Probability: NYC Office



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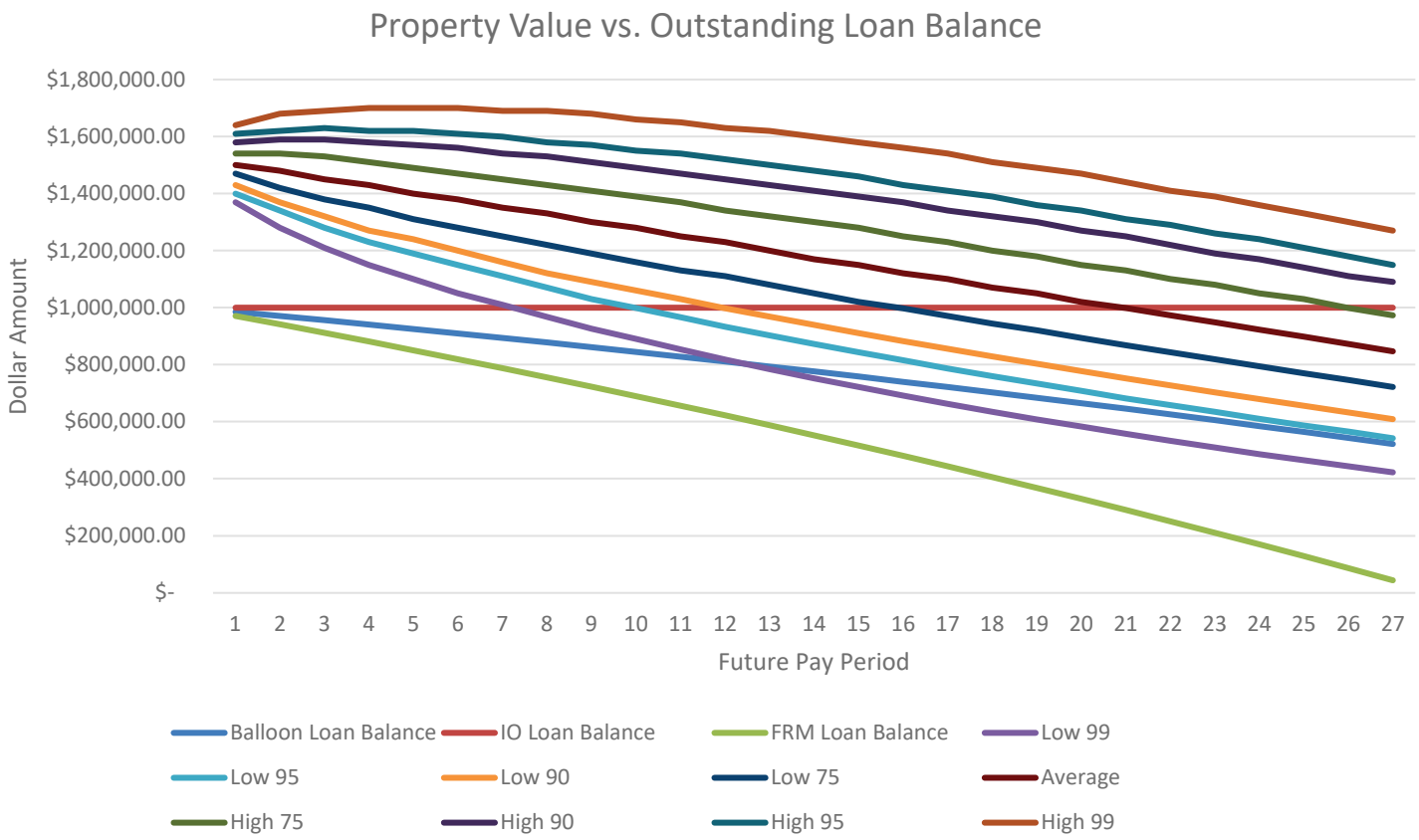
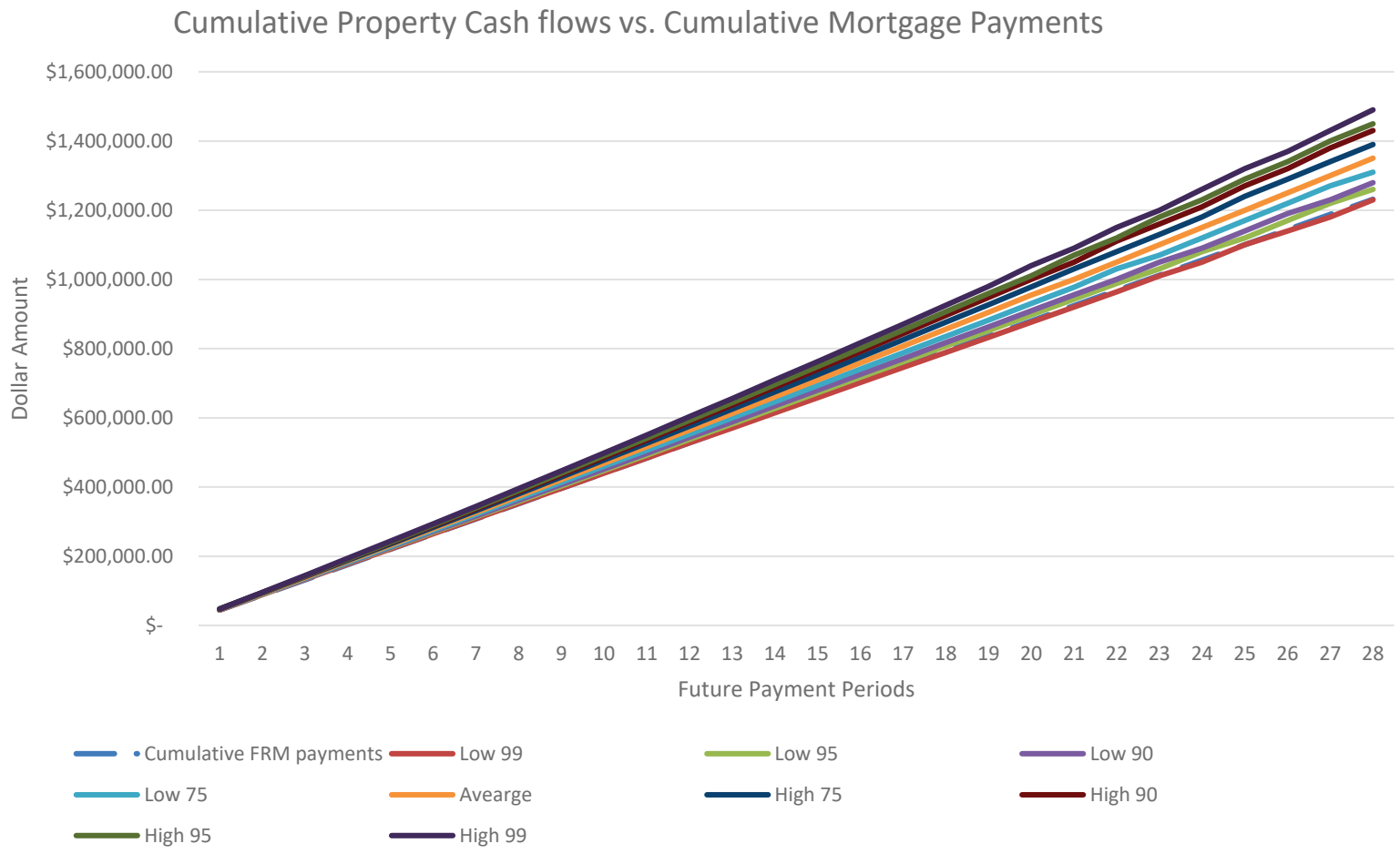
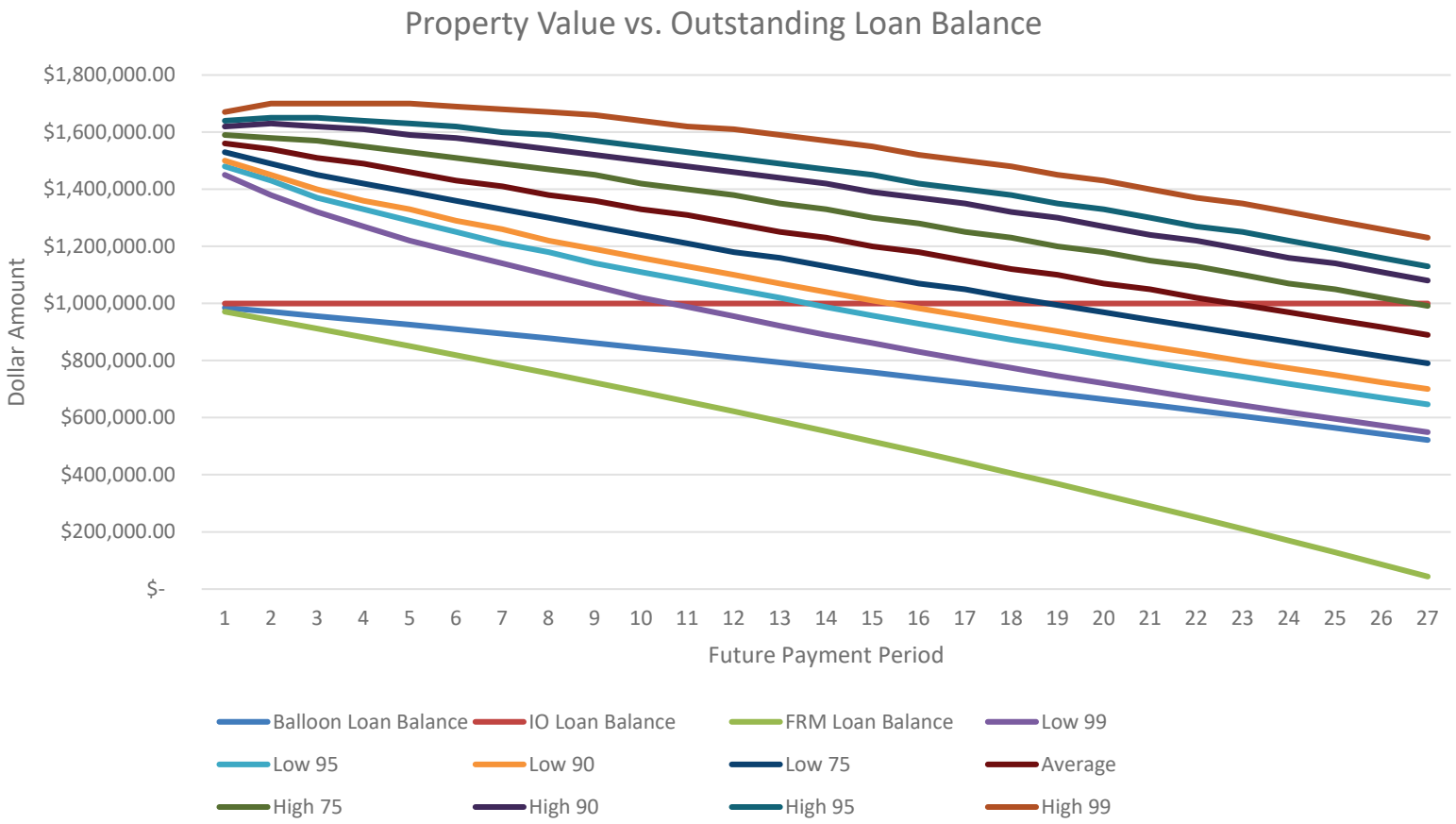
Underwater Default Probability: NYC Office



Payment Default Probability: Mixed Metro



Underwater Default Probability: Mixed Metro



Sample Estimated Probabilities of Default

Payment Default Probability (%) for FRM			
Year	Houston Industrial	NYC Office	Mixed Metro
1	5.06	12.83	0.0
2	7.49	16.01	0.52
3	8.57	17.49	1.24
4	9.03	18.2	1.58
5	9.22	18.37	1.69
6	9.27	18.42	1.80
7	9.31	18.78	1.87

Underwater Default Probability (%) for Balloon Mortgage			
Year	Houston Industrial	NYC Office	Mixed Metro
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	1.10	0.0	0.0
4	2.86	2.56	0.0
5	3.89	3.61	0.0
6	4.42	4.18	0.0
7	4.55	4.42	0.0

Further Applications to Risk Management

- This presentation did not pursue all permutations between property markets and mortgage types but simply aimed to demonstrate the conceptual approach. This type of analysis can be done for any property market and mortgage type, and for any portfolio of properties or mortgages thereof
- It can be demonstrated that the major drivers of the probability of default are the volatility of the underlying property market, LTV, the level of the mortgage rate, and the rate at which principal I amortized
- The analysis herein was limited to estimating the probability of default, but it can be extended to the full range of the usual risk management metrics like Loss-Given-Default, Expected Tail Loss, etc.
- The Northfield EE factor model also allows the integration of these investments in a multi-asset class portfolios for risk management and portfolio construction purposes.

Summary:

- The approach described herein is founded on innovative simulation and valuation technology, extensive and granular real estate data coverage, and best-of-breed risk factor model for real estate.

- It allows to estimate the probability of default that relate to the usual economic sources of such an adverse event. As such it is of major help to investors, underwriters, and risk managers.

- The approach has a broad application for any real estate market and mortgage type and fits seamlessly in the best practices of risk management.

Questions, Comments, Feedback

Emilian Belev, CFA, ARPM
Director, Enterprise Risk Analytics
emilian@northinfo.com