



U.S. mortgage market – Painting a complete picture



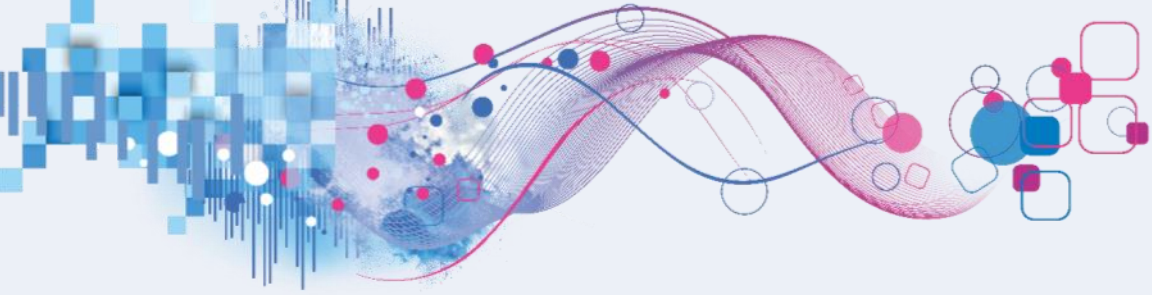


Introducing:

Michael Bradley
Freddie Mac

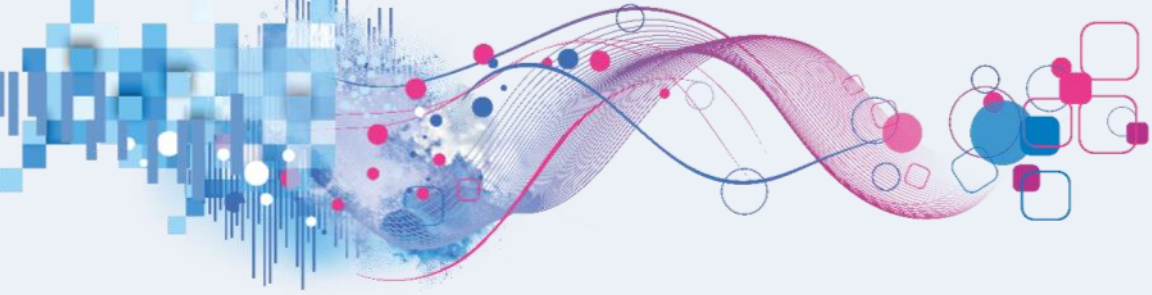
Michele Raneri
Experian





Contents

1. Macro industry trends, recently and since the recession
2. A tale of two populations: Foreclosure vs. bankruptcy analysis
3. How Freddie Mac is reducing cost and creating efficiency

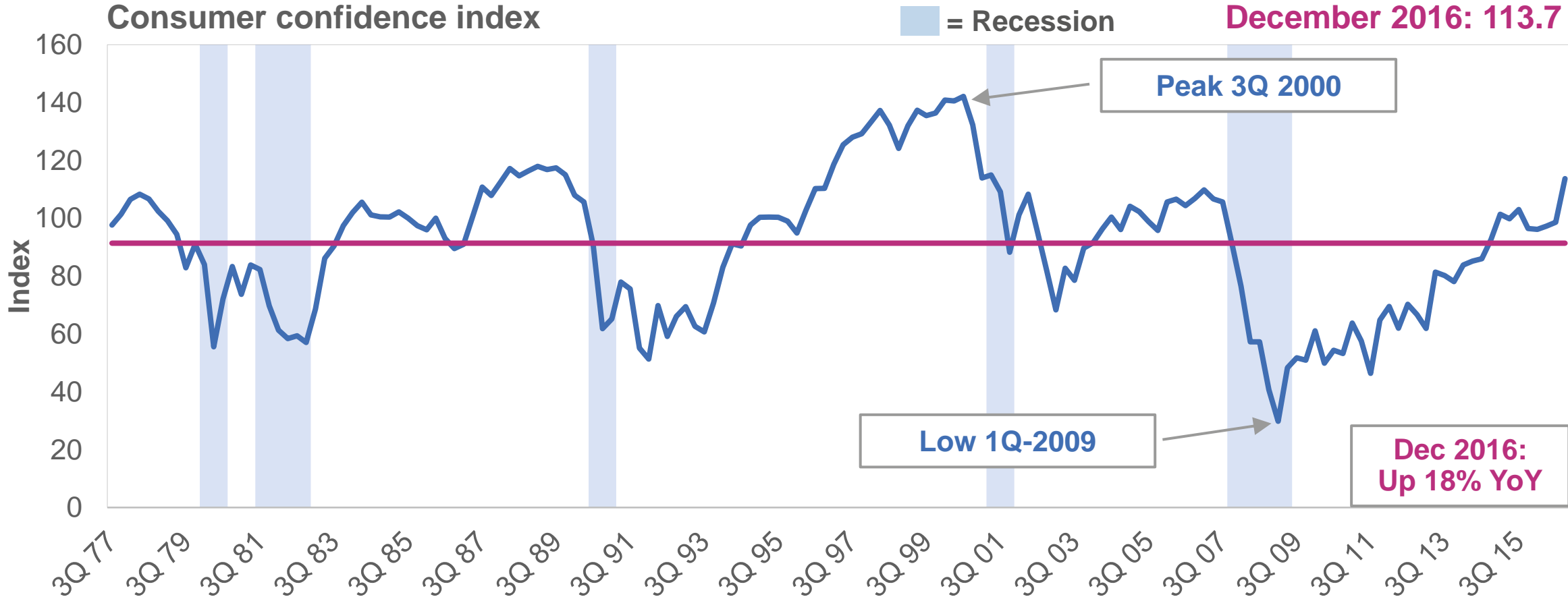


Macro industry trends, recently and since the recession

Macroeconomic trends



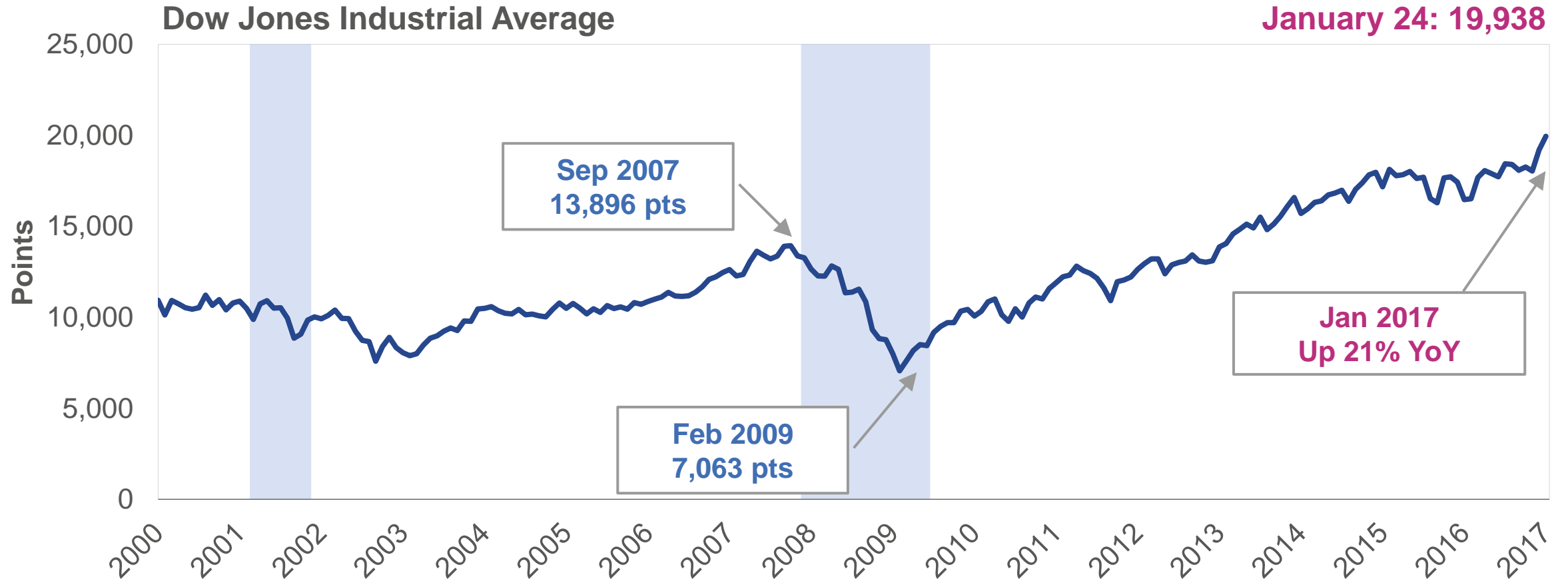
Consumer confidence



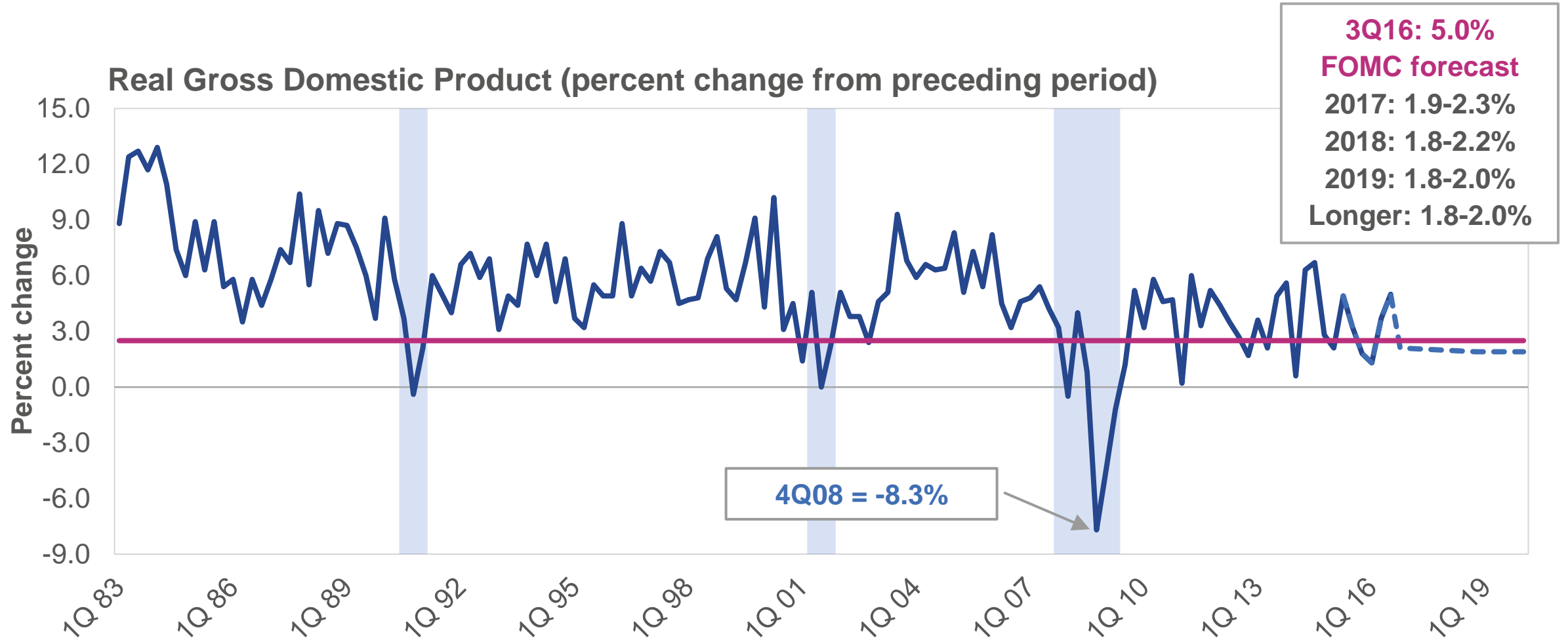
Source: Conference Board



DOW

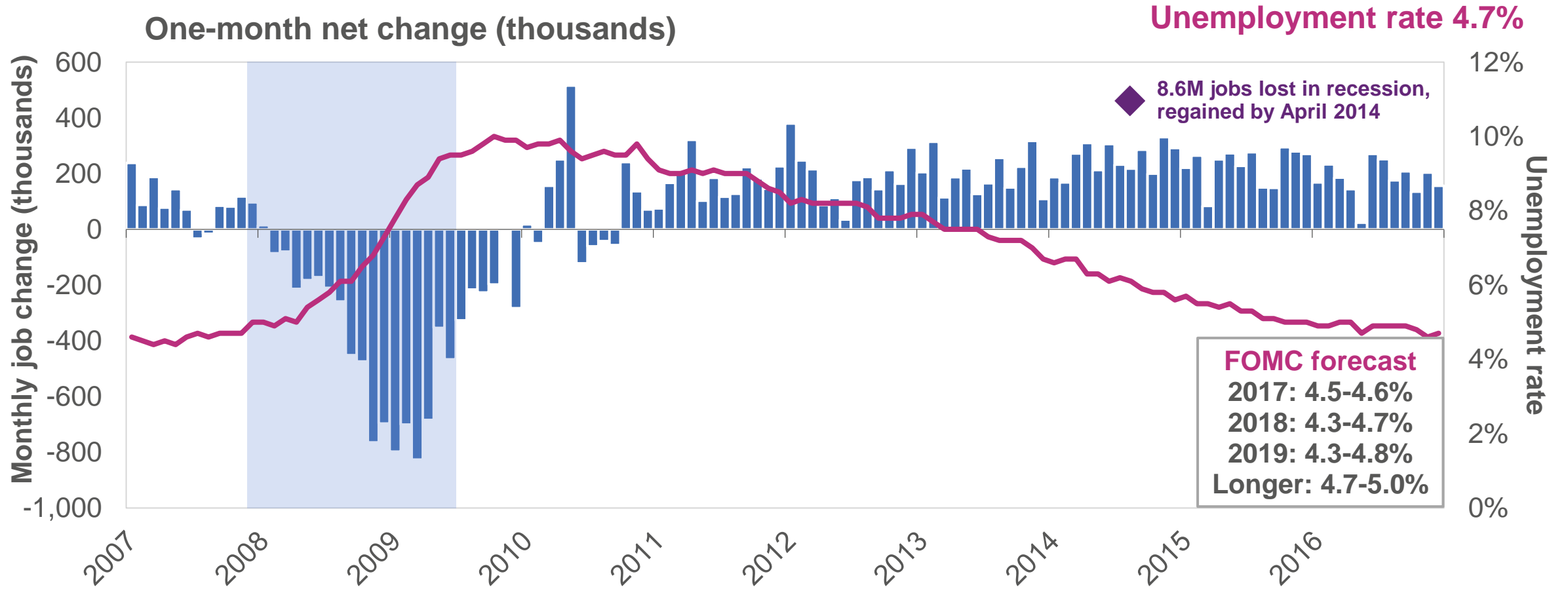


Real GDP change



Source: Bureau of Economic Analysis, Economic Projections of Federal Reserve Board Members and Federal Reserve Bank Presidents

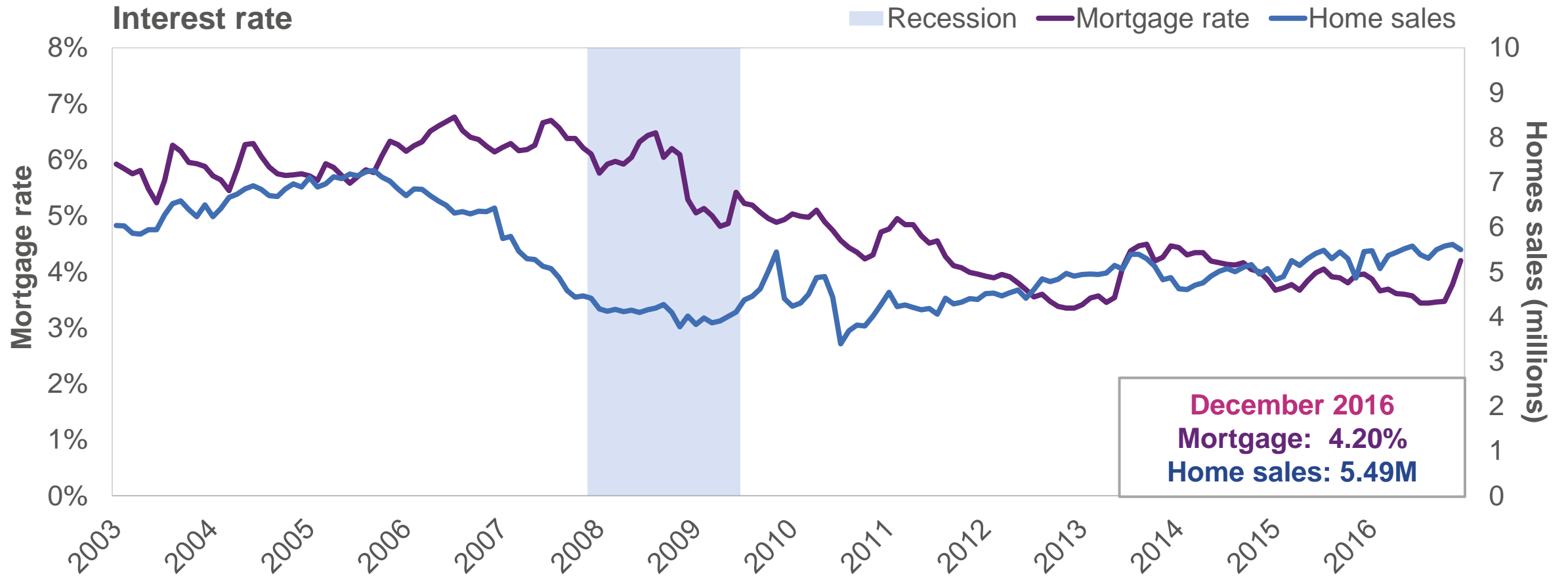
U.S. jobs gained or lost through December 2016



Source: Bureau of Labor Statistics

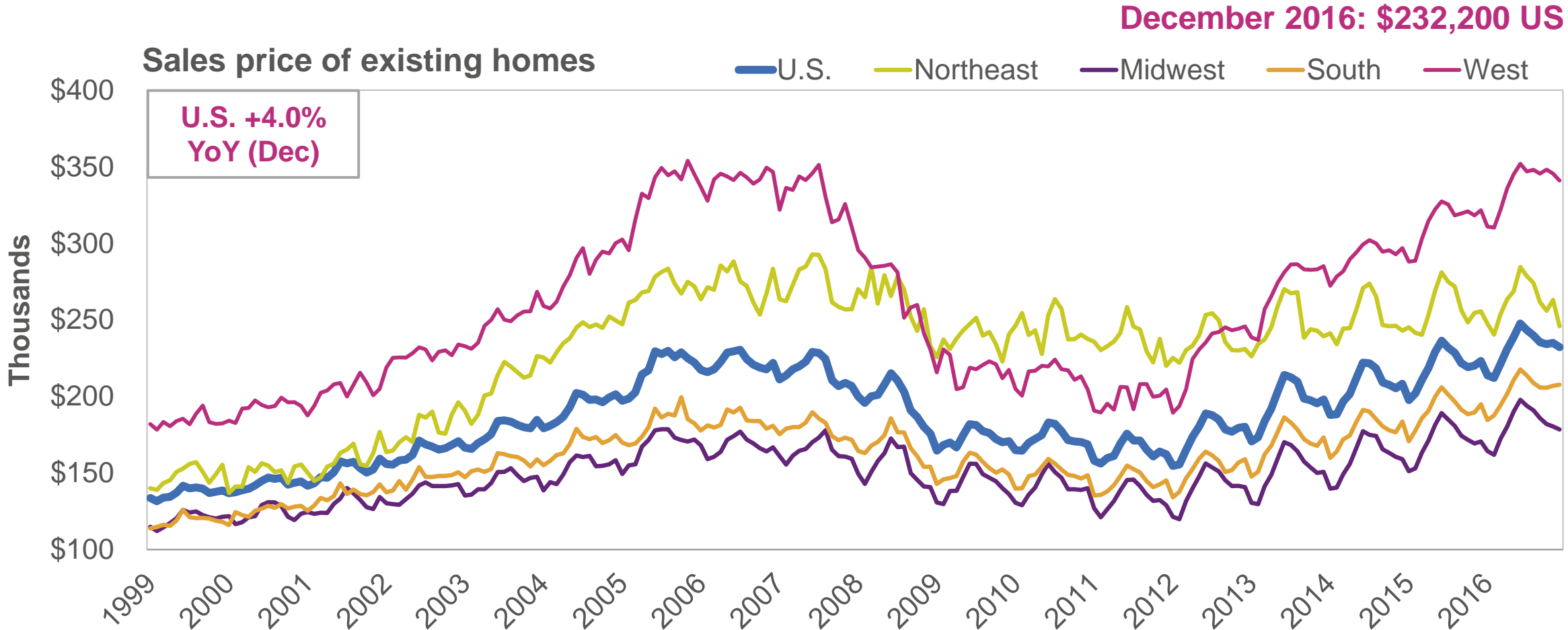


Interest rates and home sales



Source: Realtor.org

Home prices up year-over-year



Source: National Association of Realtors



Credit trends



VantageScore[®] 3.0

Model overview

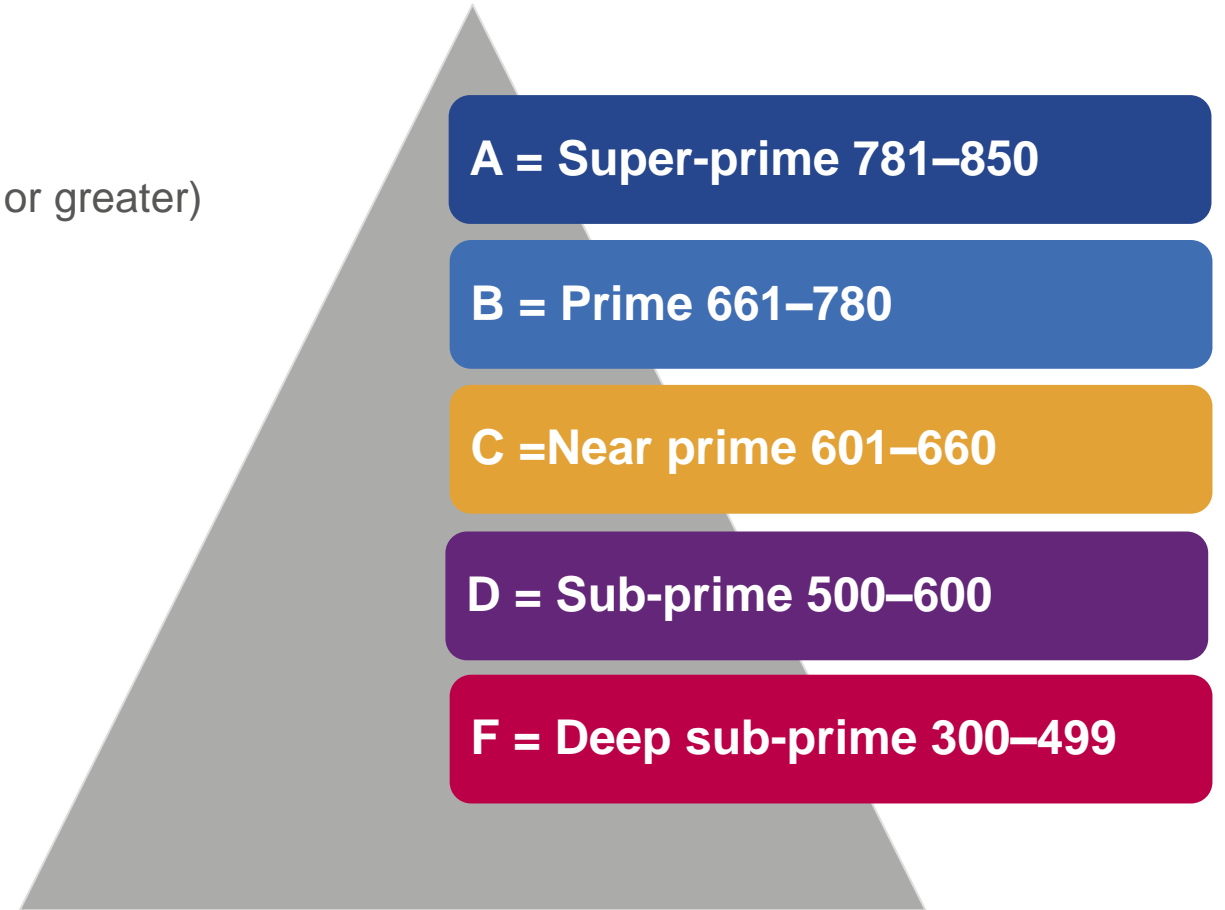
Predicts risk of borrower

- Likelihood of future serious delinquencies (90 days later or greater)
- Any type of account

24-month performance








Score range of 300–850

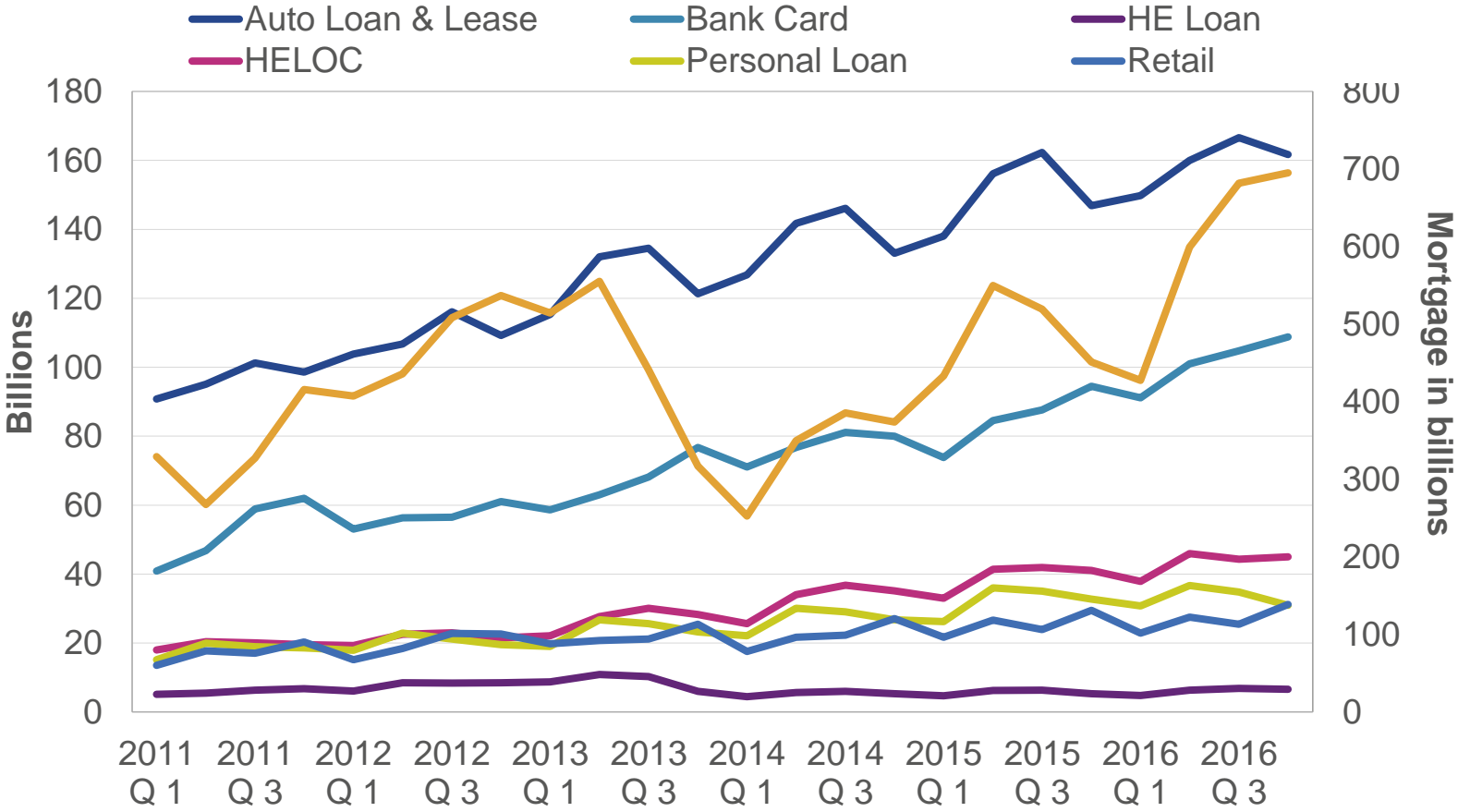
- Higher scores represent a lower likelihood of risk
- Lower scores are higher risk



Originations by lending product

YoY Change 4Q15 to 4Q16

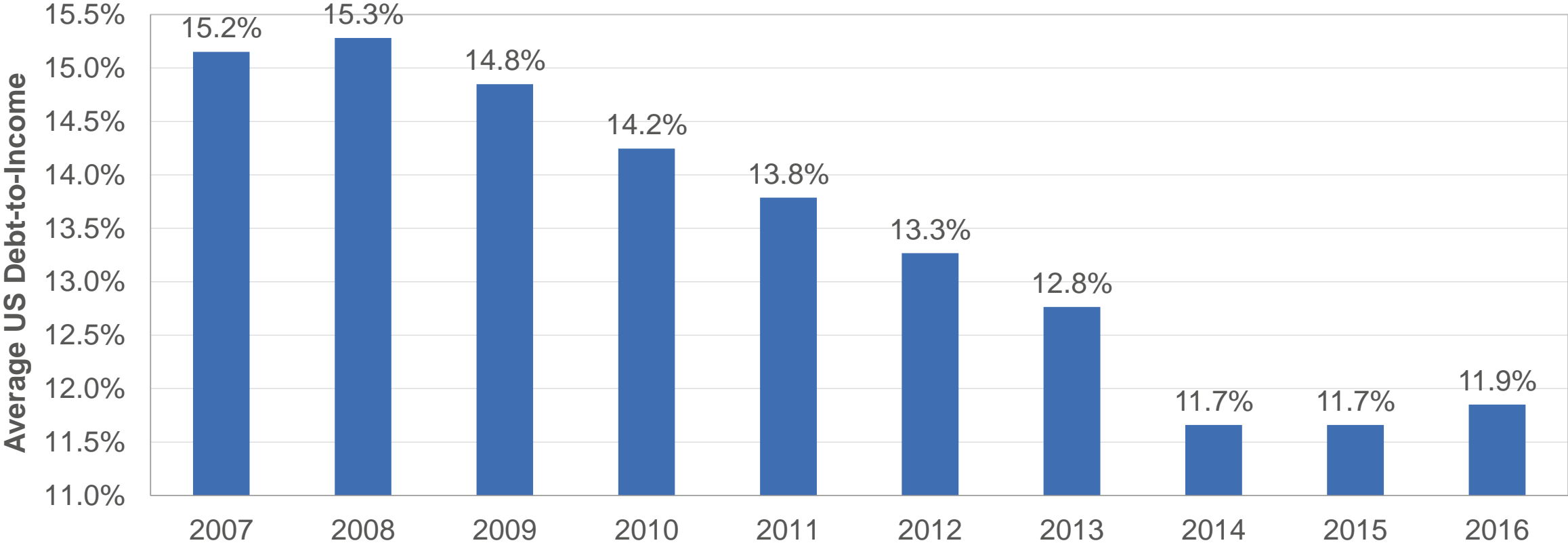
	Mortgage	+54%
	HE Loan	+24%
	Bankcard	+15%
	Auto Loan and Lease	+10%
	HELOC	+10%
	Retail	+6%
	Personal Loan	-6%



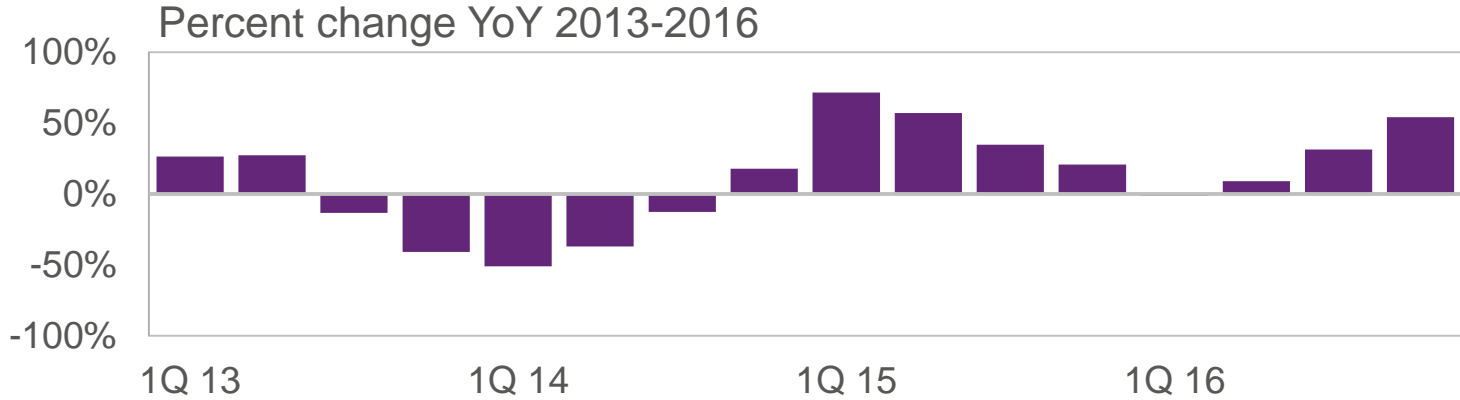
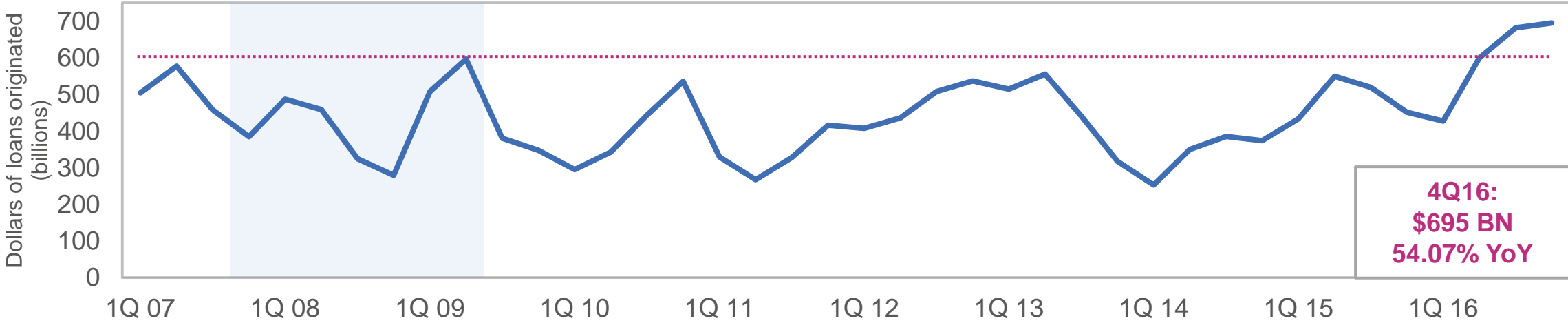
Source: Experian IntelliViewSM



Debt-to-Income InsightsSM trends



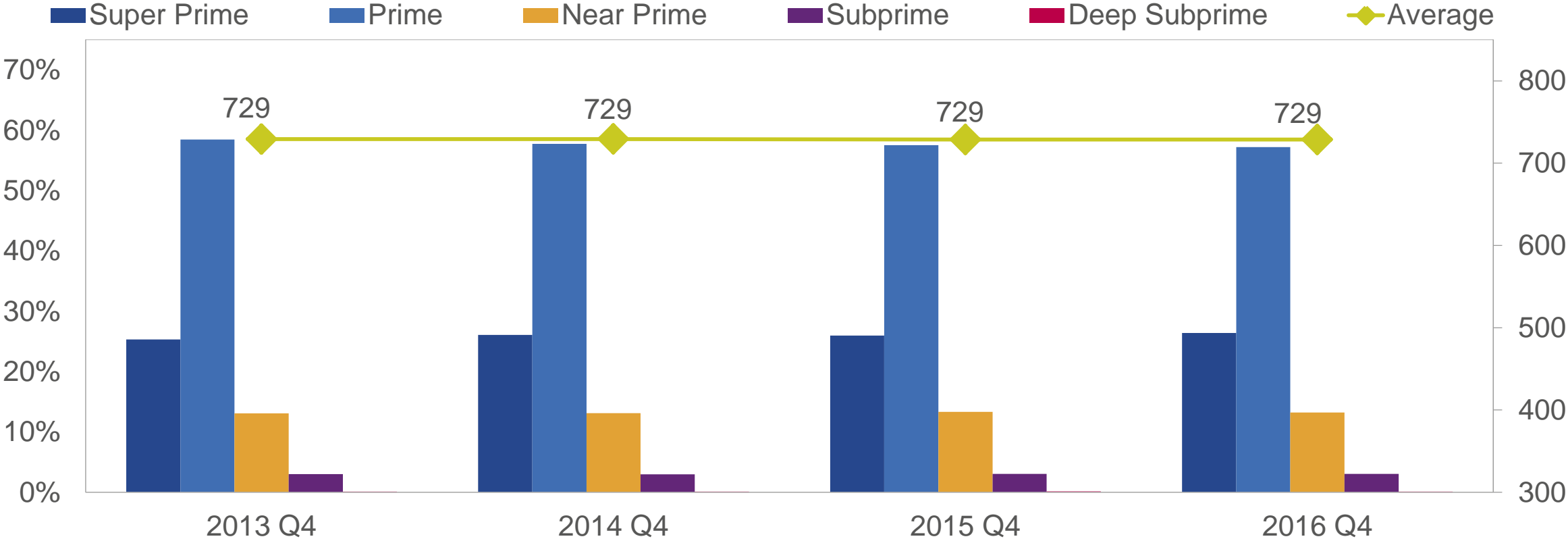
Mortgage originations



Source: Experian IntelliViewSM



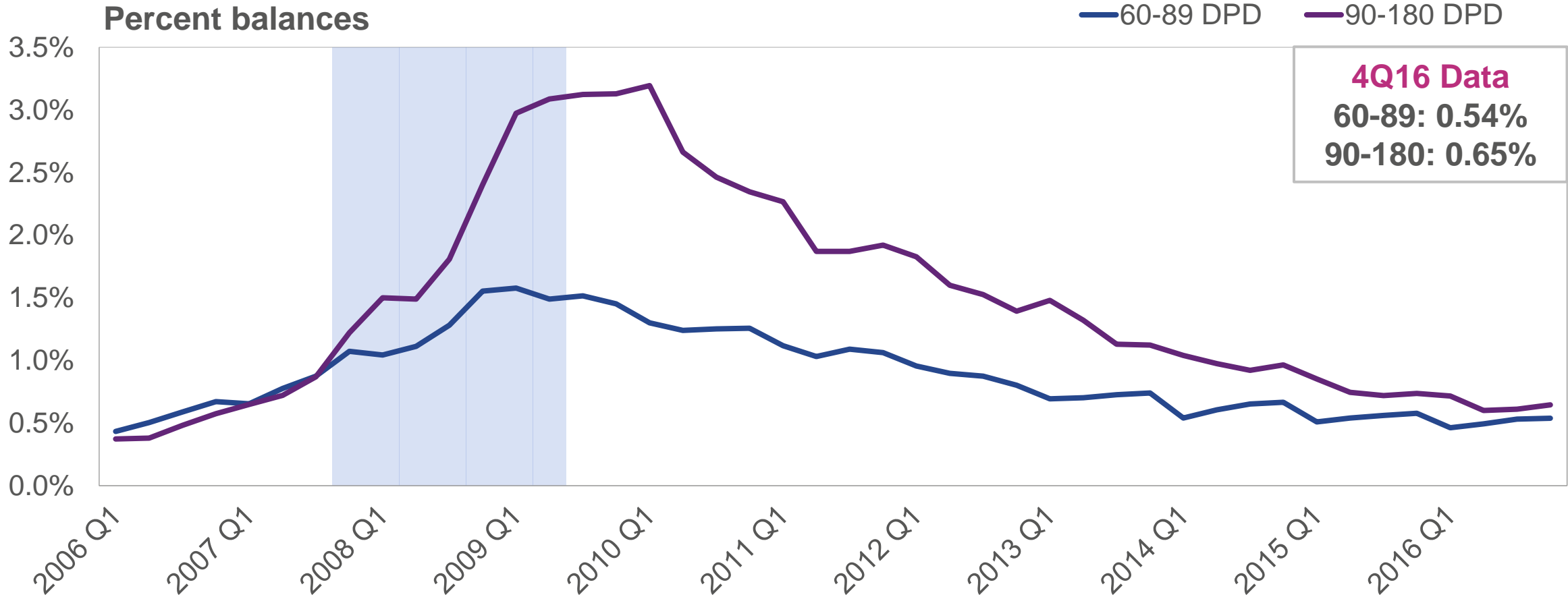
Distribution of mortgage loan originations by VantageScore® band



Source: Experian IntelliViewSM



Mortgage late stage delinquency rates



Source: Experian IntelliViewSM



Mortgage delinquency rates

By state

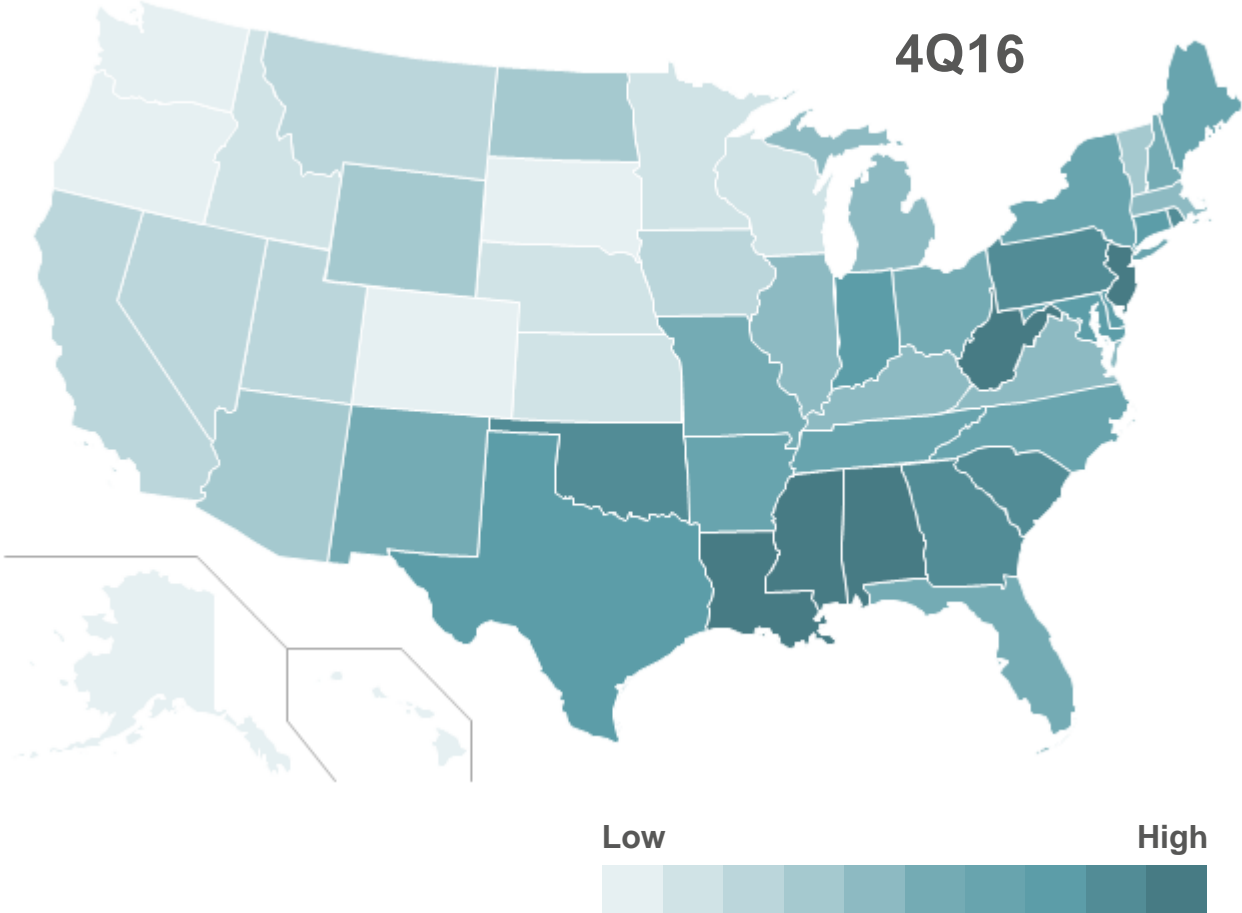
Best/worst five states*
4Q16 national mortgage
60-89 DPD

- 1. Alaska 0.24%
- 2. Oregon 0.27%
- 3. Washington 0.28%
- 4. Hawaii 0.31%
- 5. Colorado 0.31%

...

- 47. Alabama 0.73%
- 48. New Jersey 0.75%
- 49. Louisiana 0.82%
- 50. West Virginia 0.83%
- 51. Mississippi 1.41%

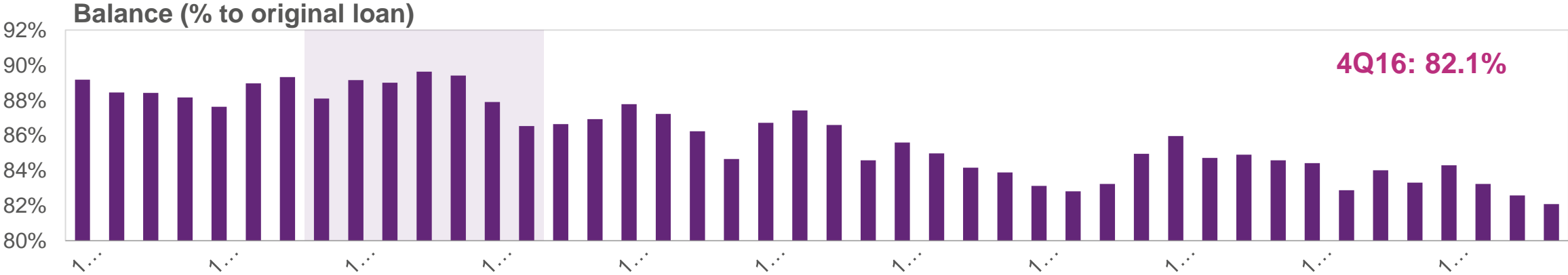
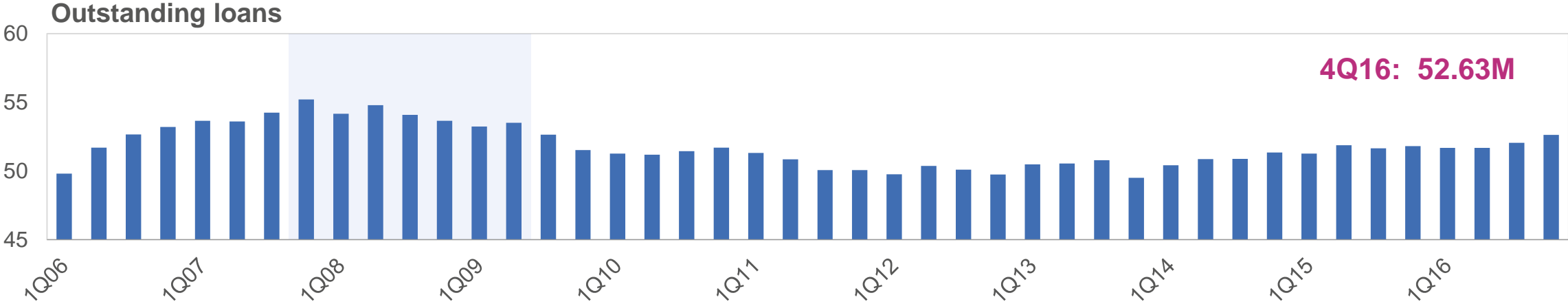
*Includes District of Columbia



Source: Experian IntelliViewSM



Mortgage trades





A tale of two populations:

Foreclosure vs. bankruptcy analysis

Analysis objective

Current market situation:

- Consumers locked out for a new mortgage by GSEs
 - 7 years after foreclosure
 - 4 years after bankruptcy

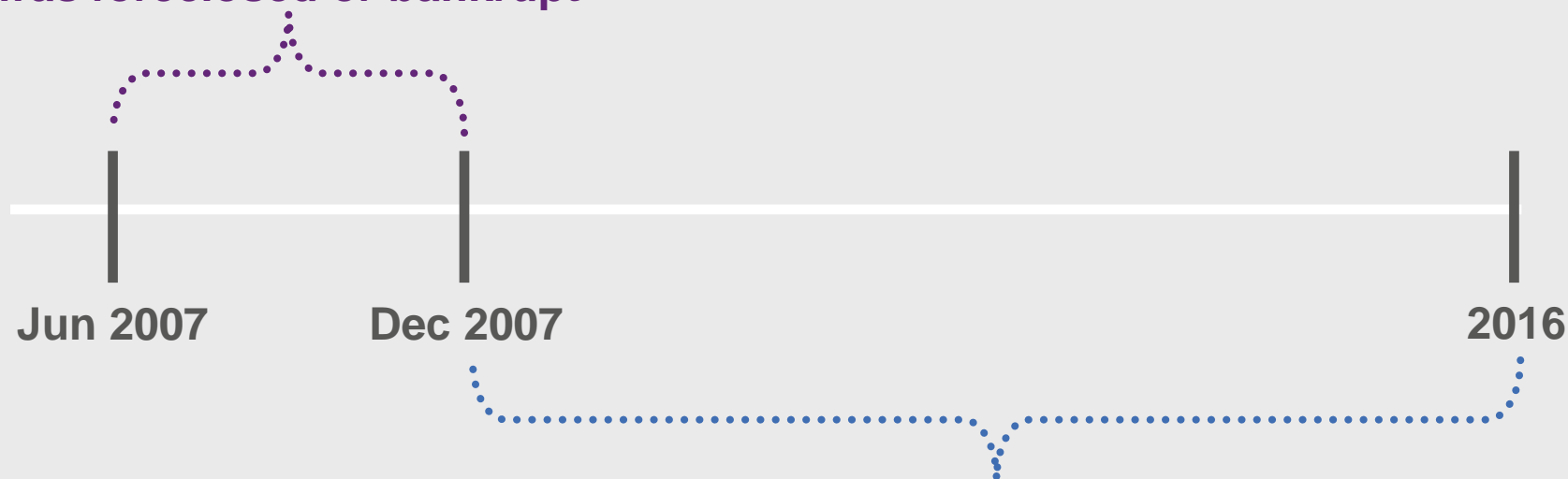
Analysis will review:

- Is there a significant difference between these two populations
 - Time to next new mortgage trade
 - Performance of these trades
- Segmentation and profiling of future bad performance

Analysis design

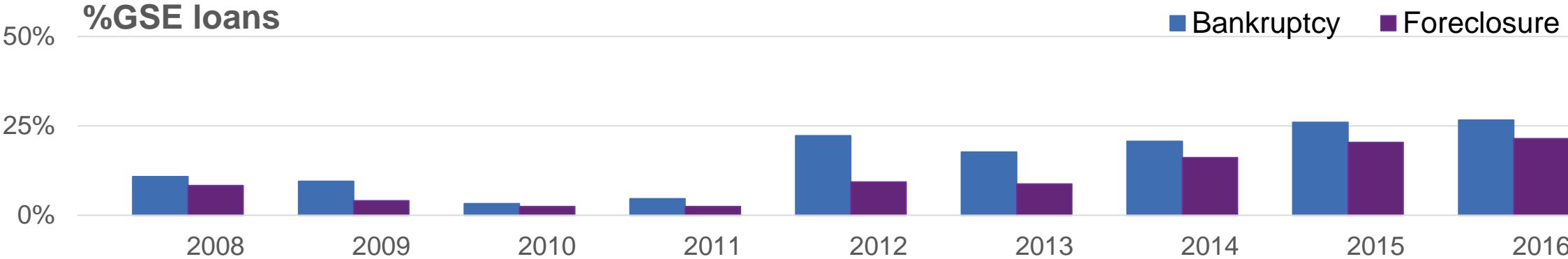
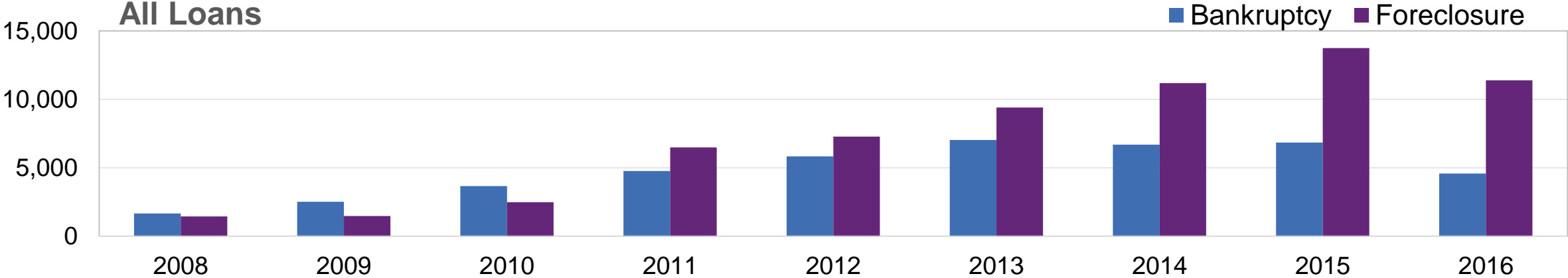
Foreclosure and bankruptcy populations

Consumers with a mortgage that was foreclosed or bankrupt

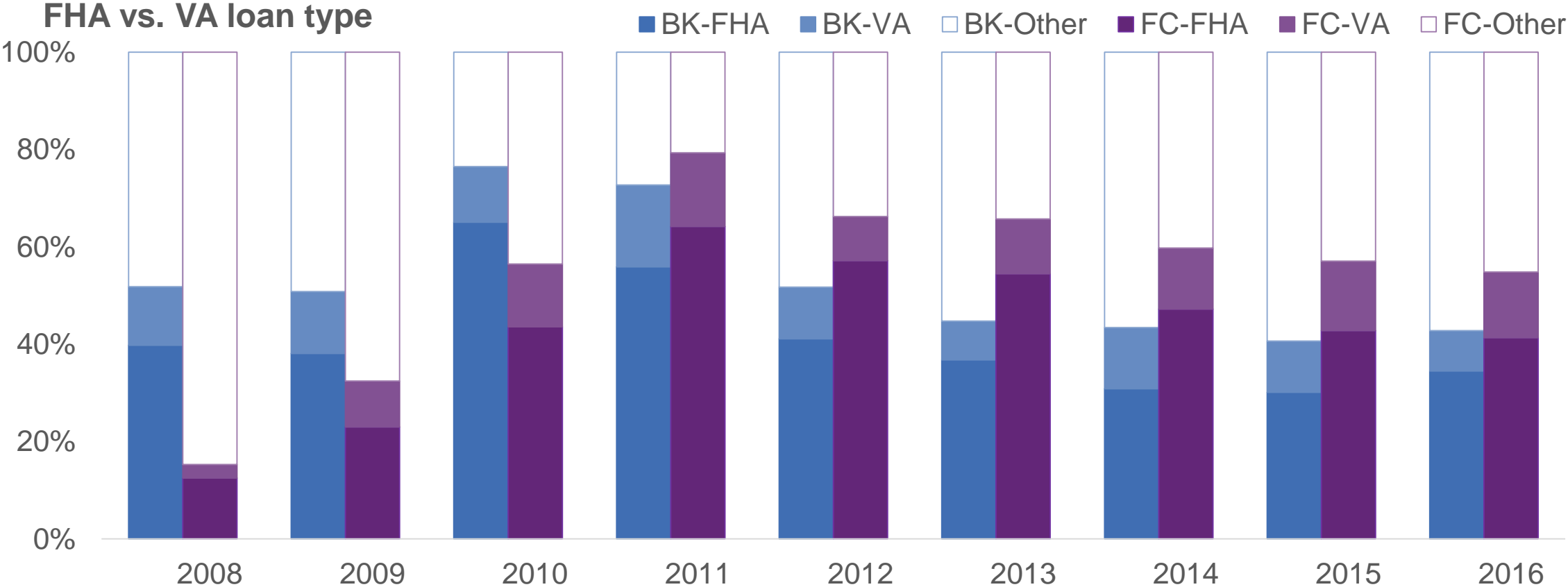


New mortgage trade open window for analysis population and performance window

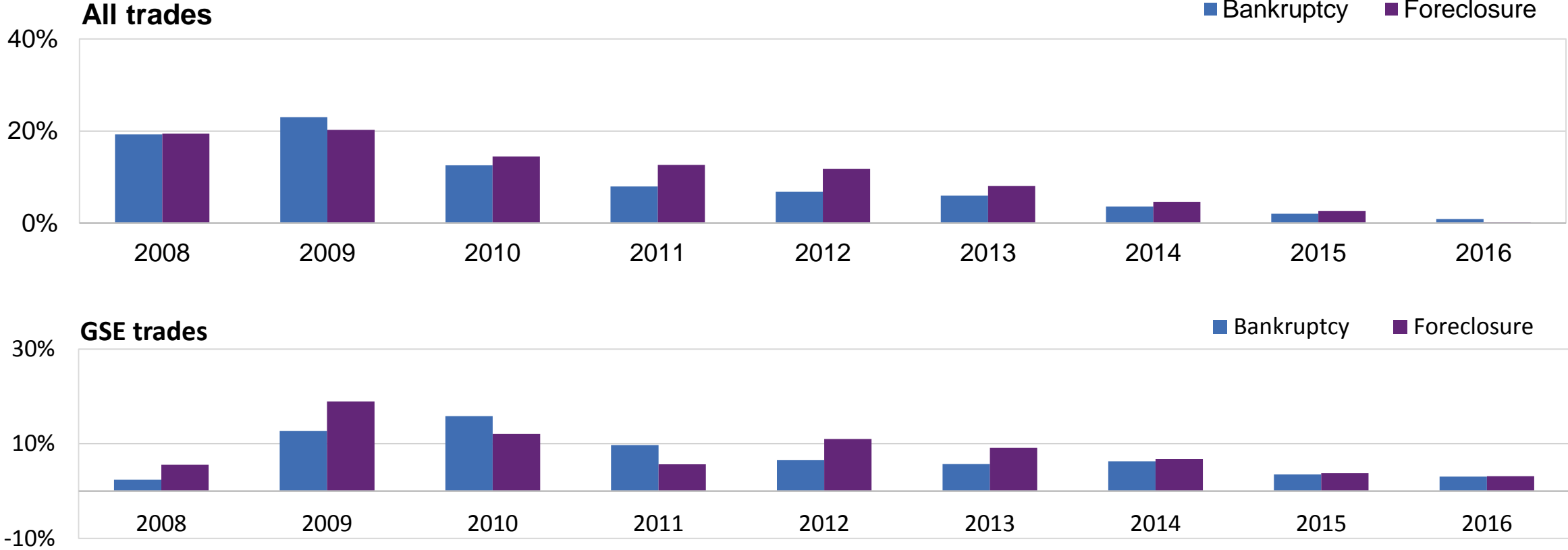
New trades by year (vintages)



Post event origination mix

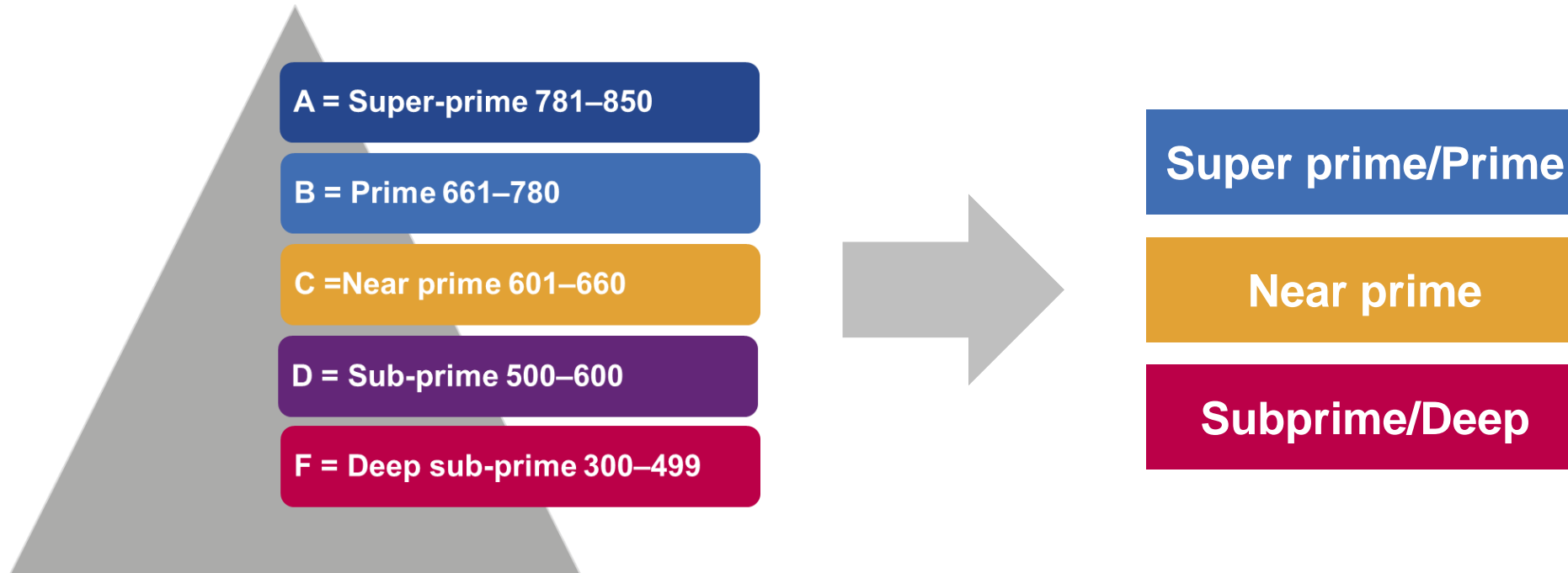


New mortgage trade performance (%90+ DPD)



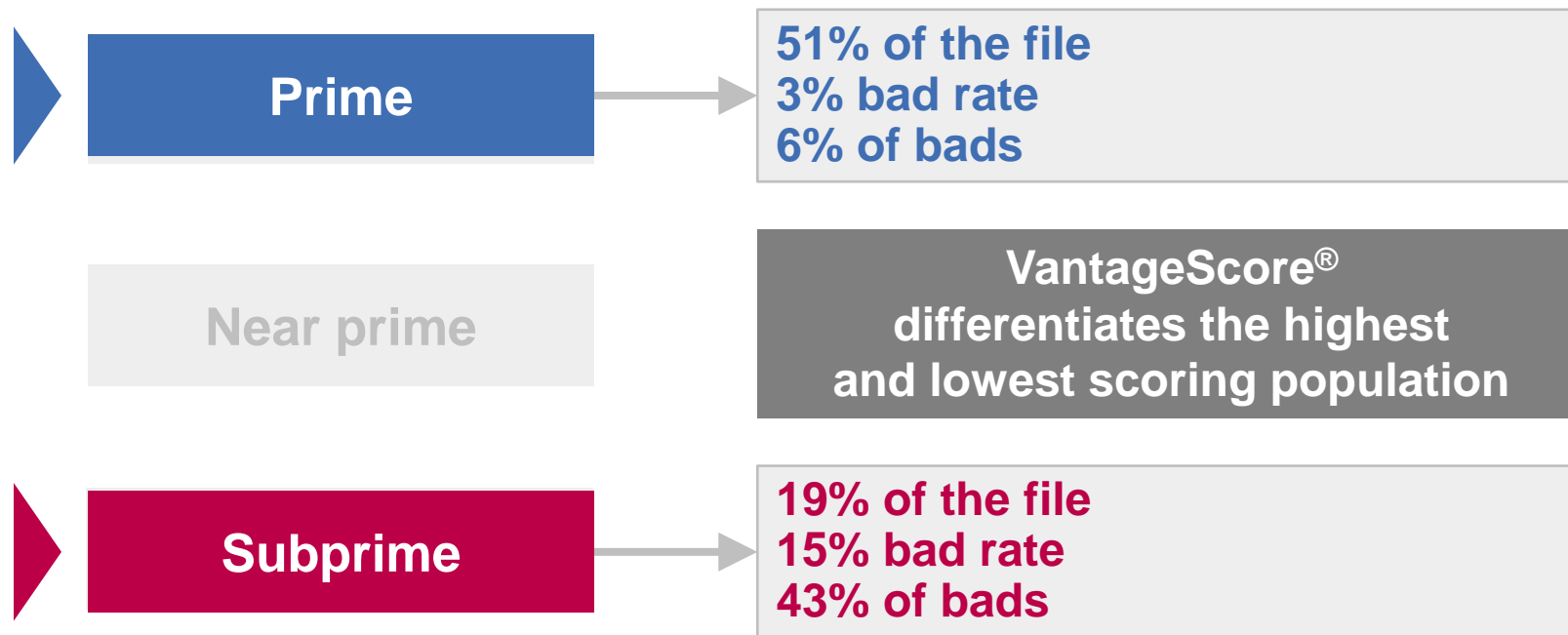
Predicting risk

Probability 90+DPD



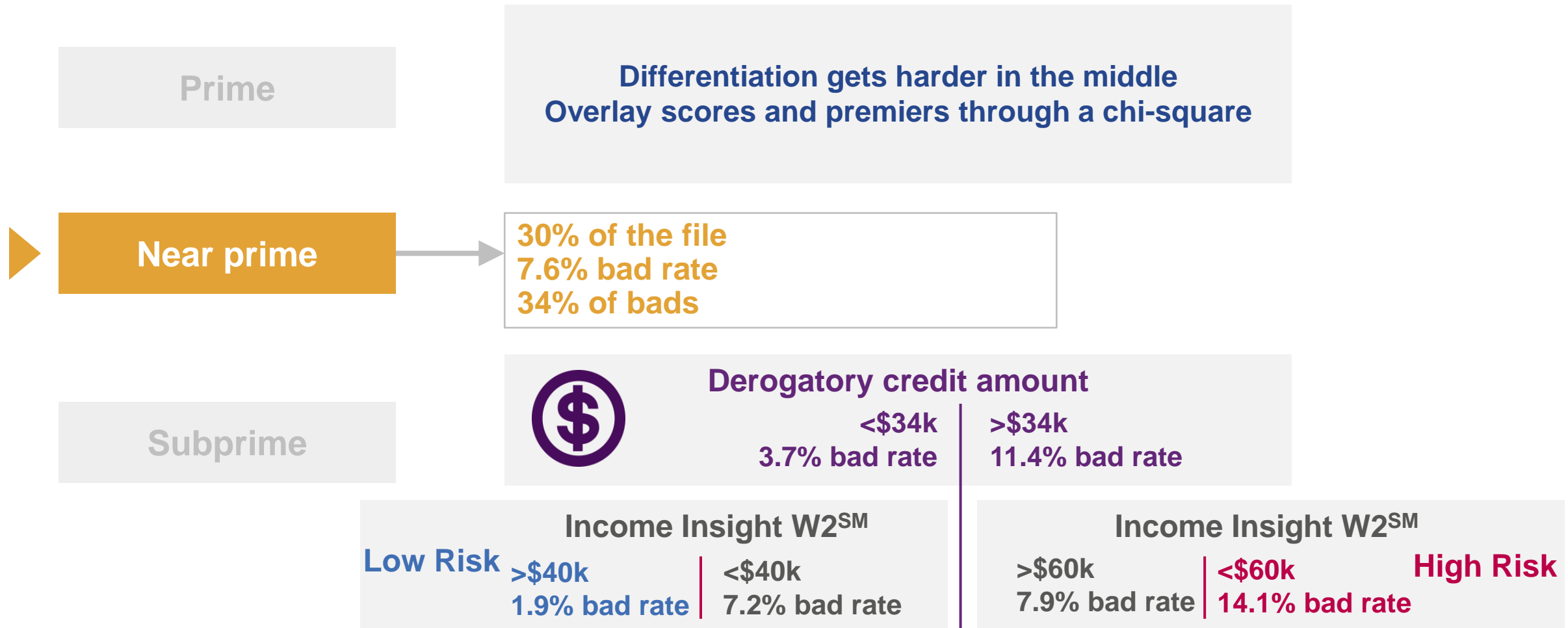
Predicting risk

Probability 90+DPD in Foreclosure



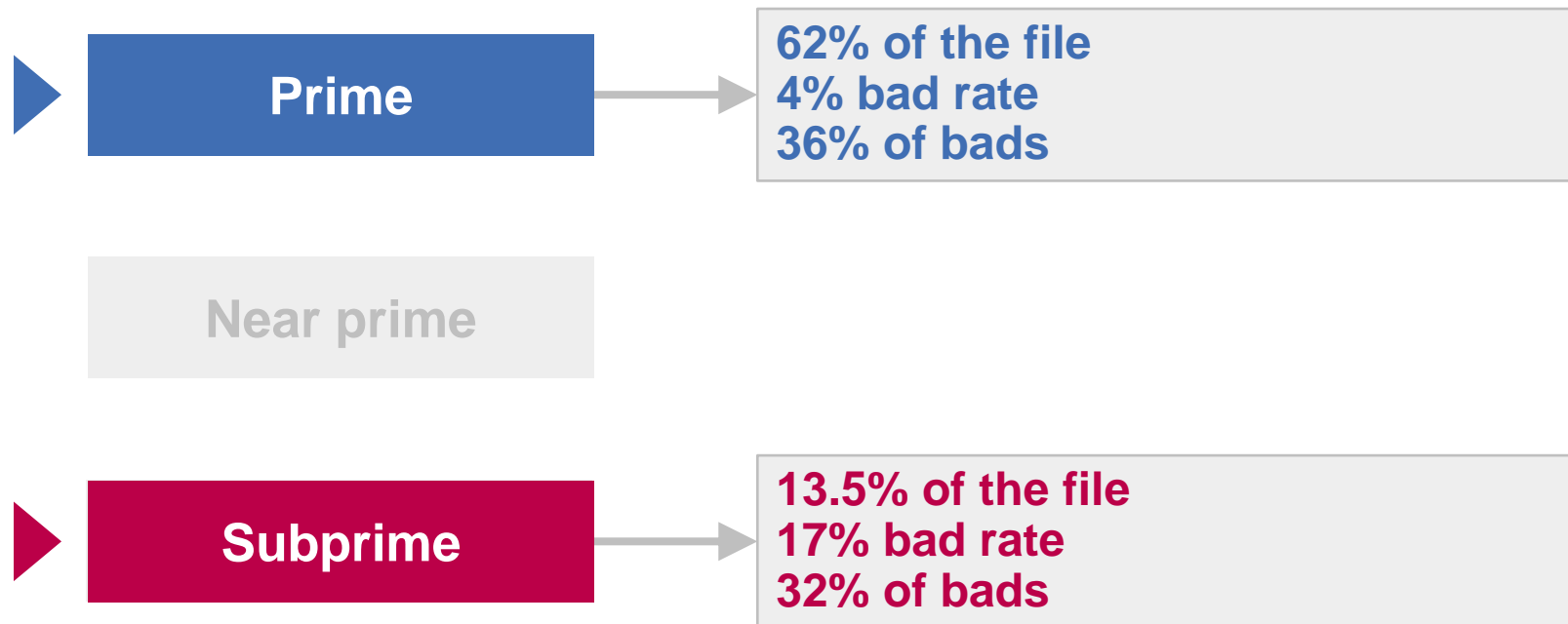
Predicting risk

Probability 90+DPD in foreclosure



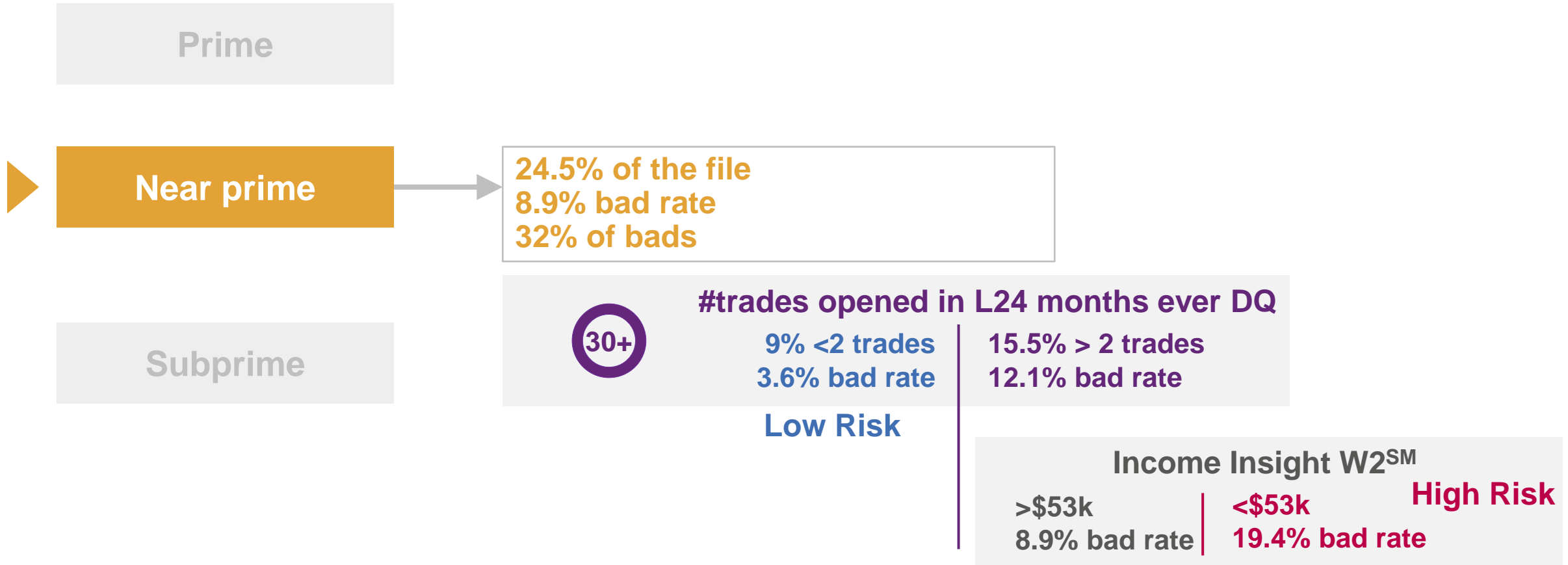
Predicting risk

Probability 90+DPD in bankruptcy



Predicting risk

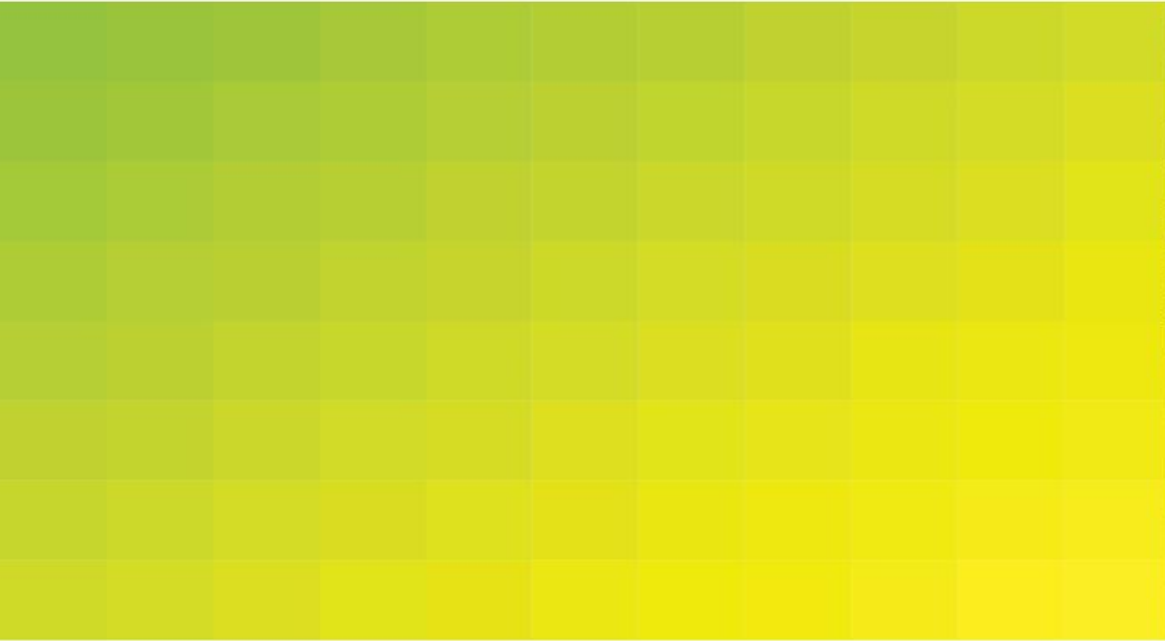
Probability 90+DPD in bankruptcy



Key points to remember

- Segmentation and profiling through overlaying premiums and scores further **separates consumers** with higher and lower risk
- Conservative analysis methods were used here and clearly demonstrates **opportunities**
- A retrospective test of your applicant population will quantify the swap-in **expansion benefit**





Reducing Costs and Speed to Close

Big Data and Advanced Analytics

May 8, 2017

Ensuring success through the development of an innovative suite of solutions designed to deliver the Certainty, Usability, Reliability and Efficiency our customers expect.

Loan Advisor Suite

Certainty

Give you confidence that the loans you originate meet the requirements for delivery and sale to Freddie Mac.

Usability

Provide intuitive and easy-to-use tools with clear and actionable feedback.

**Customer
Success**

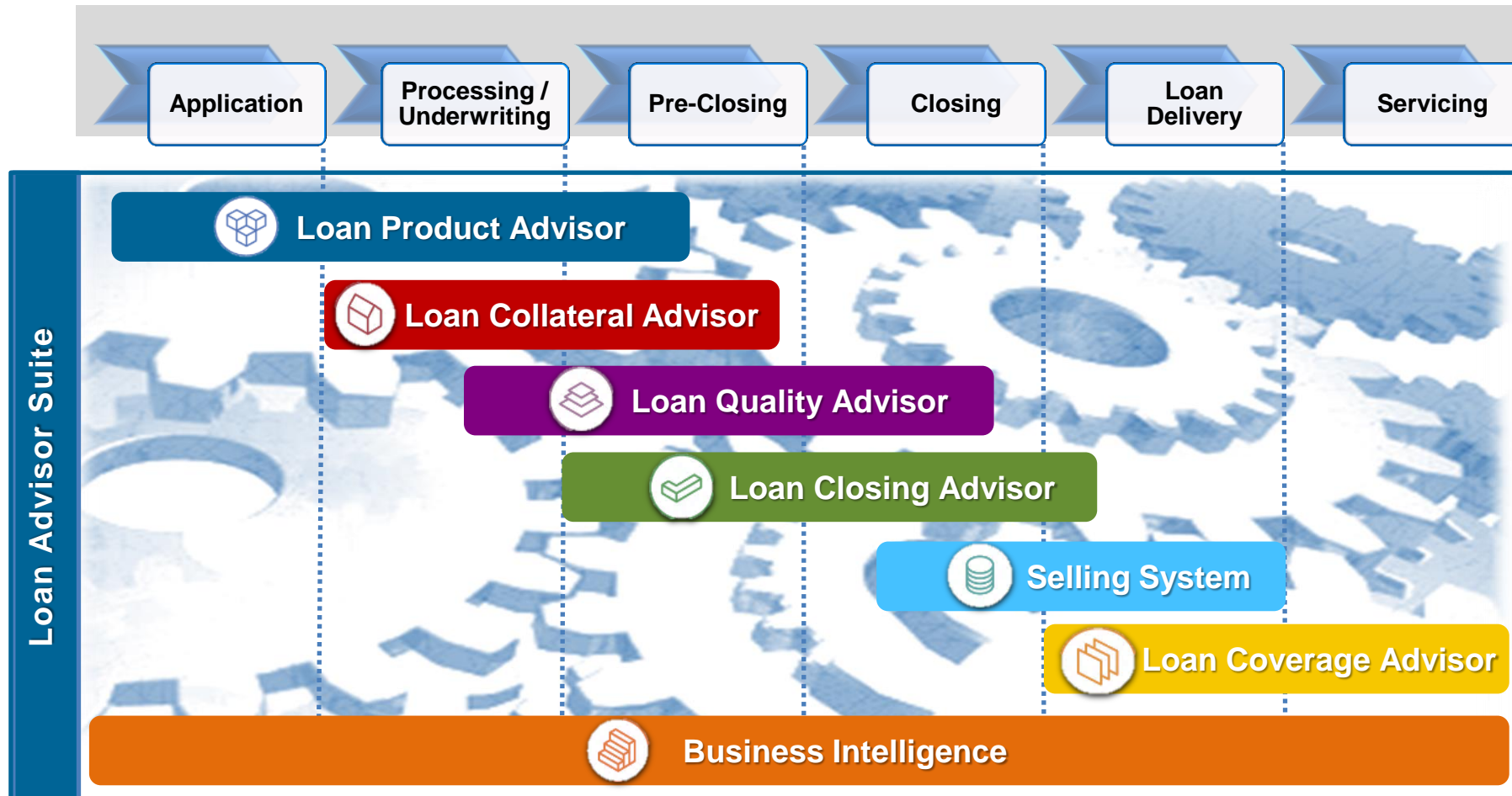
Reliability

Instill trust that our tools will be available, and perform, when you need them.

Efficiency

Lower cost to originate via automated data validation and focusing your attention where it needs to be.

Loan Advisor Suite: Component Overview



The Loan Advisor Suite builds the manufacturing quality story required for greater purchase certainty.

- “Our challenge then is to reconsider the appraisal – the process of developing the opinion of value – and the content of the appraisal report to serve the future underwriting, pricing, and management of mortgage credit risk.”
- “If credit investors can obtain the same or equivalent information from other sources – we live in a big data world today, after all – then what is the value proposition of an appraisal?”
- There is a shortage of appraisers and few new entrants into the profession: The cost of obtaining an appraisal has increased to \$700-\$900 in many markets and the time to complete the assignment can take as long as six weeks.

Freddie Mac’s internal research indicates collateral valuation can be reengineered.

Appraisers Suffer from Anchoring Bias

Group A: “Chesterfield MO is a nice suburb of St. Louis.”

Group B: “Chesterfield MO is a nice suburb of St. Louis.
Do you think the median sale price in Chesterfield is more or less than \$900,000?”



Group B's estimate was ~ 40 to 52% higher!

- Assess primary functions performed by the current appraisal process
 - » Estimate value
 - » Inspect property condition

- Use big data and advanced analytics to automate these same functions
 - » Improve the timeliness and customer satisfaction of our Single-Family guarantee business while maintaining credit quality and prudent risk management
 - » In certain cases, in lieu of a new appraisal, leverage our risk tools and big data to develop an independent opinion on the collateral condition and value
 - » Leverage prior experience, our top-tier AVM (HVE), and big data/advanced analytics

Our design leverages big data and emphasizes function.

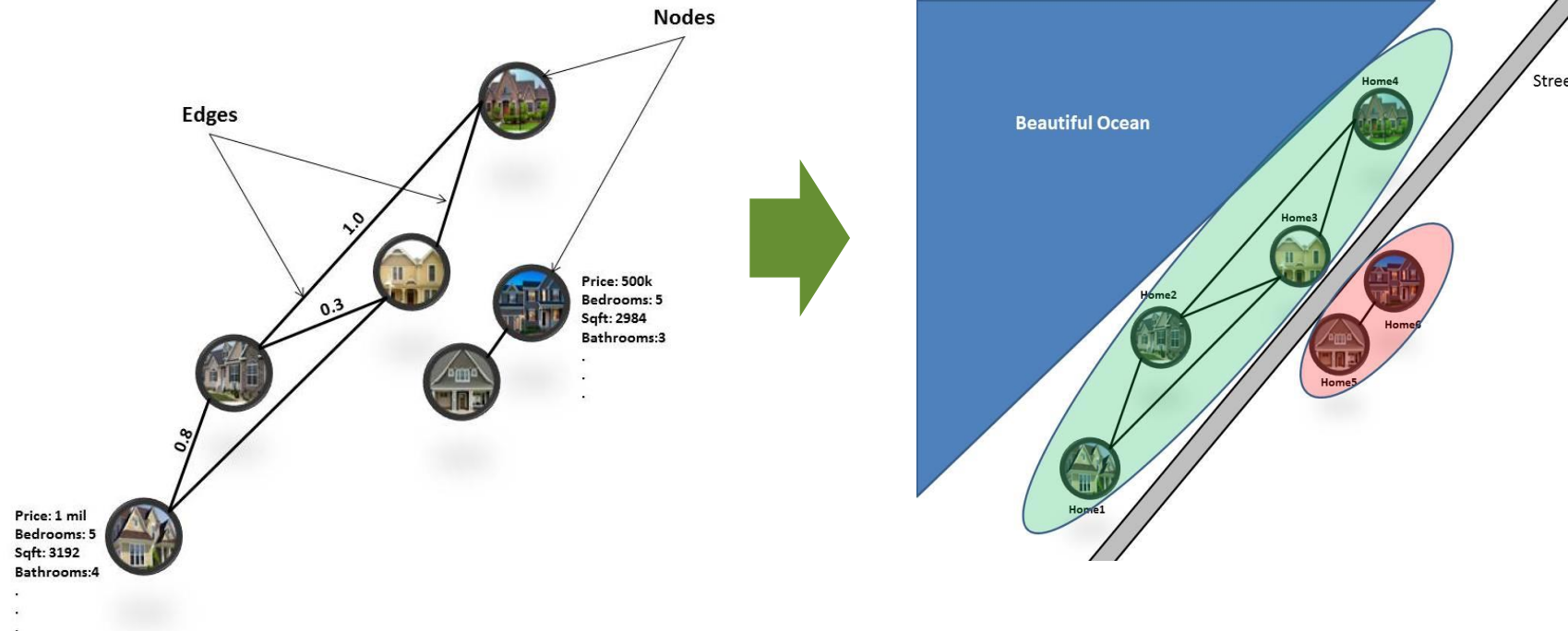
- Examples of the types of data we are using to develop various checks:
 - » Repeat sales data to assess house price growth of the property compared to the appreciation rate for other homes in the local market (zip code).
 - » Prior appraisal data from UCDP:
 - Review the last known condition and quality rating
 - Confirm there are no historical and unacceptable findings for the subject property
 - Confirm that the property is a single-family property
 - » Public records: quality ratings, property age, and tax assessment data
 - Typically, homes of higher quality construction will decline at a slower rate due to longer lasting materials.
 - Also used to determine distressed sale information.

Big data serves as the foundation for rule development.

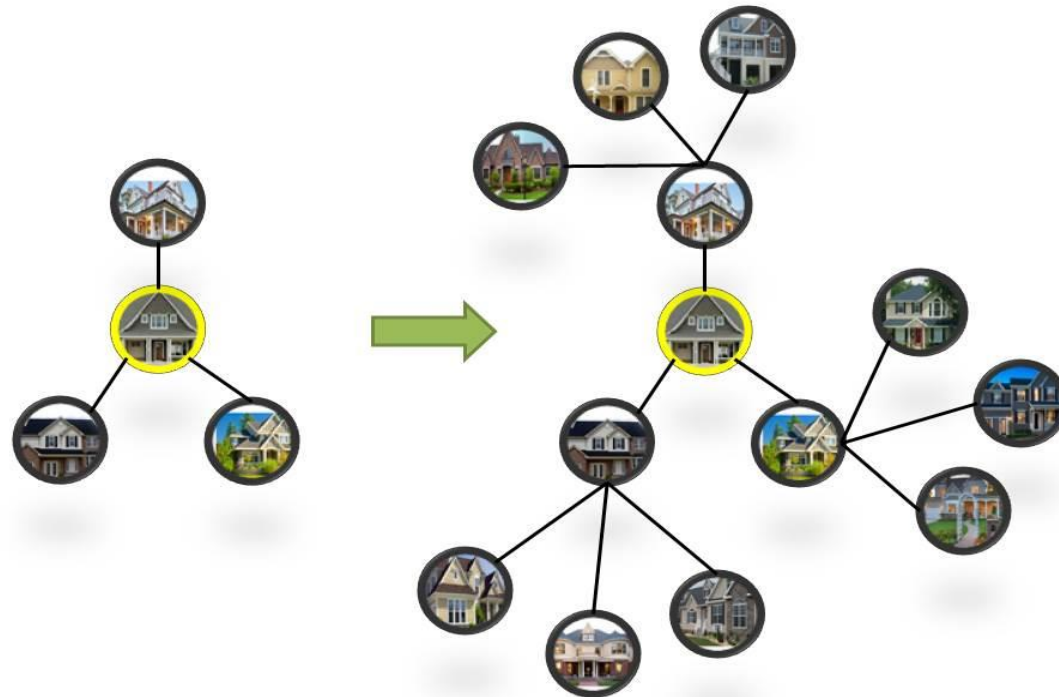
- **Knowledge Graph** is a knowledge base that connects millions of pieces information to enable “smarter” search capabilities.
- **Google Knowledge Graph** was introduced in 2012 using many information sources such as Search Clicks, Linked Pages, etc. to extrapolate the edges (relations) between the nodes (entities).
- **Facebook has the Social Graph** whose nodes and edges are constructed from the social network’s millions of users and their data.

Application of Knowledge Graphs to Mortgages!

- We can use Graph clustering algorithms to map out neighborhoods programmatically and determine the right neighborhood boundaries.

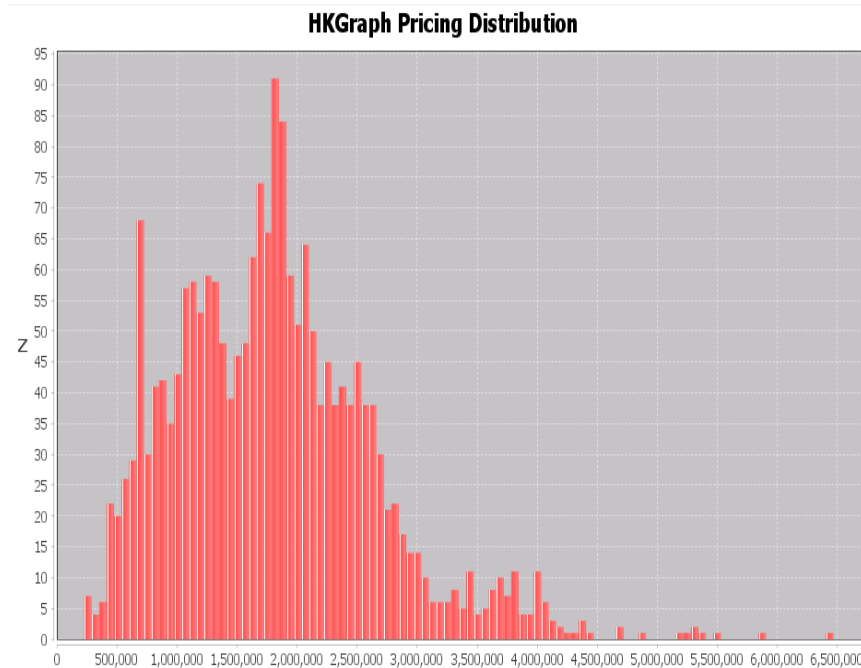


- Imagine estimating the value of a subject home (yellow outline) with three comparable homes. We can use the Home Knowledge Graph to find homes that are similar to the three comps and increase the number of properties used to model the subject home's value, decreasing the noise in the system.



Application of Knowledge Graphs to Appraisals

- Map out neighborhoods and determine the right neighborhood boundaries
- Increase the number of properties used to estimate the subject home's value



Similar
Neighborhood
Estimation

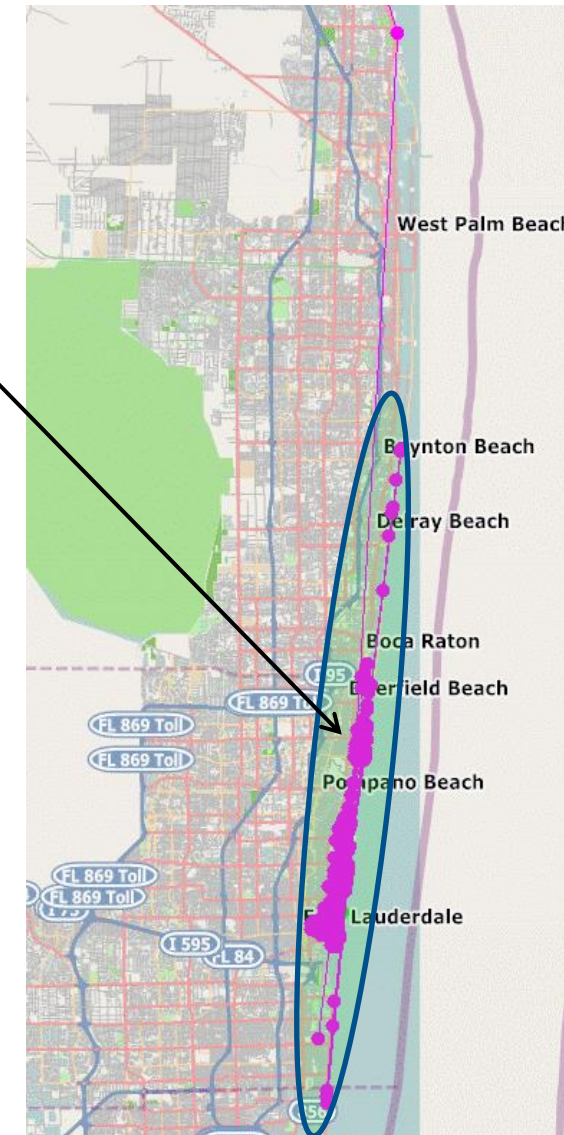
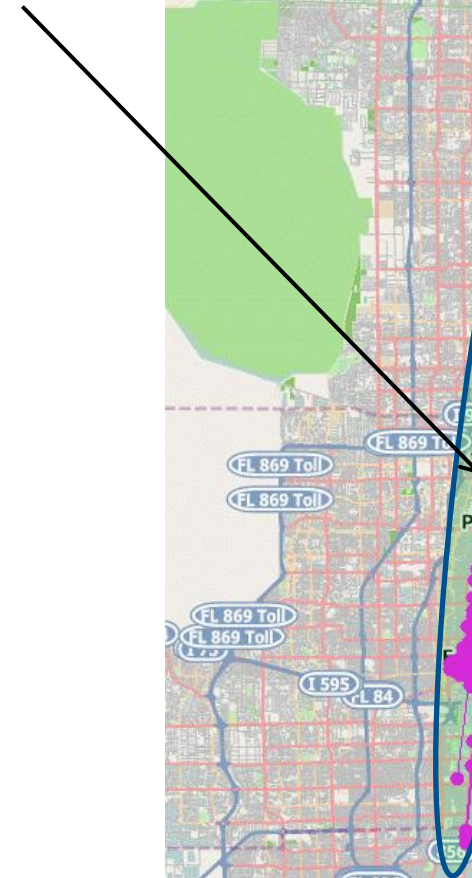


Image processing capabilities detect appraisals with photo issues



Living Room



Dining Room



Kitchen



Living Room



Dining Room



Kitchen



Basement



Bathroom



Bedroom



Basement



Bathroom



Bedroom

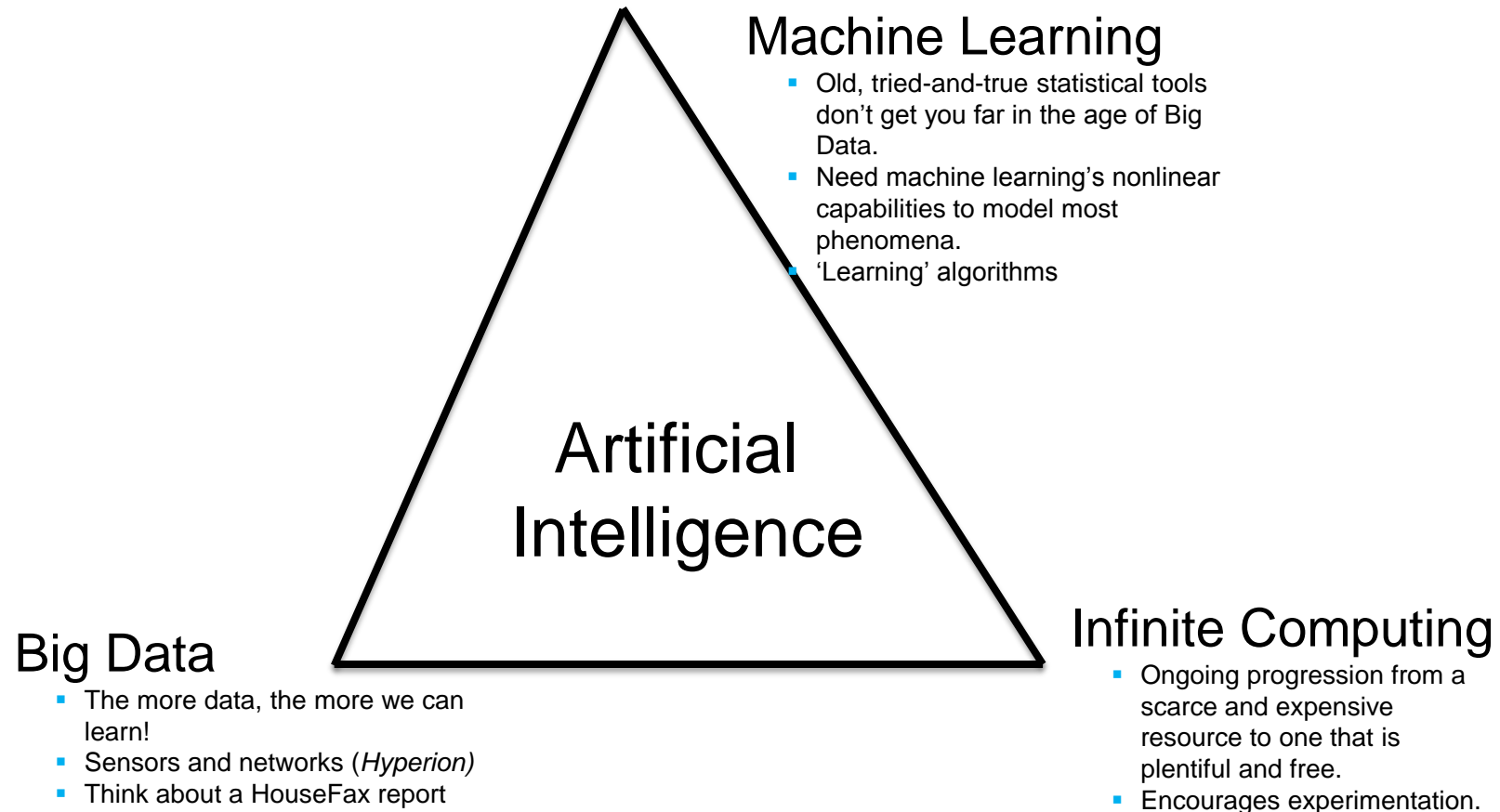


Address: 123 Main Street



Address: 210 Maple Avenue





<https://www.youtube.com/watch?v=V1eYniJ0Rnk>

Once an interface becomes available, the technology is about to take off! Think of Watson on the Cloud!

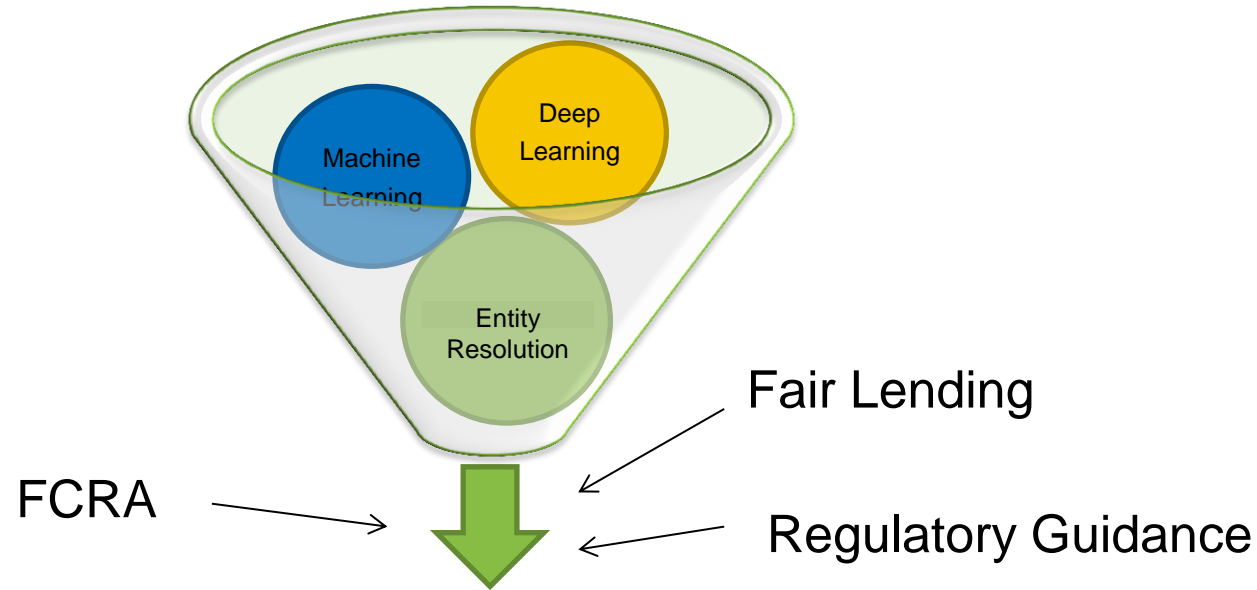
10^{47^*}

$10^{127^{**}}$

*, ** Source: Showdown: Artificial Intelligence and Go, The Economist, March, 12, 2016, pages 73-74.

- “The math-powered applications powering the data economy were based on choices made by fallible human beings....many of these models encoded human prejudices, misunderstanding, and bias into the software systems that increasingly managed our lives”*
- Examples:
 - Models used to evaluate teachers
 - Model that ranks universities and departments
 - For-profit universities
 - Parole models

* From: **Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy**, by Cathy O’Neil, Crown Publishing, New York, N.Y., (2016).



How to Leverage in the Context
of a Regulated Financial Institution?

- Recent paper by Google on Lattice Regression
<http://arxiv.org/pdf/1505.06378.pdf>

Questions and answers

Experian contact:

Michele Raneri

michele.raneri@experian.com

714-830-5843



Michele Raneri



@MLRaneri

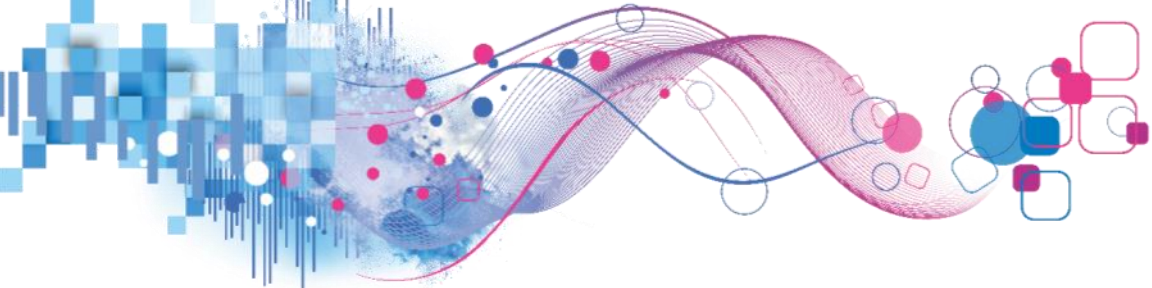


Share your thoughts about Vision 2017!

Please take the time now to give us your feedback about this session. You can complete the survey at the kiosk outside.

How would you rate both the **Speaker and Content**?





 experian™