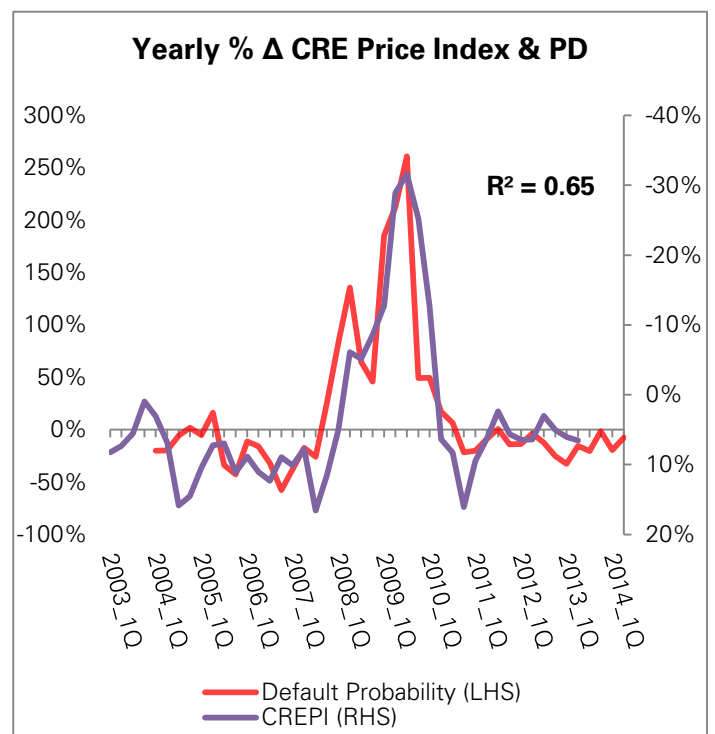
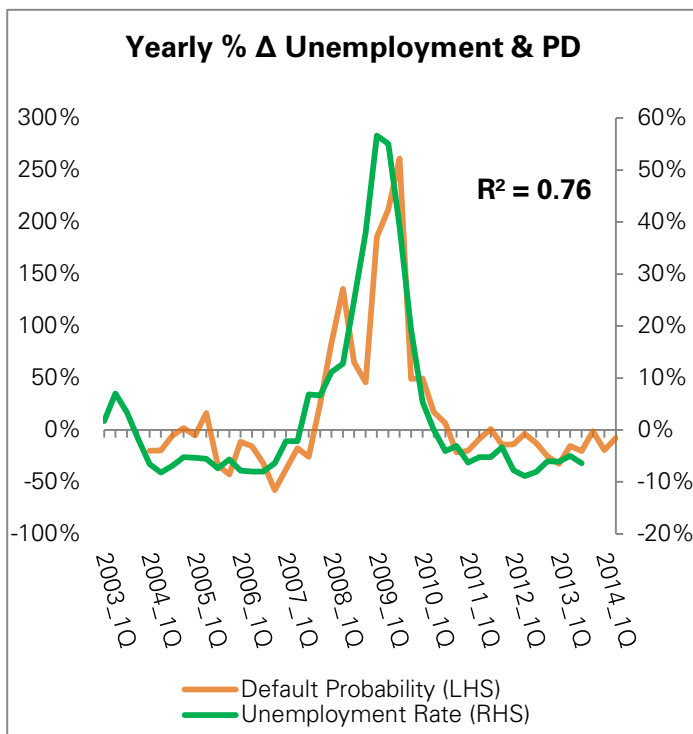


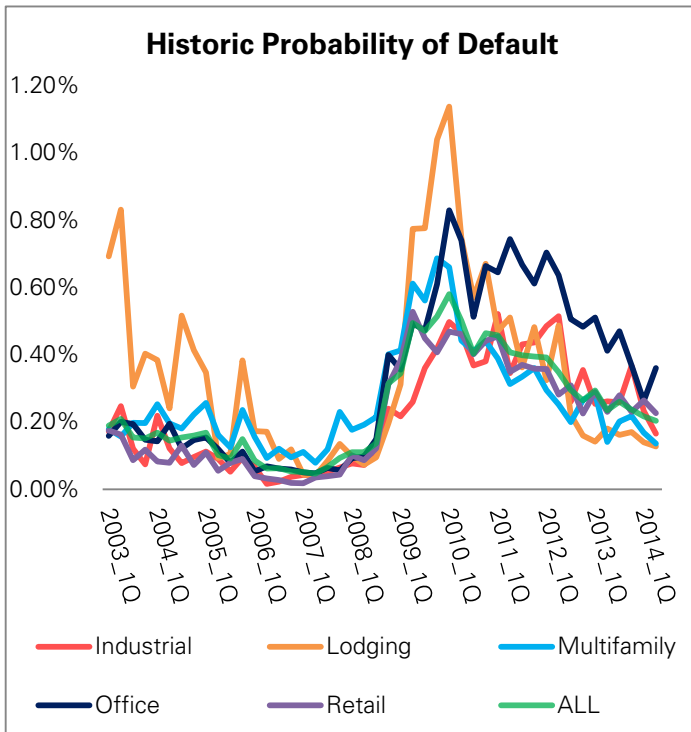
Modeling Commercial Real Estate Probability of Default on the Loan Level

Probability of default (PD) is used across the fixed income and credit markets to model credit risk and price loans or bonds. In commercial real estate lending, banks model PD for CCAR stress testing, loan scoring, and loan pricing. Micro inputs for a PD model can include asset type, debt service coverage ratio, and vintage to name a few. Macro inputs can include myriad economic and real estate indicators like CPPI, GDP growth, REIT indexes, metro area vacancy rates, and NOI trends.

As opposed to a borrower or counterparty risk scoring method, this is a fundamental loan level analysis that shows how the quarterly probability of default over time has followed the economy. PD is defined as the percentage (by count) of loans that became delinquent, modified, or specially serviced for each quarter after being current in the previous period. Since this is a transitional analysis as opposed to a running delinquency rate, loans are not counted after the quarter in which they default.

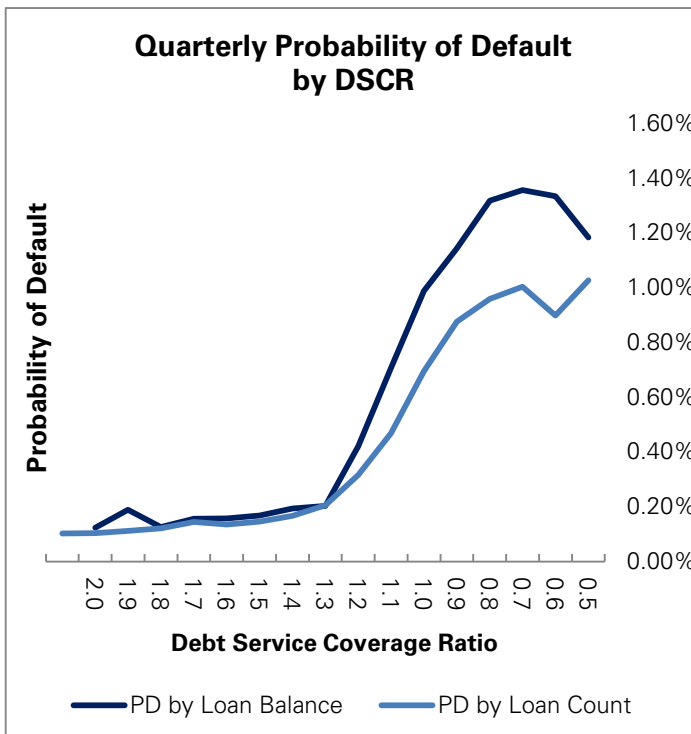
While the absolute values of PD over time are interesting and important, the yearly percentage change in PD reveals a close relationship with two important economic indicators. Yearly changes in the Unemployment Rate and the Commercial Real Estate Price Index correlate closely with the change in default probabilities over the last ten years. The correlation between the yearly change in unemployment and the yearly change in the PD of CMBS loans is extremely high at 0.87 (R-Squared = 0.76). Changes in unemployment seem to be a good leading indicator for PD. In fact, the correlation between yearly changes in unemployment and a one quarter lagging change in PD is 0.90 for an R-Squared of 0.80. Conversely, PD seems to be a leading indicator for changes in the CRE Price Index. Yearly changes in PD and the CREPI show a correlation of -0.81 (R-Squared = 0.65) but shifting the PD one period back in time pushes the correlation up to -0.89 (R-Squared = 0.80). Intuitively this makes sense as more defaults would cause a lagging decrease in values and fewer defaults would increase values in later periods.





On an absolute level, defaults were extremely low during the boom years and then spiked in mid to late 2008. While PDs have recovered, they have not yet reached the lows seen in 2007. Lodging and office hit the highest levels in 2009, but all the major property types have come back into a fairly tight band over the last several quarters.

On a fundamental property performance level, a loan's debt service coverage ratio (DSCR) will strongly dictate the likelihood of default. Quarterly default rates increase quickly when DSCR crosses below 1.3x, with about a 50% increase in PD for each 0.1x step down in DSCR. In terms of balance, the PD increases even more drastically after passing below the 1.3x DSCR threshold.



Although CMBS loans can differ from balance sheet loans in structure and risk, many banks have found the robust nature of historical CMBS data to be useful in calibrating PD and LGD (loss given default) models. While this is a broad analysis of CRE loans in CMBS, all of these results can be honed based on demographics like location, loan size, original term, property type, and appraised value to name a few. Doing this type of analysis on the loan level bolsters a PD model's relevance and alignment with realistic outcomes through boom, bust, and recovery cycles. ■

For inquiries about the data analysis conducted in this research, contact press@trepp.com.

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