Outline

- An alternative to the "sell-side" credit rating business model

- Generic elements required of an ideal credit risk analytics platform

- A new bottom-up corporate credit analytics platform

- Single-obligor analysis and credit portfolio analytics

An Alternative Way

- The business model of the sell-side credit rating industry has been severely criticized for its role in causing the 2008-09 financial crisis.

- Regulators have been trying to address the problems associated with the issuer-pay business model. The results are predictably disappointing, however; for example, see what the US Dodd-Frank Act has accomplished.

An Alternative Way (continued)

- The US Dodd-Frank Act (July 2010) mandates the responsible US federal agencies to remove regulatory references to commercial credit ratings.

- According to the notice of final rule making released by the Fed, FDIC and OCC (June 2012) and starting from January 1, 2013, the regulatory capital for a US bank's sovereign bondholding is assessed using the OECD Country Risk Classification (0 being the best and 7 the worst).

An Alternative Way (continued)

As of Jan 1, 2013

Country Code ISO Alpha 3		Country Name [1]	Classification		Notes
			Previous	Current Prevailing	
1	AFG	Afghanistan	7	7	
25	BRA	Brazil	3	3	
37	CHN	China	2	2	
38	TWN	Chinese Taipei	1	1	
68	DEU	Germany	0	-	(5) (6)
70	GRC	Greece	0	-	(5) (6)
78	HKG	Hong Kong, China	1	1	
80	ISL	Iceland	0	-	(5)
81	IND	India	3	3	
85	IRL	Ireland	0	-	(5) (6)
87	ITA	Italy	0	-	(5) (6)
89	JPN	Japan	0	-	(5)
94	KOR	Korea	0	-	(5)
145	PRT	Portugal	0	-	(5) (6)
158	SGP	Singapore	0	0	
166	ESP	Spain	0	-	(5) (6)
179	THA	Thailand	3	3	
192	USA	United States	0	-	(5)
197	VNM	Viet Nam	5	5	

(5) High Income OECD Country not reviewed or classified.
(6) High Income Euro Area Country not reviewed or classified.

RMI
Advancing Risk Management
for Singapore and Beyond

NUS
National University
of Singapore

An Alternative Way (continued)

- I contend that "sell-side" credit ratings should be viewed as a "public good".

- Not-for-profit credit ratings should be made widely available to compete with commercial credit rating firms.

- I envision a co-opetition model that need NOT be a zero-sum game.

  (Duan and van Laere, 2012, "A *Public Good* Approach to Credit Rating – from concept to reality," *J of Banking and Finance*)

What kind of credit information?

- Granularity of credit information – should one be content with letter ratings or move on to probability of default (PD)?

- Being content with vaguely short-term or long-term? How about striving for a precise term structure of PDs?

- Going beyond individual obligors to address credit portfolios, and relating defaults to market risks (wrong-way risk).

- Beyond PD – recovery rate, contingent exposure, and risk premium.

RMI's CRI infrastructure

- Risk Management Institute (RMI) of National University of Singapore launched its public-good Credit Research Initiative (CRI) in July 2009.

- In July 2010, RMI released daily updated PDs on about 17,000 exchange-listed firms in 12 Asian economies.

- As of July 2013, RMI has already been producing daily updated PDs (1 month to 5 years) on about 35,000 currently active, exchange-listed firms in 106 economies. In addition, historical PDs on about 30,000 delisted firms are made available. (Web: http://rmicri.org)

RMI's CRI infrastructure (continued)

- The CRI is an example of transforming Big Data into Smart Data (credit information that is of high quality, timely, granular and easily aggregatable for various applications).

- This Smart Data (i.e., PDs) are distributed free of charge to anyone who wants to use. It functions like a truly freely accessible "public good."

- The advancement of this Smart Data system is meant to be organic and evolutionary, counting on the collective undertaking of credit risk experts around the world participating on a voluntary basis. It is meant to work like a selective Wikipedia.

RMI
Advancing Risk Management for Singapore and Beyond

**NUS** National University of Singapore

RMI's default prediction model

- The current version of RMI's model is a bottom-up reduced-form credit risk model developed by Duan, Sun and Wang (2012, *J. of Econometrics*) – assessing default likelihoods of individual obligors and portfolios of obligors.

- The model generates the term structure of PDs from one month up to five years.

- The model only deals with PDs, and is meant to be coupled with your own model on recovery rates, etc.

RMI
Advancing Risk Management for Singapore and Beyond

NUS
National University of Singapore

RMI's default prediction model (continued)

- ## Default and other exits

    A corporate obligor can disappear due to default/bankruptcy or M&A. The model accommodates these two competing risks.

- Forward default probabilities are the building blocks

Today   3-m   4-m

Data
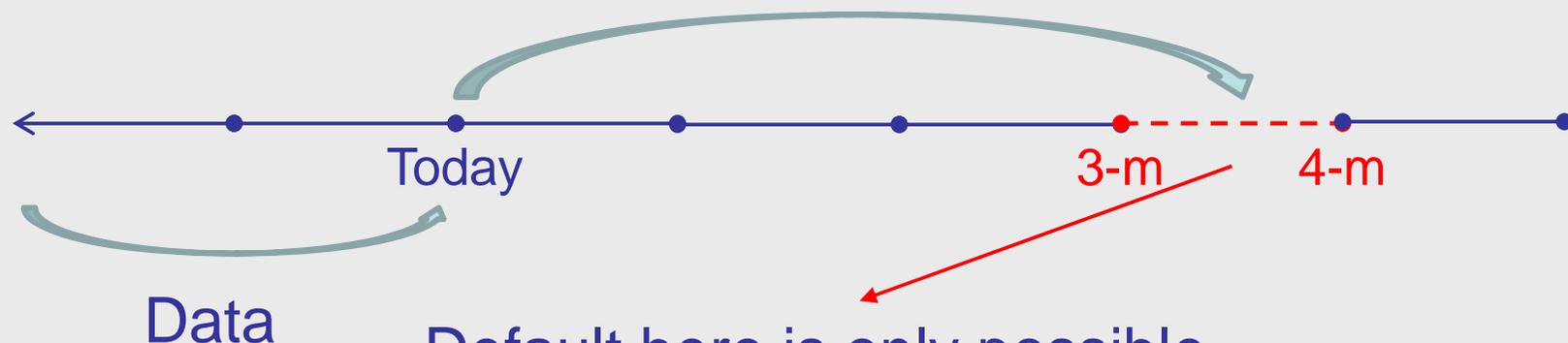
Default here is only possible when the obligor has survived the first 3 months (default or M&A)

RMI's default prediction model (continued)

- Default (or survival) probability of every forward period is captured by a function of variables that characterize state of the economy (common macro variables) and vulnerability of individual obligors (firm-specific attributes).

- The function is shared by all obligors but differ for different forward periods.

- The function's coefficients are specific to a forward period, but for adjacent periods, they are made to have smoothly transitioned coefficients via a term structure modeling technique.

RMI's default prediction model (continued)

- The **common macro variables** used in the current version of the RMI model are
  - Trailing 1-year stock market return
  - Short-term risk-free rate

- The **firm-specific attributes** are
  - Distance-to-default (level and trend)
  - Ratio of cash to total assets (level and trend)
  - Ratio of net income to total assets (level and trend)
  - Relative size (level and trend)
  - Market-to-book value
  - Idiosyncratic volatility

Single-Obligor Analysis
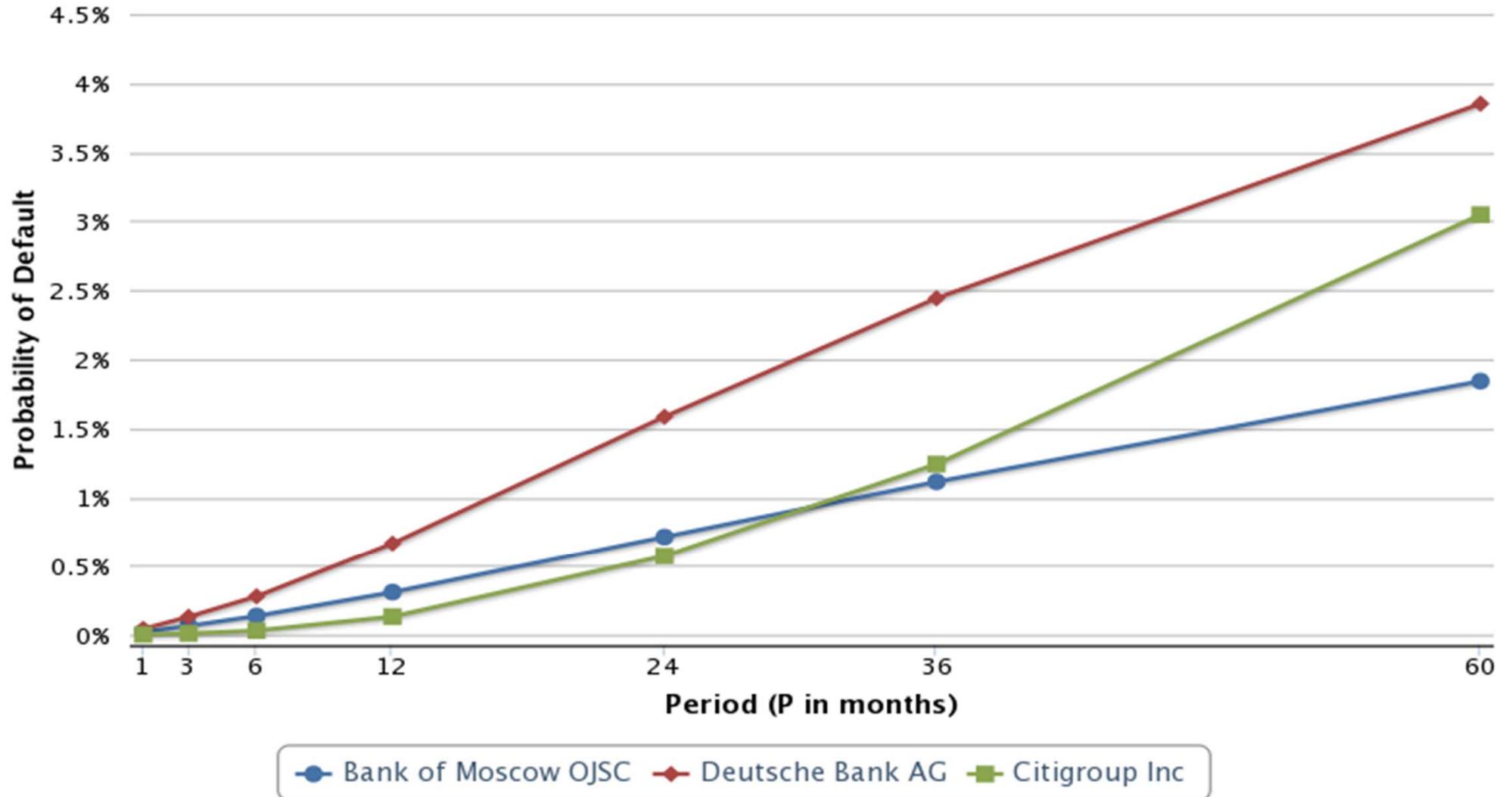
Single-Obligor Analysis (continued)

<u>Simple Credit Portfolio Indicator</u>

Corporate Vulnerability Index (equally-weighted)
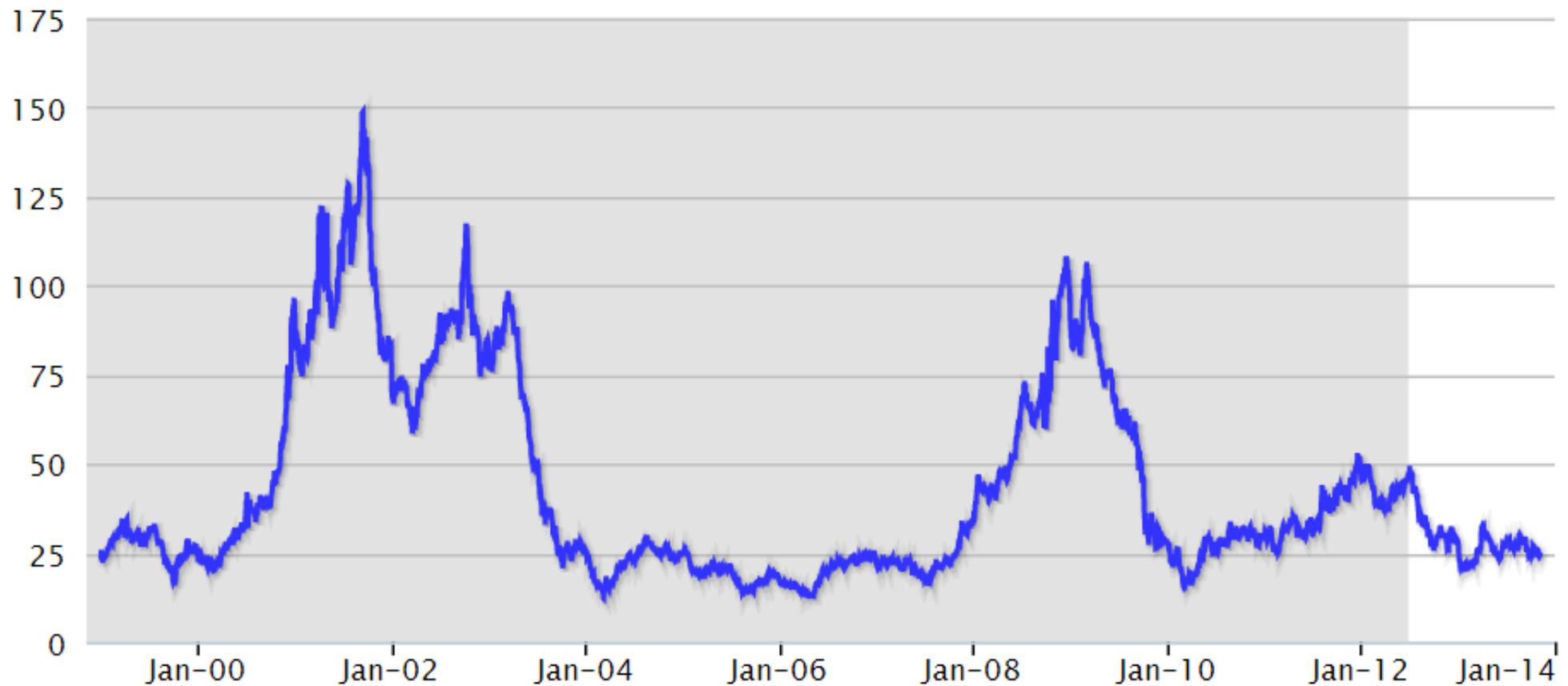
On Nov 8, 2013

Simple Credit Portfolio Indicator

Corporate Vulnerability Index (value-weighted)

CVIvw (EMU)

On Nov 8, 2013
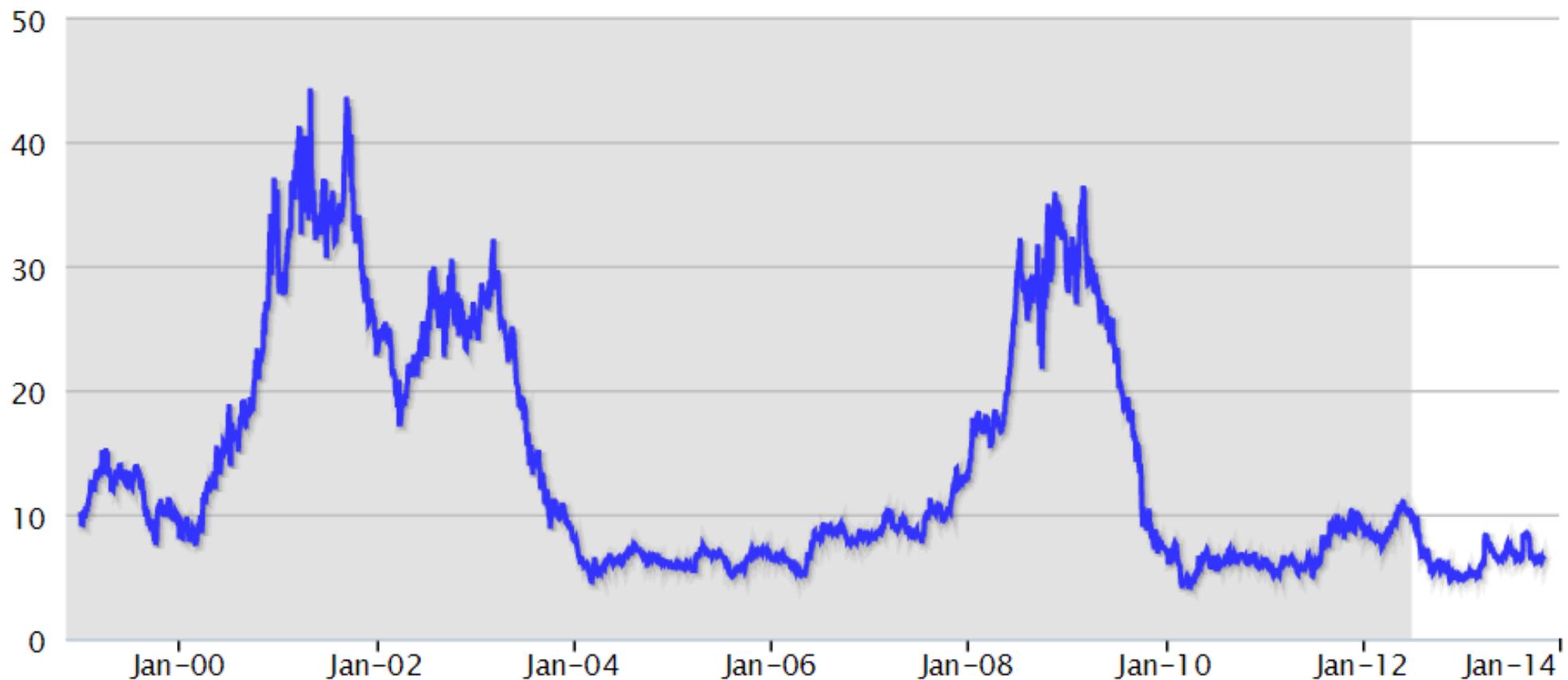
Credit Portfolio Analytics

The RMI PD model

- The model attempts to describe a dynamic data panel of default/other exit indicators associated with obligors' attributes and macro risk factors at appropriate time points. The model has default correlations naturally built-in.

- Default correlations can be derived from a factor model using one-month default and other exit probabilities for all obligors in a target group. One also needs to make sure that the deduced longer-term individual obligor PDs match well with the longer-term RMI PDs for these obligors.

RMI
Advancing Risk Management for Singapore and Beyond

NUS
National University of Singapore

<u>Credit Portfolio Analytics</u> (continued)

Elements of a credit portfolio analytics tool set

- A PD model with default correlations that can be used for easy cross-sectional aggregation
- An LGD model

Additional information needed to implement the RMI model for credit portfolio management

- Individual exposures (name and size)
- LGD assumption
- Actual risk premiums/spreads charged
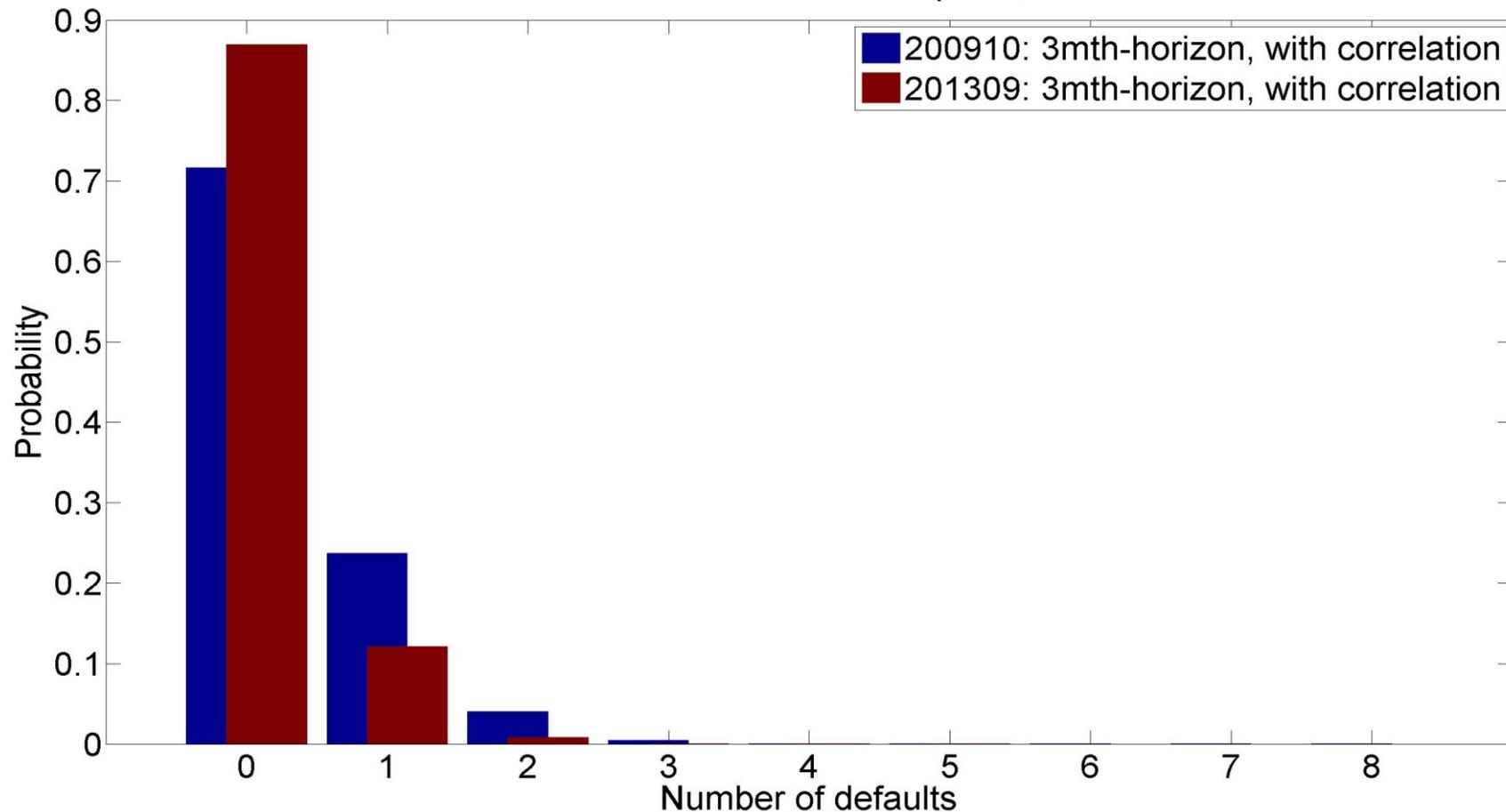
RMI
Advancing Risk Management for Singapore and Beyond

NUS
National University of Singapore

Credit Portfolio Management

A real credit portfolio as of December 2012 (contained 549 public firms in October 2009 and dropped to 548 names in September 2013)

Credit Portfolio Management (continued)

A real credit portfolio as of December 2012 (contained 549 public firms in October 2009 and dropped to 548 names in September 2013)

Credit Portfolio Management (continued)

Loss distribution comparison

Legend:
- 200910: 3mth-horizon, with correlation
- 201309: 3mth-horizon, with correlation
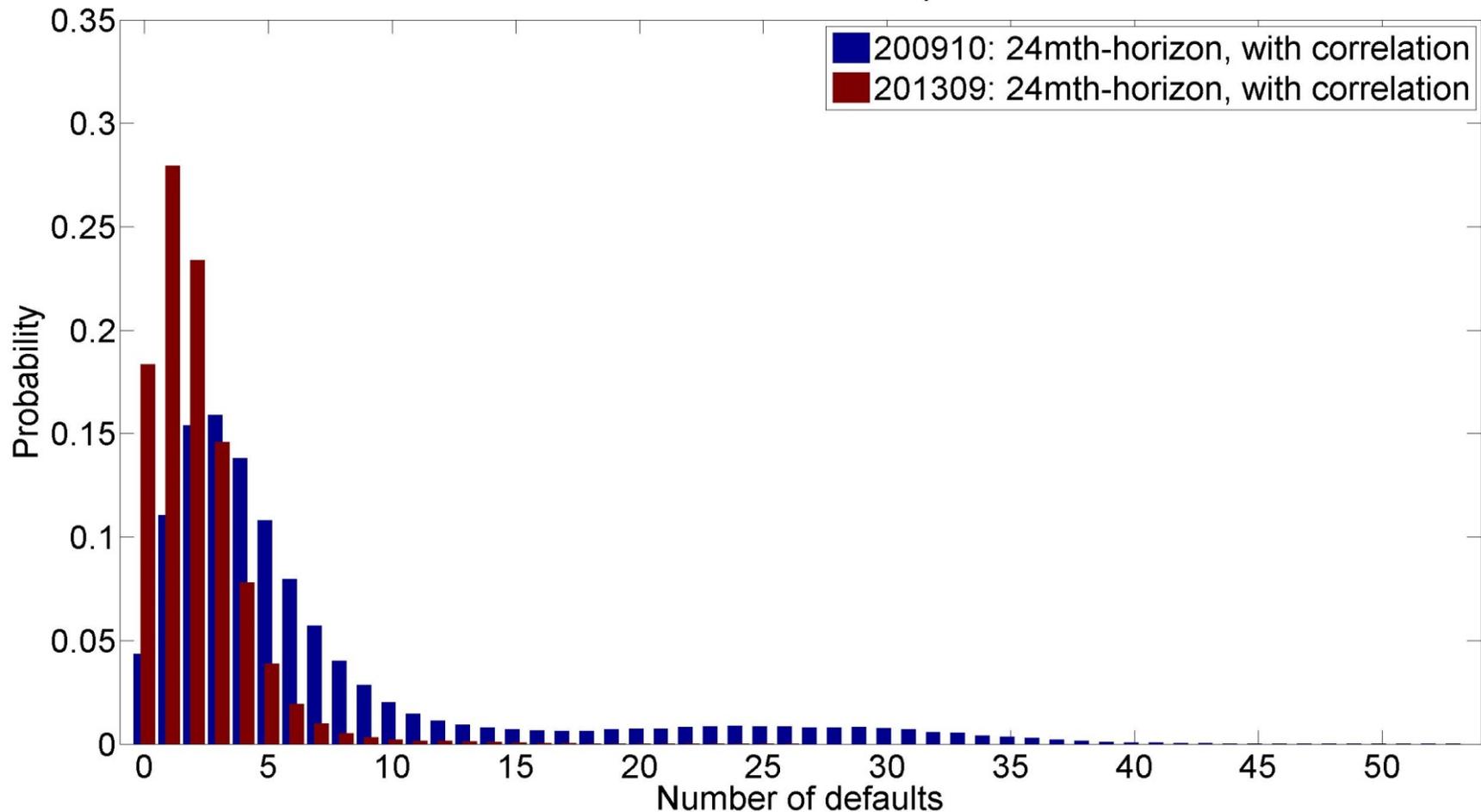
A real credit portfolio as of December 2012 (contained 549 public firms in Oct 2009 and dropped to 548 names in Sep 2013) using its current recovery rate assumption.

Credit Portfolio Management (continued)
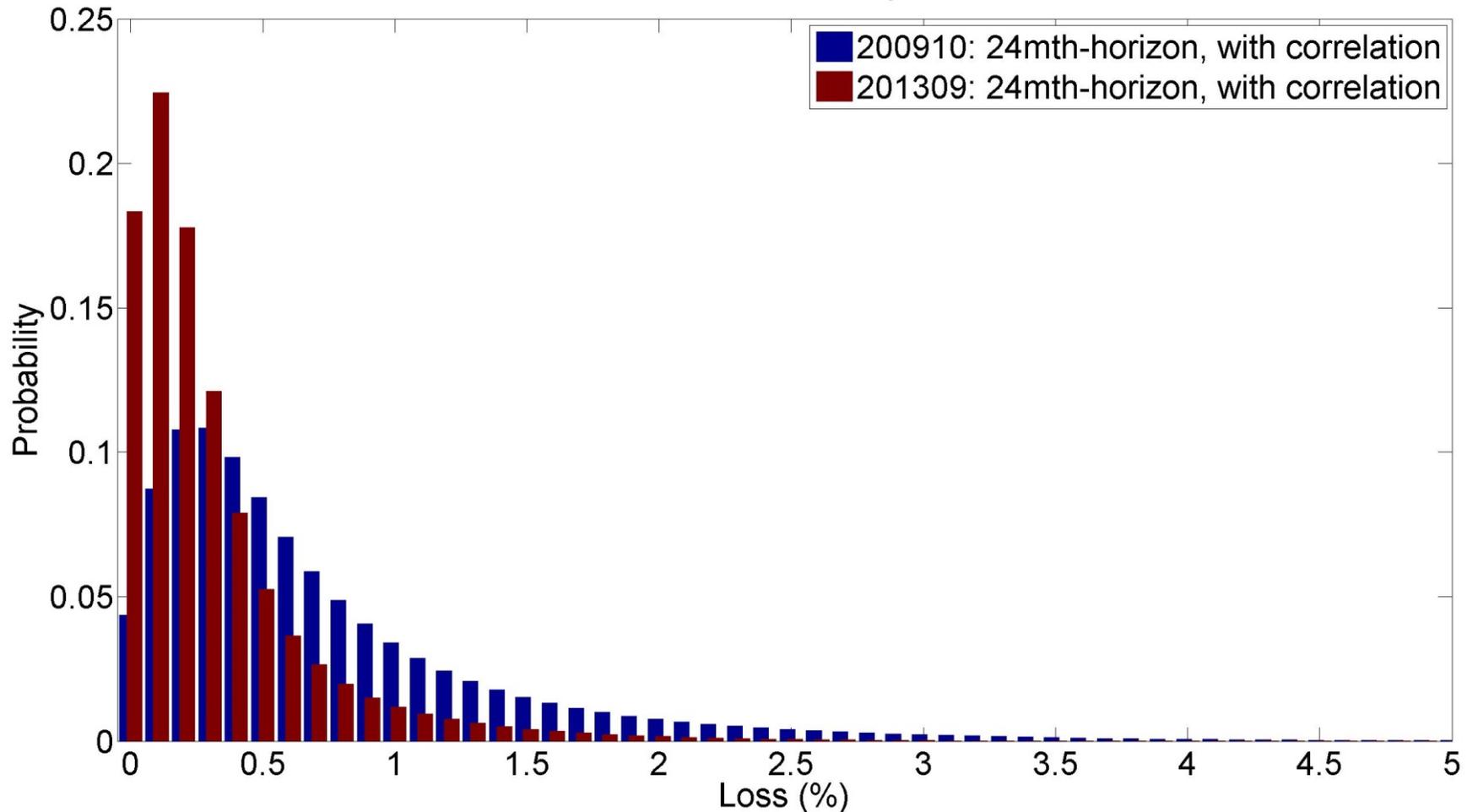
Loss distribution comparison

Legend:
- 200910: 24mth-horizon, with correlation
- 201309: 24mth-horizon, with correlation

A real credit portfolio as of December 2012 (contained 549 public firms in Oct 2009 and dropped to 548 names in Sep 2013) using its current recovery rate assumption.

<u>Wrong-way Credit Risk</u>

- In addition to default correlations among obligors, market and default risks are likely to move in tandem.

- The common factors underlying default correlations can be related to market risk factors such as crude oil price, exchange rate.

- One can then envision a future scenario for market risk factors and compare the default/loss distributions with and without the scenario.

Wrong-way Credit Risk (continued)

Comparison on default distributions

Legend:
- 200910 - 24mth-horizon, without correlation
- 200910 - 24mth-horizon, with correlation
- 200910 - 24mth-horizon, with correlation, stress testing
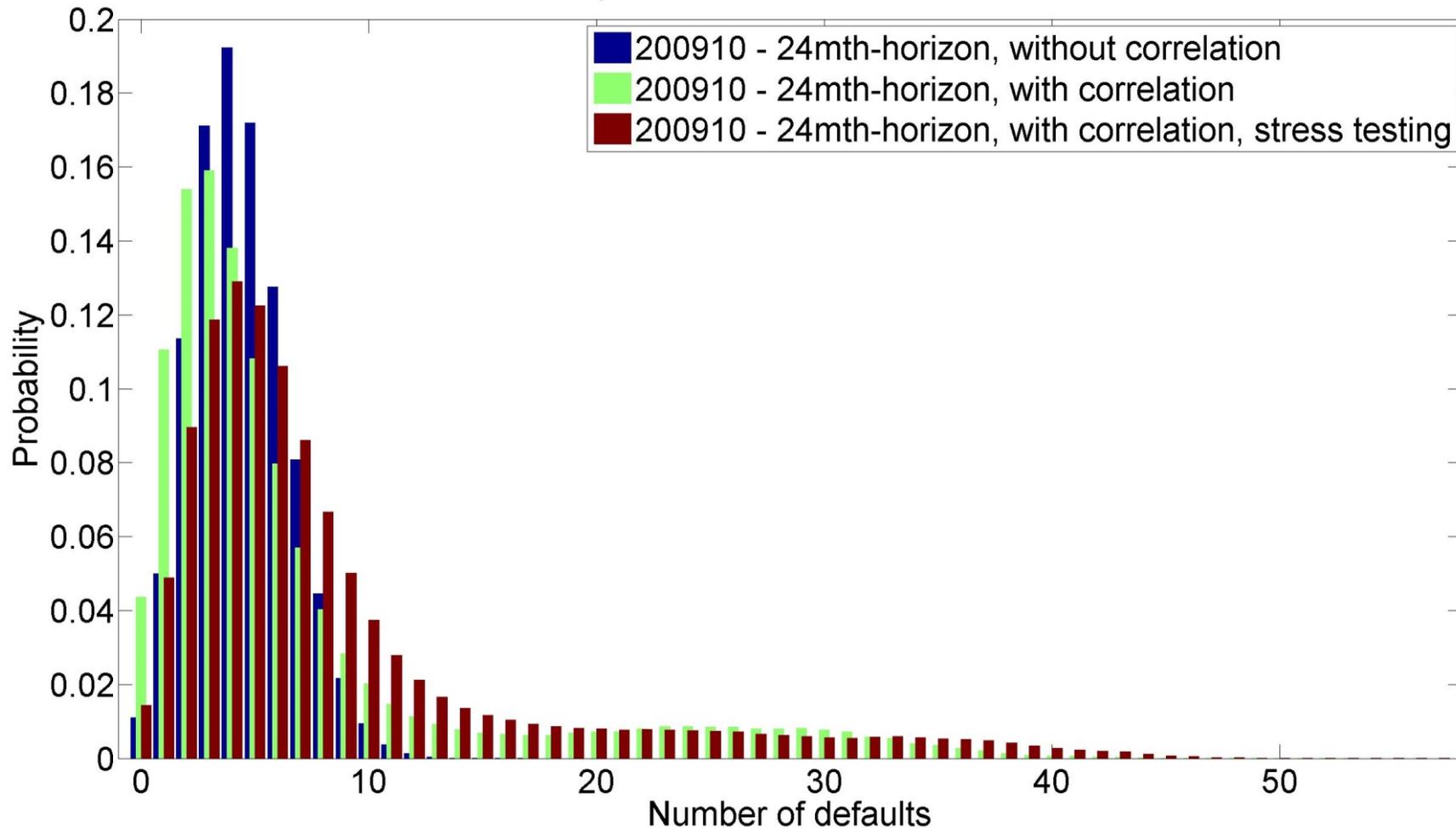
The default distribution of a real credit portfolio (549 public firms) in Sep 2009 responds to a 5-std drop in the Brent Oil Index in the first month and then climbs back to its normal level according to an estimated AR(1) model.