Challenges in Modeling Commercial Real Estate Loan Defaults

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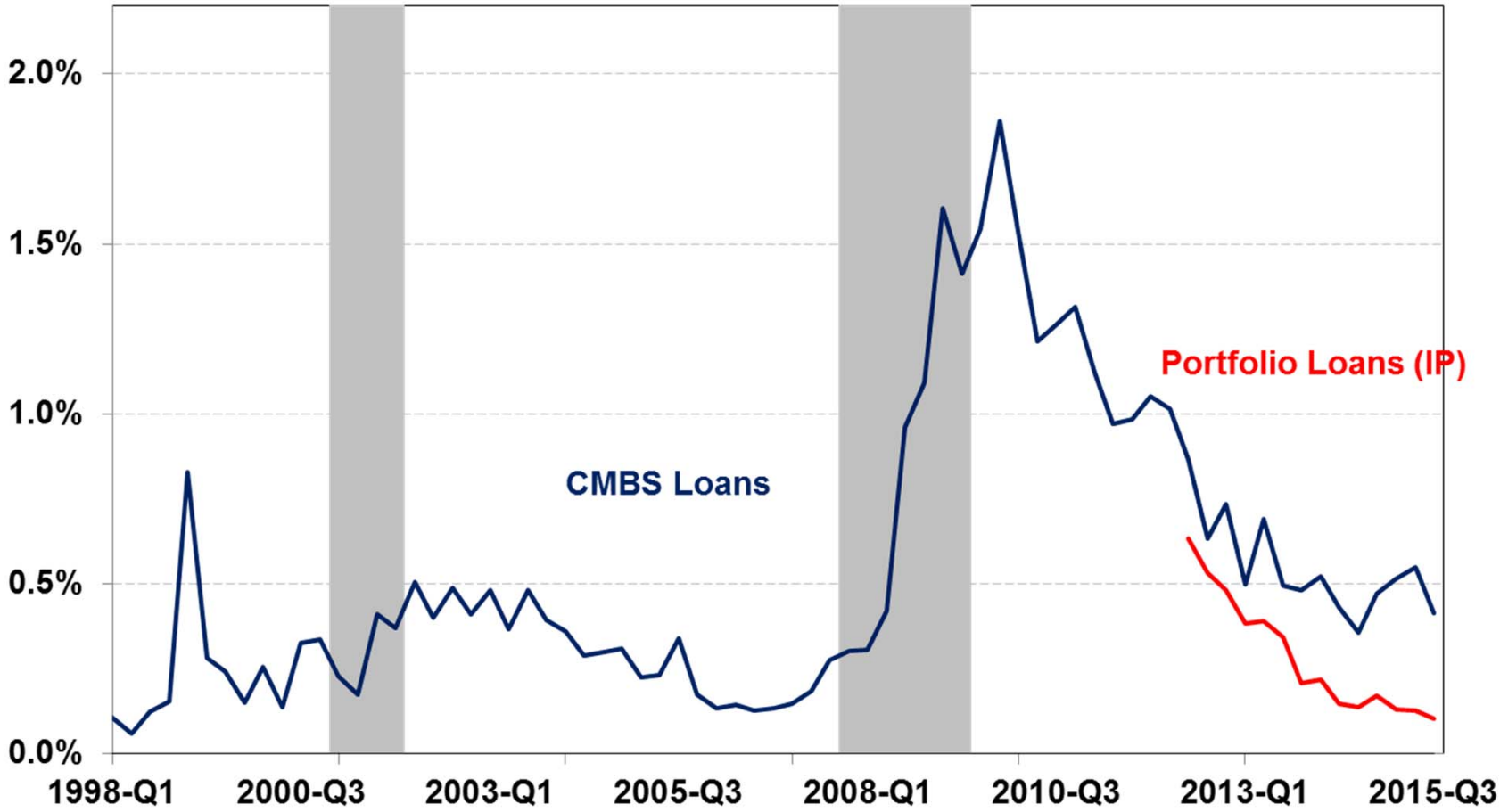
The views in this presentation are solely my own, and do not represent polices or positions of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

Background

- Why do we care about CRE defaults?
  - CRE a large sector, recent robust growth
  - Losses can be large: third highest category in terms of loan losses in CCAR 2016 severely adverse scenario
  - Losses quite cyclical

Default Rates Over Time



Source: CMBS and FR-Y14Q data.

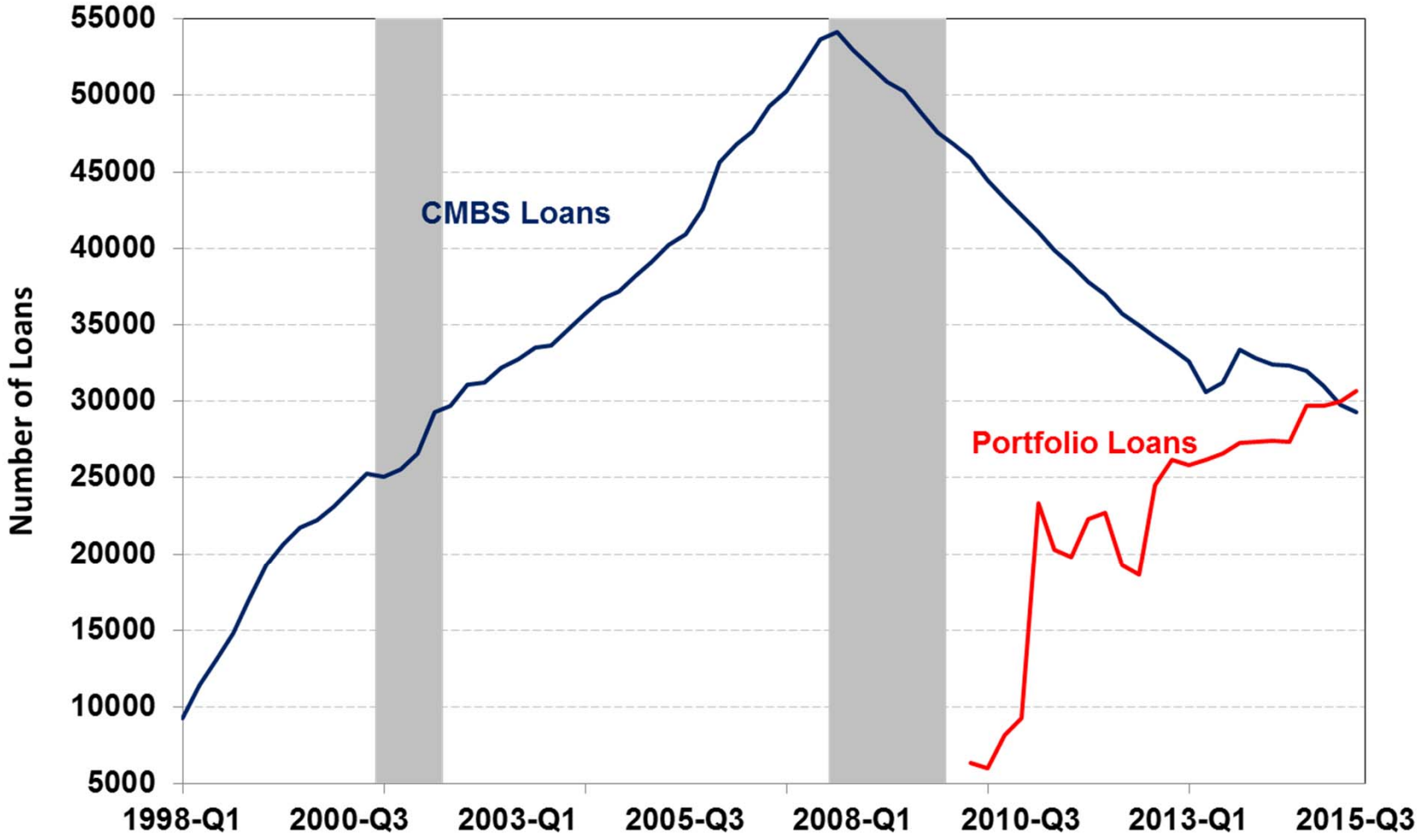
CRE Loan Model in 2016

- The PD model for CRE mortgages is a hazard model for transition to default, given loan characteristics and macroeconomic variables.
  - The effect of loan maturity is estimated separately for each loan type (IP, C&LD) using historical FR Y-14Q data.
  - The effect of other loan characteristics and the macroeconomic variables is estimated in a single model using historical CMBS data.
- Loss Given Default is estimated using historical Y14Q data
- The model has developed to deal with certain challenges that arise in modeling CRE loan defaults, and these issues also motivate some of the changes we are considering making this year.

Challenge #1: Data Availability

- The FR-Y14Q collection began after the Great Recession
- As a result the Federal Reserve's model uses data on both CMBS and portfolio loans
  - CMBS data goes back much further – covers several recessions – can better help get at macro sensitivity

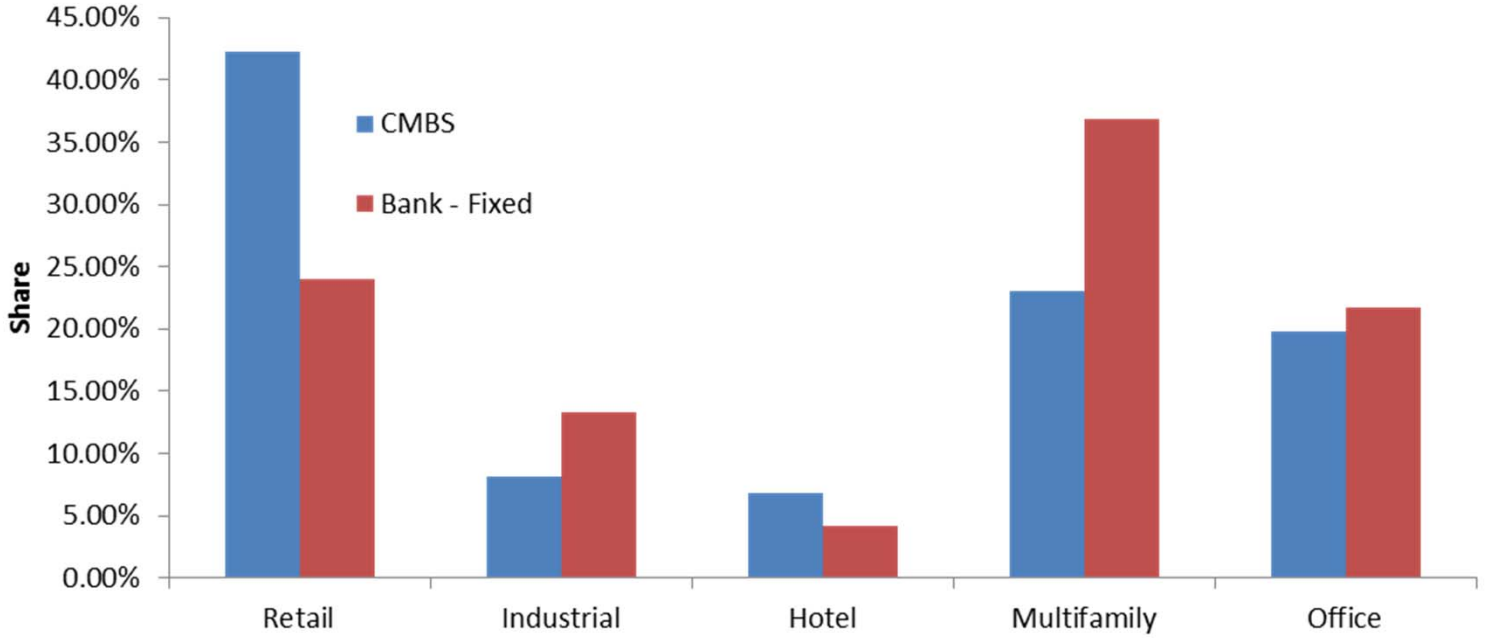
Y14 Data – A Late Bloomer



Source: CMBS and FR-Y14Q data.

Challenge #2: Loan Characteristics Can Differ

- There is substantial overlap between CMBS and Portfolio loan characteristics



Source: Black, Krainer, Nichols (2016). Both samples are limited to fixed-rate loans from the same set of banks active in origination for both securitization and their own portfolios.

- But at the same time there are also differences…
  - CMBS loans tend to be for stabilized, income producing properties
    - By contrast, approximately 20% of Portfolio loans are for construction and land development, which history has shown are more sensitive to business cycles
  - CMBS loan terms are dominated by 10-year maturities; Portfolio loans can be much shorter, or longer…
    - These differences also interact with specific institutional features of each market: for example, while default rates for all loans types rise rapidly as we approach maturity, the increase tends to be sharper for CMBS loans
      - Likely because they are harder to renegotiate

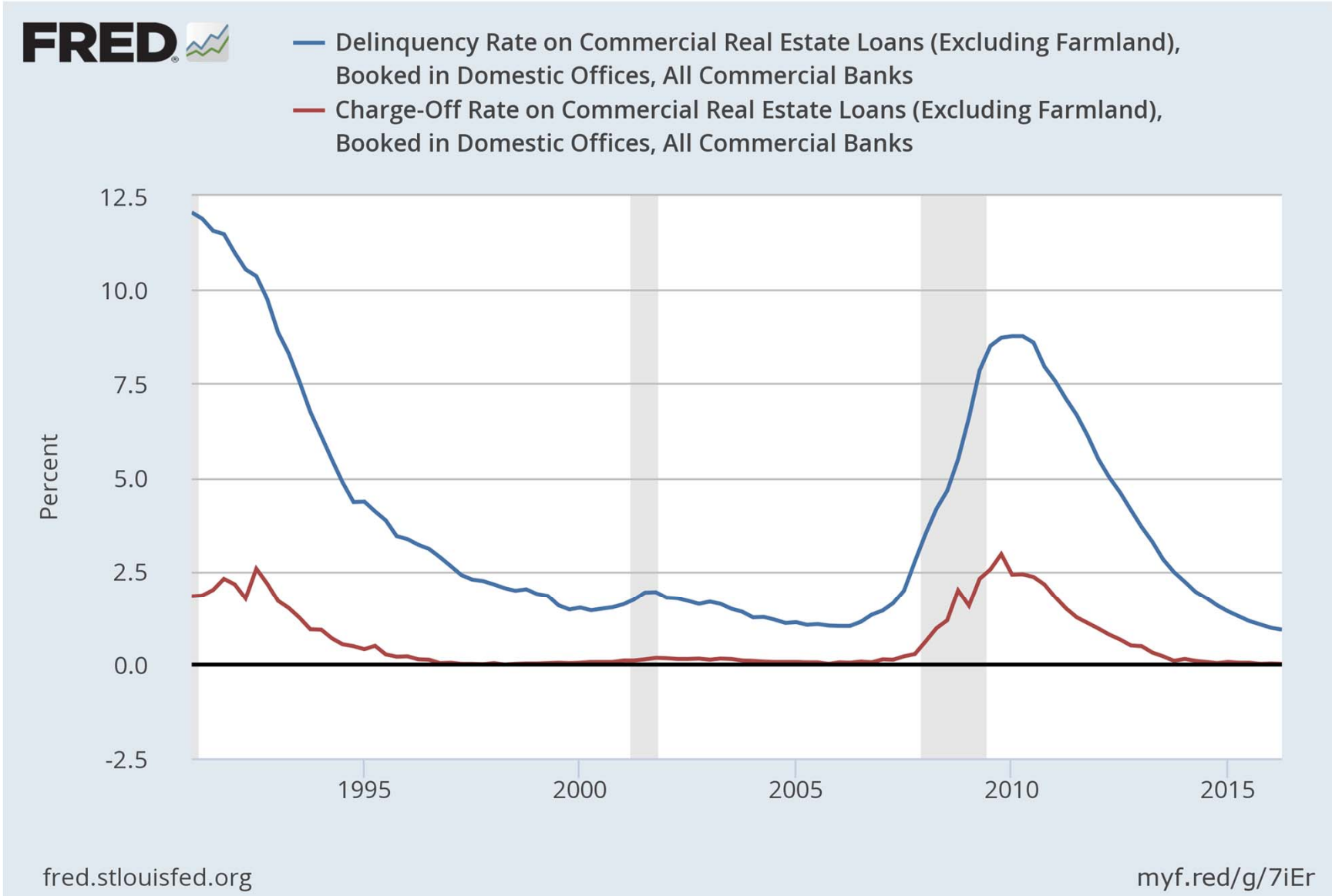
- We deal with these challenges by using data on each type of portfolio loan to appropriately scale loss rates and also to gauge the impact of some risk characteristics, most notably time to maturity
  - Would like to rely more on portfolio loan data as the dataset gets larger

Another Response: Benchmarking

- Another way to manage these challenges is through the use of benchmarking
  - SR-15/18, Appendix C: “For instance, a firm’s primary model may use a preferred methodology, but lack a rich data set to support modeled estimates. In these cases, the firm should use benchmark models based on different data and modeling approaches to provide additional checks on primary model estimates.”

- There are a variety of data and models that can be used to benchmark CRE loan losses
  - For instance, vendor models, historical loss experience, Call Report data
  - Each of them brings something to the table, but may exhibit its own challenges
  - Simpler models may be allow one to more easily perform sensitivity analysis, obtain error bands, …

- *One example*: CLASS model (Hirtle, Kovner, Vickery & Bhanot, 2016)
  - Top-down model based on Y9C and Call Report Data
  - Benefits: Consistent data (publicly) available over much longer historical period, speed, transparency – internal and external
  - Costs: Not CRE-specific, may not fully capture differences in risk across bank portfolios, not completely obvious how to translate results from one model to another
    - *Some of these concerns can be mitigated by more purpose-built top-down models*


FRED
Delinquency Rate on Commercial Real Estate Loans (Excluding Farmland), Booked in Domestic Offices, All Commercial Banks
Charge-Off Rate on Commercial Real Estate Loans (Excluding Farmland), Booked in Domestic Offices, All Commercial Banks
Percent
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
1995
2000
2005
2010
2015
fred.stlouisfed.org
myf.red/g/7iEr

Changes to the CRE Model

These issues motivate, in part, the changes we are considering making to the CRE model this year:

1. Different ways to combine CMBS and CRE data that put them on a more equal footing

2. Simplifying the model structure, while still capturing key risk drivers
   - Also has an added benefit of more stable models

3. Further developing benchmarking, including benchmark models that are more relevant for CRE.