Update on Ag. Asset Condition Monitoring and Stress Testing

Jay Smith
FRB Minneapolis
Banking and Policy Studies

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Bottom Lines

- The expected weakening in ag. asset values seems to have begun.

- Stress tests continue to show modest bank impacts from fall in ag. land values.
  - Uncertainty around this result remains.

- New stress test on Farm Credit system produces results similar to banks.
  - Even more uncertainty around this result

Last Year's Discussion of Ag. Asset Values

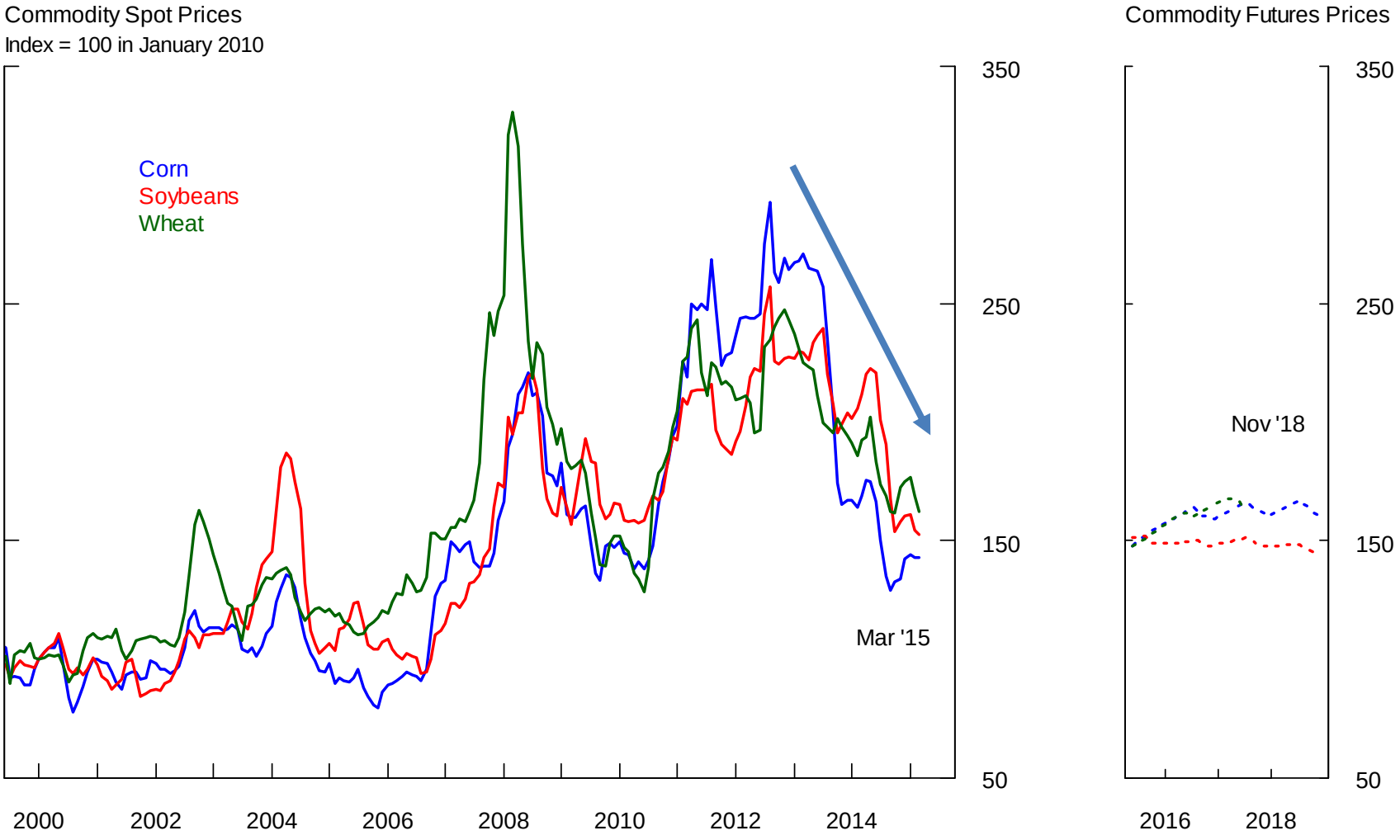
- We had concerns:
  - Incomes were beginning to fall for crop farmers.
  - Land prices were high and starting to cool.
  - Loan growth rates at lower capital ag banks were high.
  - Debt levels continued to rise in real terms.

- But, there were mitigating factors:
  - Crop prices were near the historical median.
  - Producer debt repayment capacity utilization was low.

Concerns Have Heightened and/or are Beginning to be Realized

- Crop farmer income has dropped materially and is expected to stay low for years.
- Land prices are either flat or decreasing in most states.
- Producers are drawing on lines of credit to make up for cash shortfall.

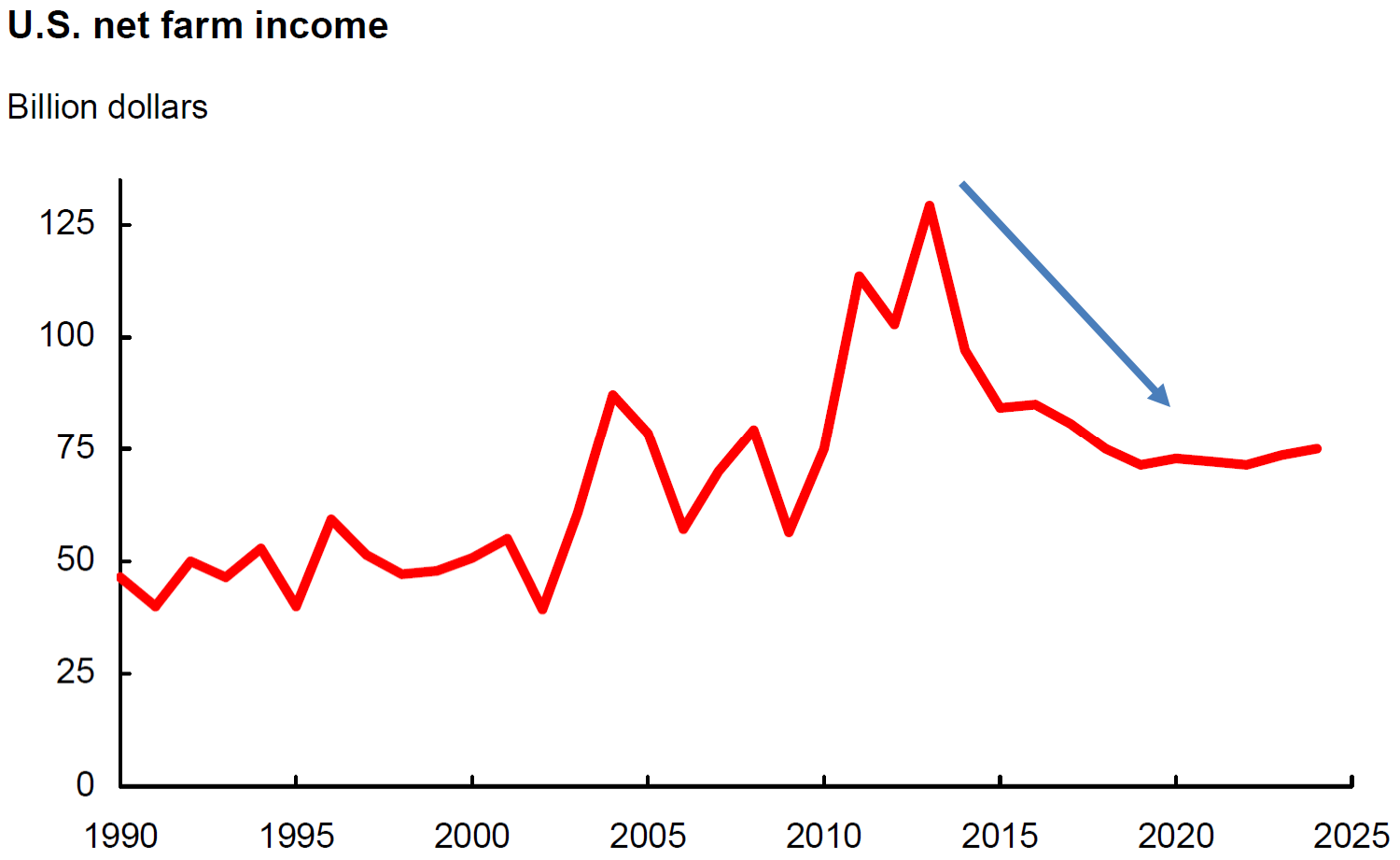
Farm Income is Dropping…



Source: USDA; Notes: Series represent national average prices deflated using CPI.

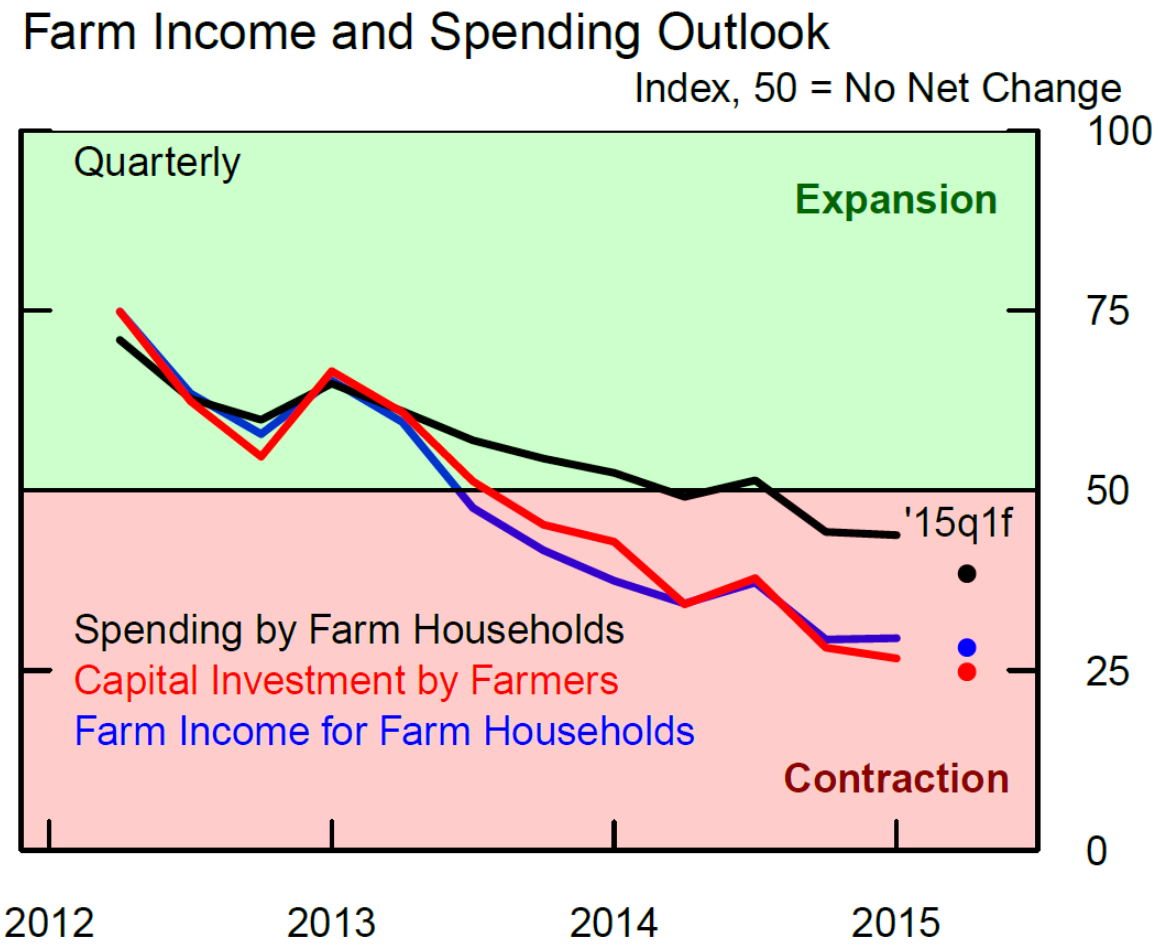
Source: Bloomberg

… And Is Not Expected to Bounce Back



Source: USDA Agricultural Projections to 2024 (February 2015)

Farm Household Indicators are Negative

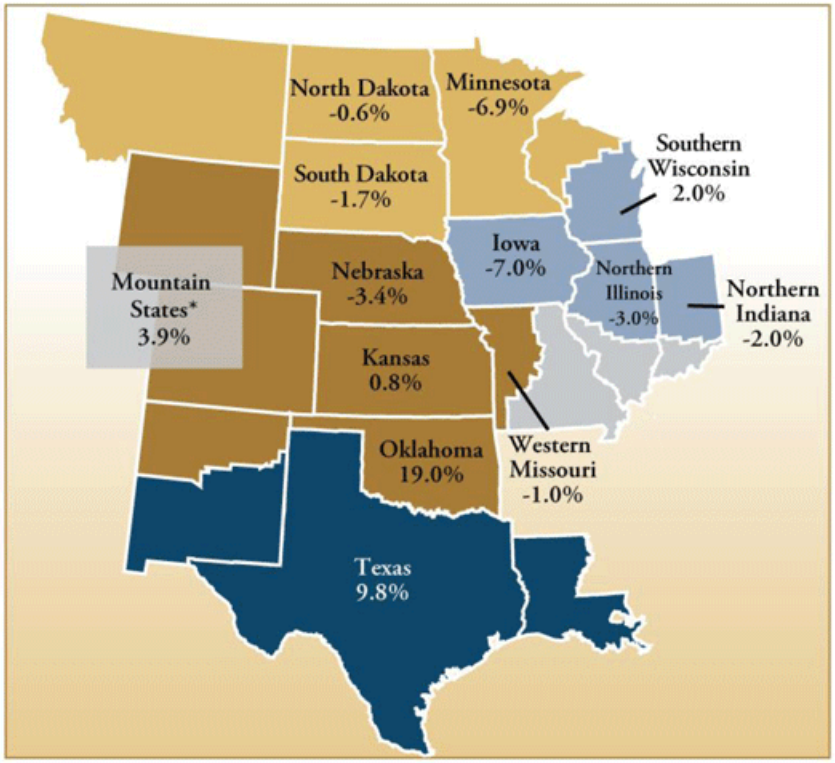


Source: Federal Reserve Survey of Agricultural Credit Conditions;
Notes: Diffusion indices = percent of survey responses indicating increase − 0.5*percent indicating no change. Forecast points are forward looking.

The Land Market is Cooling

Map: Value of Nonirrigated Cropland Fourth Quarter 2014

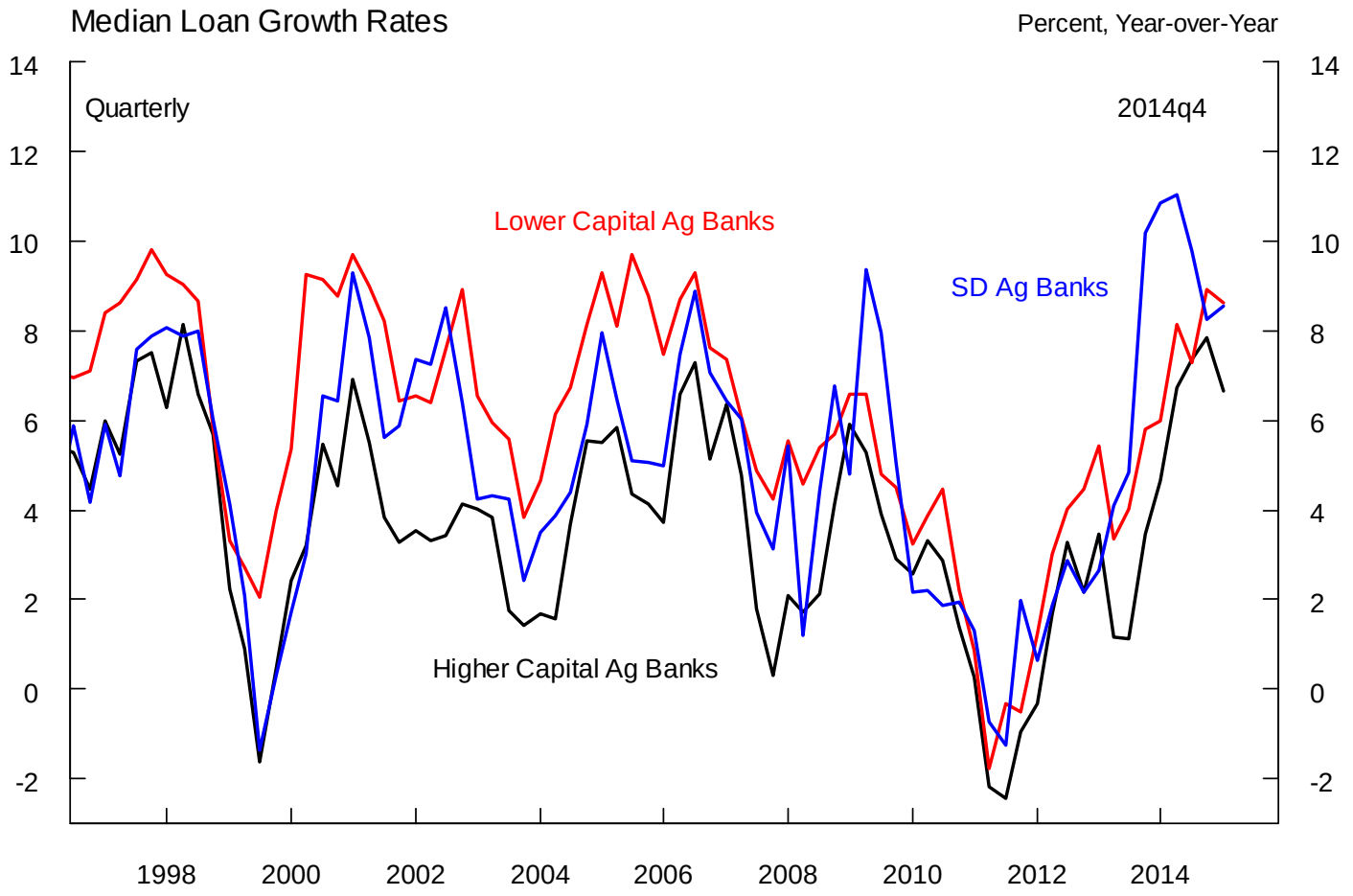
Percent change from previous year



Source: Ag Finance Databook (2015q1)

*Mountain States include Wyoming, Colorado and northern New Mexico, which are grouped because of limited survey responses from each state.
Source: Federal Reserve District Agricultural Credit Surveys (Chicago, Dallas, Kansas City and Minneapolis)

Ag Bank Loan Growth Rates Are Still High



Source: Call Report

Notes: Ag Banks are defined as commercial banks where agricultural loans are at least 25% of total loans; 'Lower Capital' refers to banks with Tier 1 capital ratios below the national median, 'Higher Capital' for those with Tier 1 capital ratios above

Refresher on Stress Tests

- Developed three models to measure how much ag. bank loan losses will increase when ag. land values fall
  - Benchmark: What happens to the "average" bank?
  - Systems: What happens when we allow feedback between variables?
  - Distributional: What happens to the most "vulnerable" ag banks?

Scenario Construction

- Ran three "what if" scenarios through models
  - **Mild:** 5% drop in nominal land values, YoY
    0.4% increase in farm debt-to-equity
    5 point increase in portfolio vulnerability
    50 basis point increase in interest rate
  - **Severe:** 25% drop in nominal land values, YoY
    2.1% increase in farm debt-to-equity
    10 point increase in portfolio vulnerability
    100 basis point increase in interest rate
  - **Persistent severe:** Two Severe Scenarios in a row

Stress Testing Model Variables

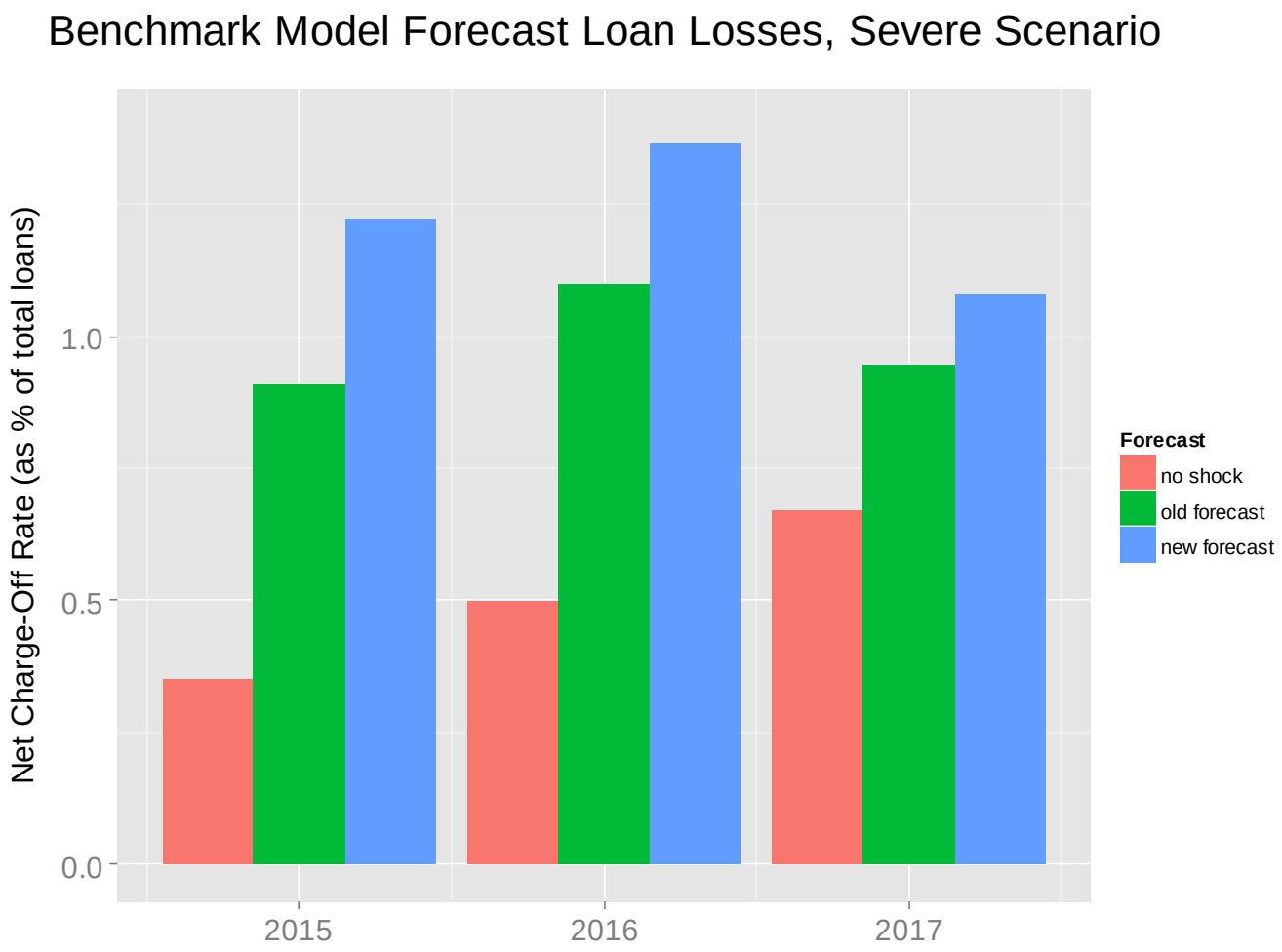
- "General" factors specific to a bank
- Change in land values (nominal state land values/acre)
- Previous years' net charge-offs (% total loans)
- Changes in national average farm debt-to-equity ratio
- Forward-looking indicator of portfolio vulnerability
- **Proxy for the interest rate charged on loans**

Banks We Included

- Last year: Included banks in existence for the **entire** 1980-2014 period (319 banks)

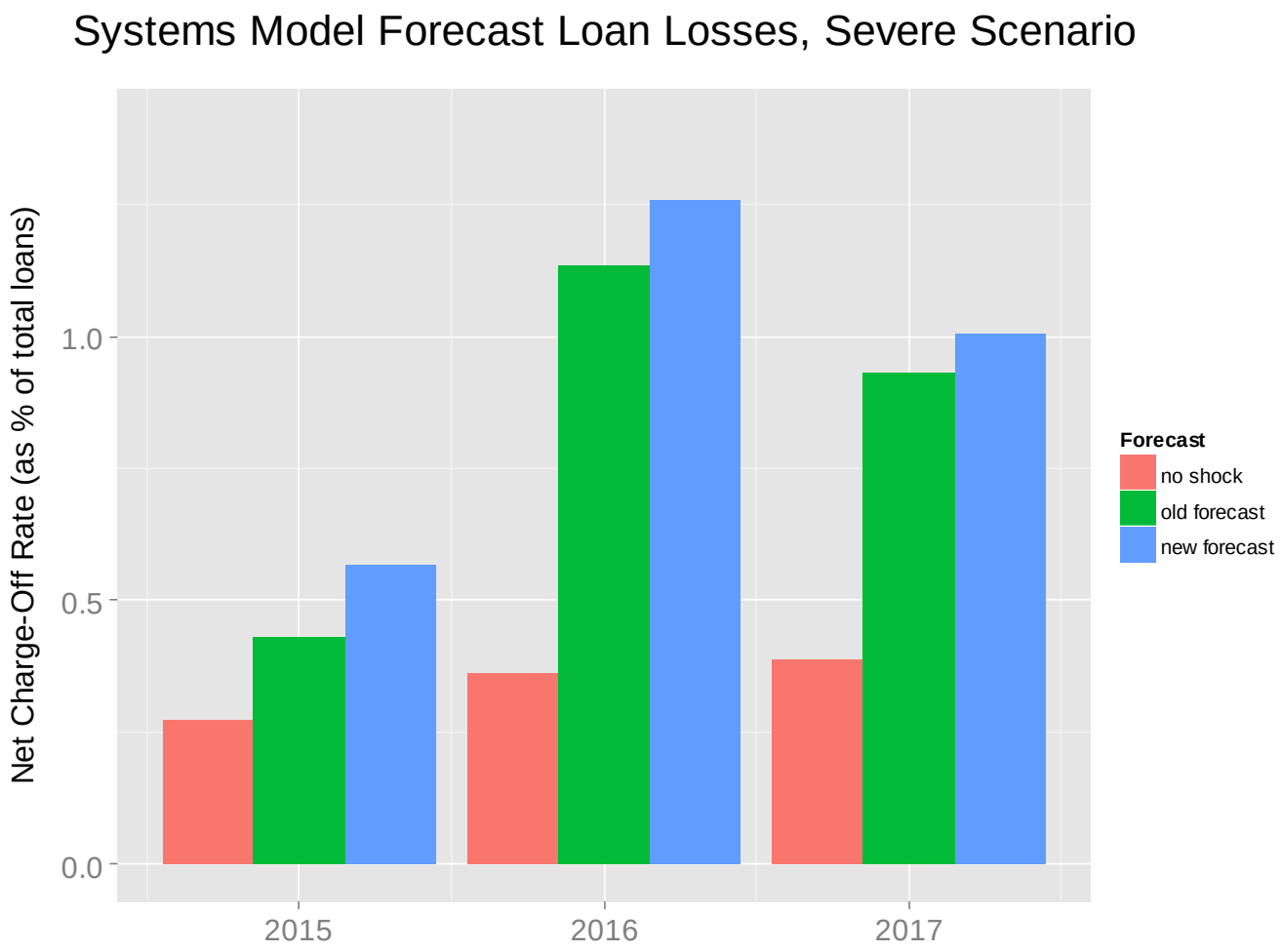
- Today: Include banks in existence for at least 3 years **at any point** during this period
  - This should increase losses banks will suffer during the stress event
  - 979 banks

Update of Benchmark Model Loss Forecast



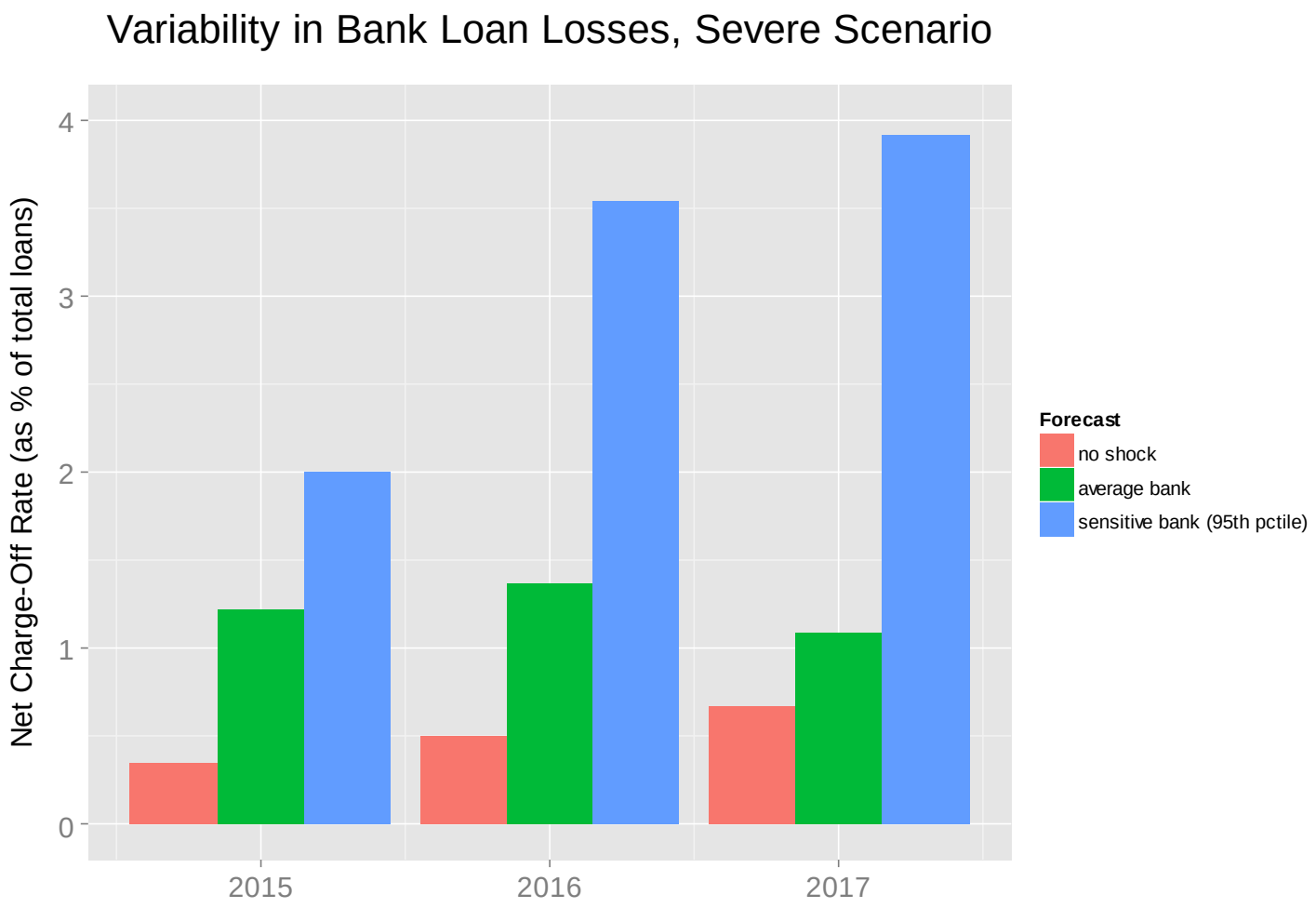
* No shock: no change in nominal land values, interest rate, DtE ratio, or portfolio vulnerability

Update of Systems Model Loss Forecast



* No shock: nominal land values, interest rate, DtE ratio, and portfolio vulnerability evolve endogenously

Most Vulnerable Take a Big Hit



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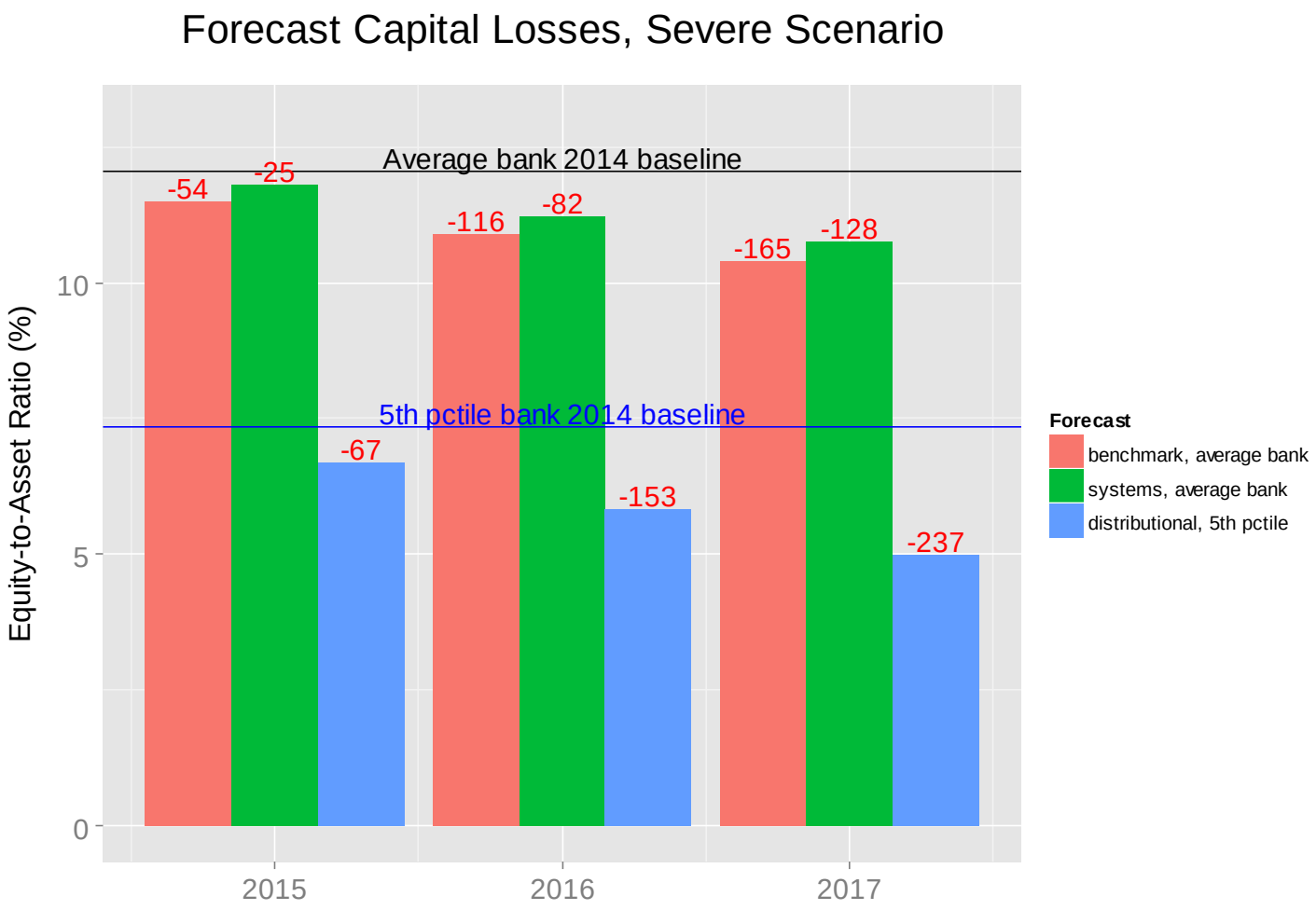
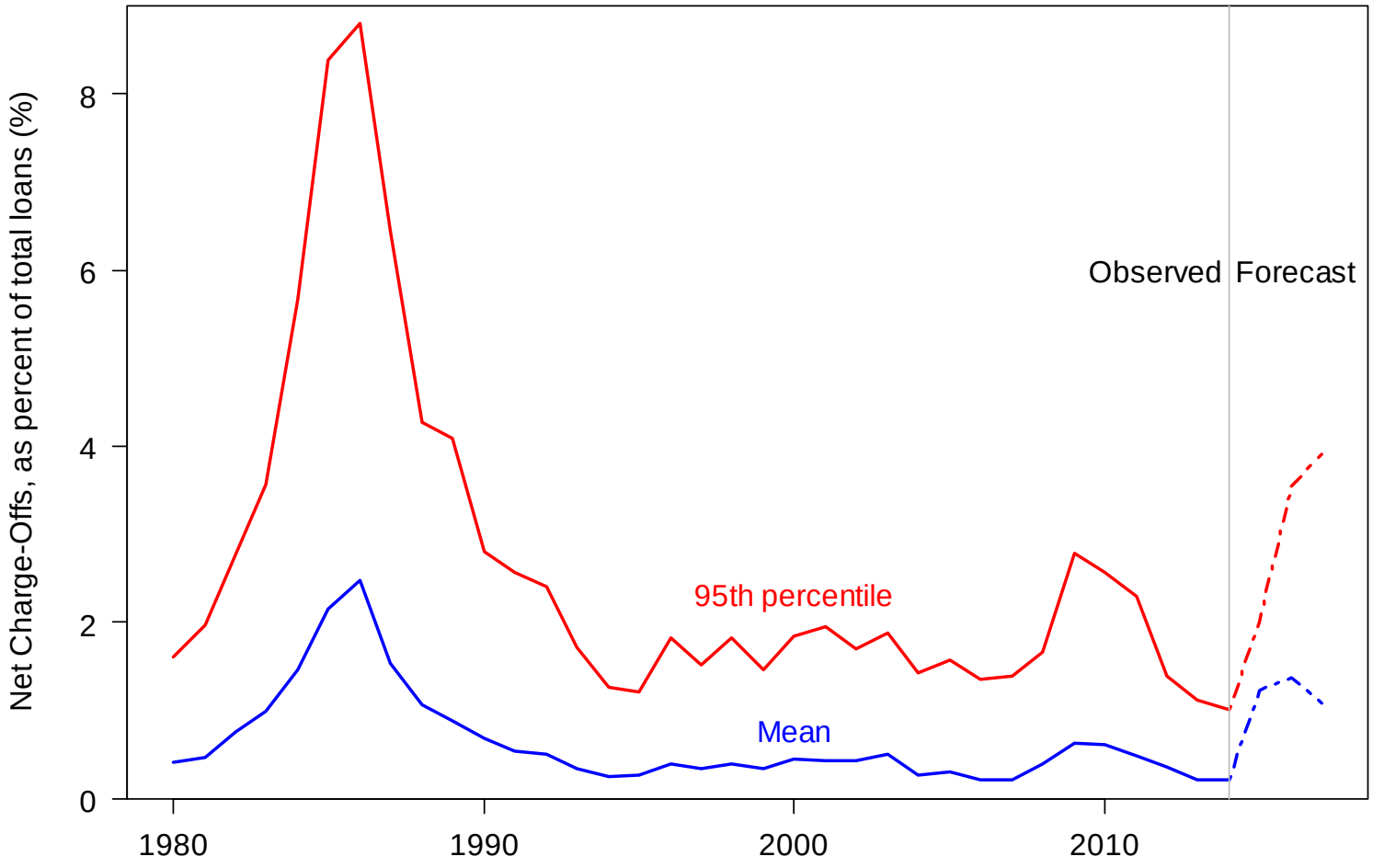
Capital Forecast Results



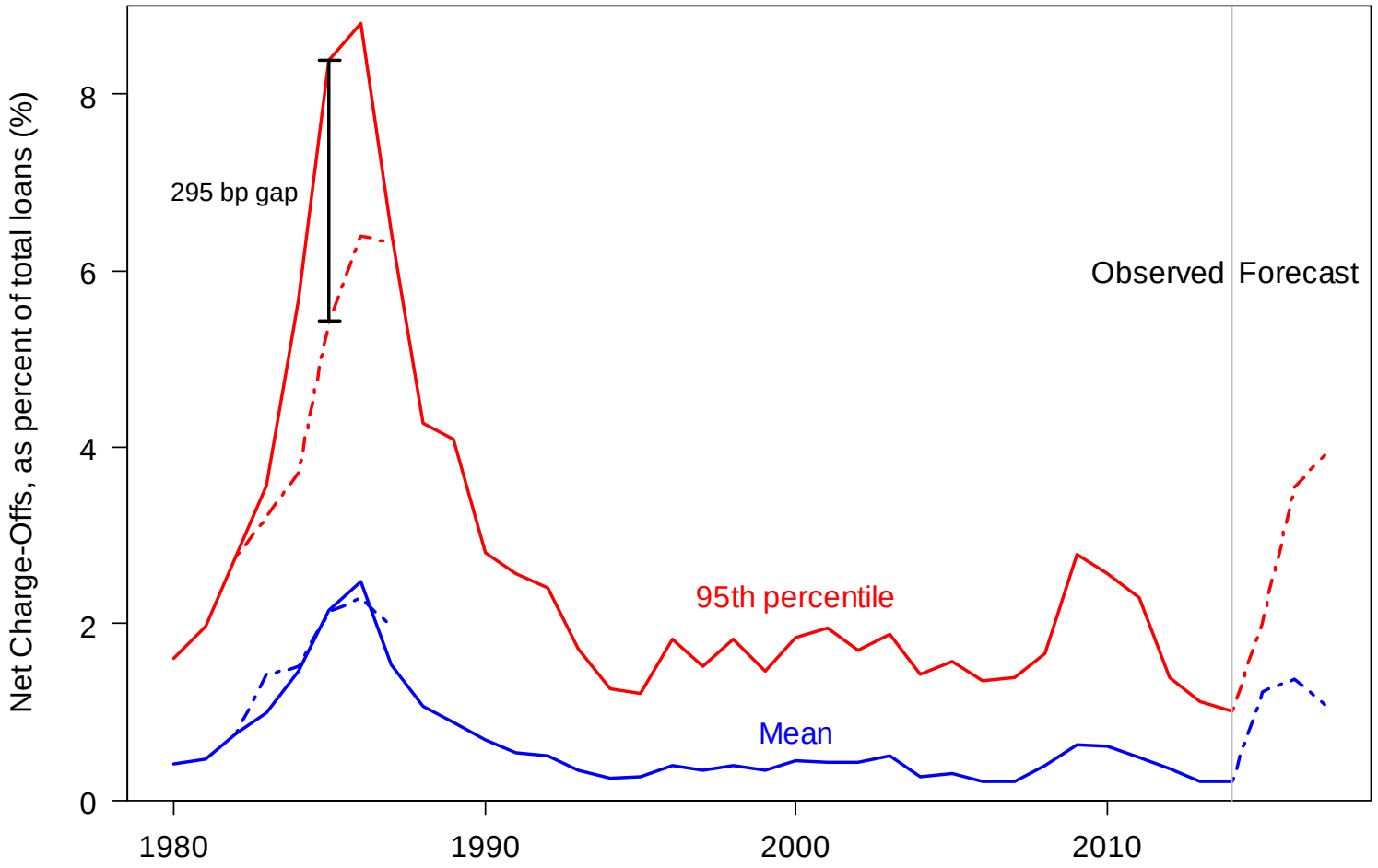
* Text in red indicates the decline in basis points from the relevant baseline.

Stress Test Forecast in Historical Perspective



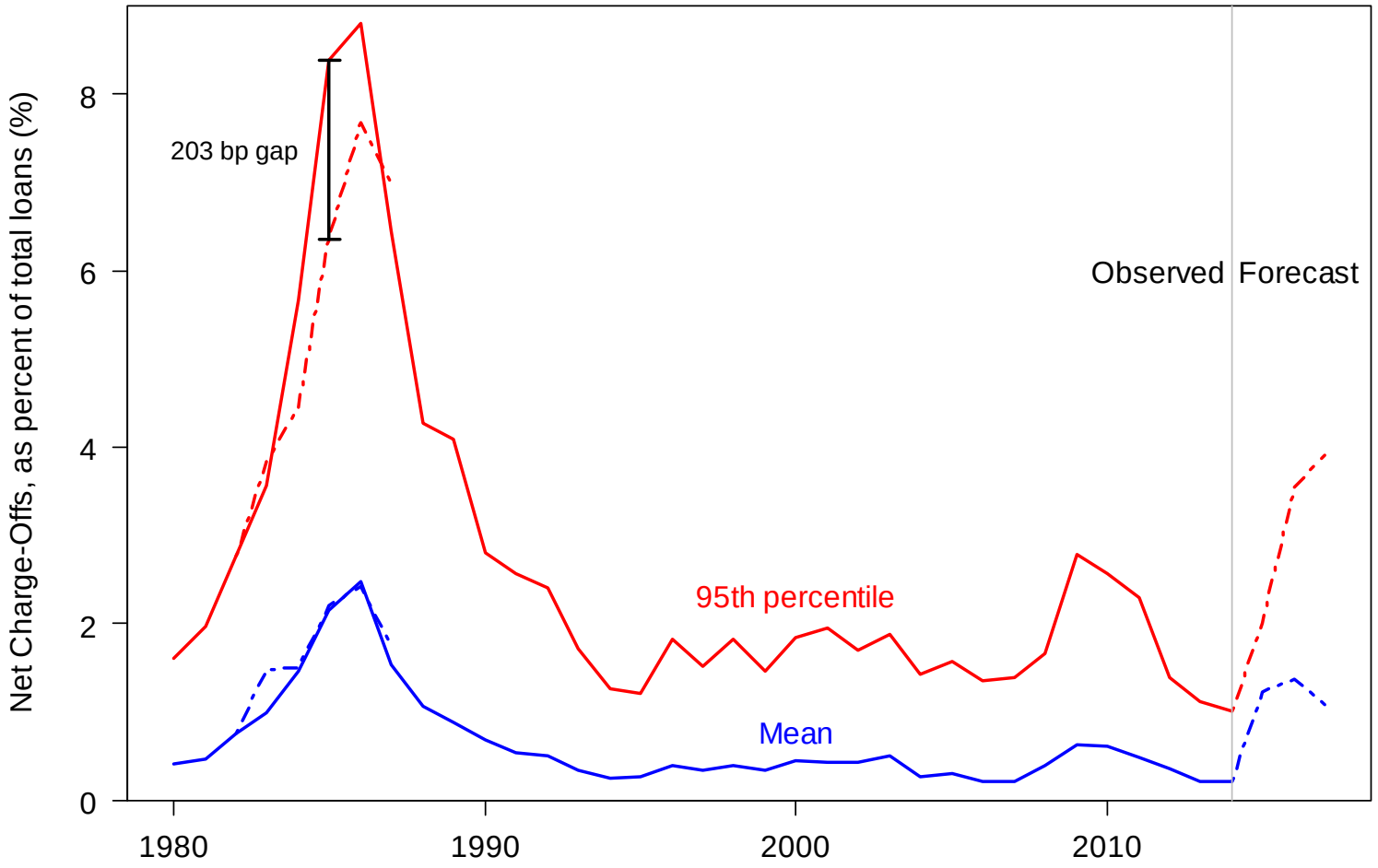
* Severe scenario; mean forecast comes from benchmark model, 95th percentile forecast comes from distributional model

Current Model “Undershoots” Farm Crisis



* Models estimated over 1980 – 2014; Mean back-fit comes from benchmark model, 95th percentile back-fit comes from distributional model

Better If It Uses Data from Crisis Only



* Models estimated over 1980 – 1987; Mean back-fit comes from benchmark model, 95th percentile back-fit comes from distributional model

What We Learn from Back-testing

- Current model does fine for the average bank but not for the most “vulnerable”.
  - But most vulnerable banks are of greatest interest
- “Crisis” model does a better job estimating the most “vulnerable” but still undershoots the peak.
- Very Tentative Conclusions
  - Ag. banks that existed in the early 80’s were more sensitive to ag. land value declines.
  - There are additional factors causing extreme losses that we have not yet identified.
  - Imperfect data we use reduces accuracy of forecast.

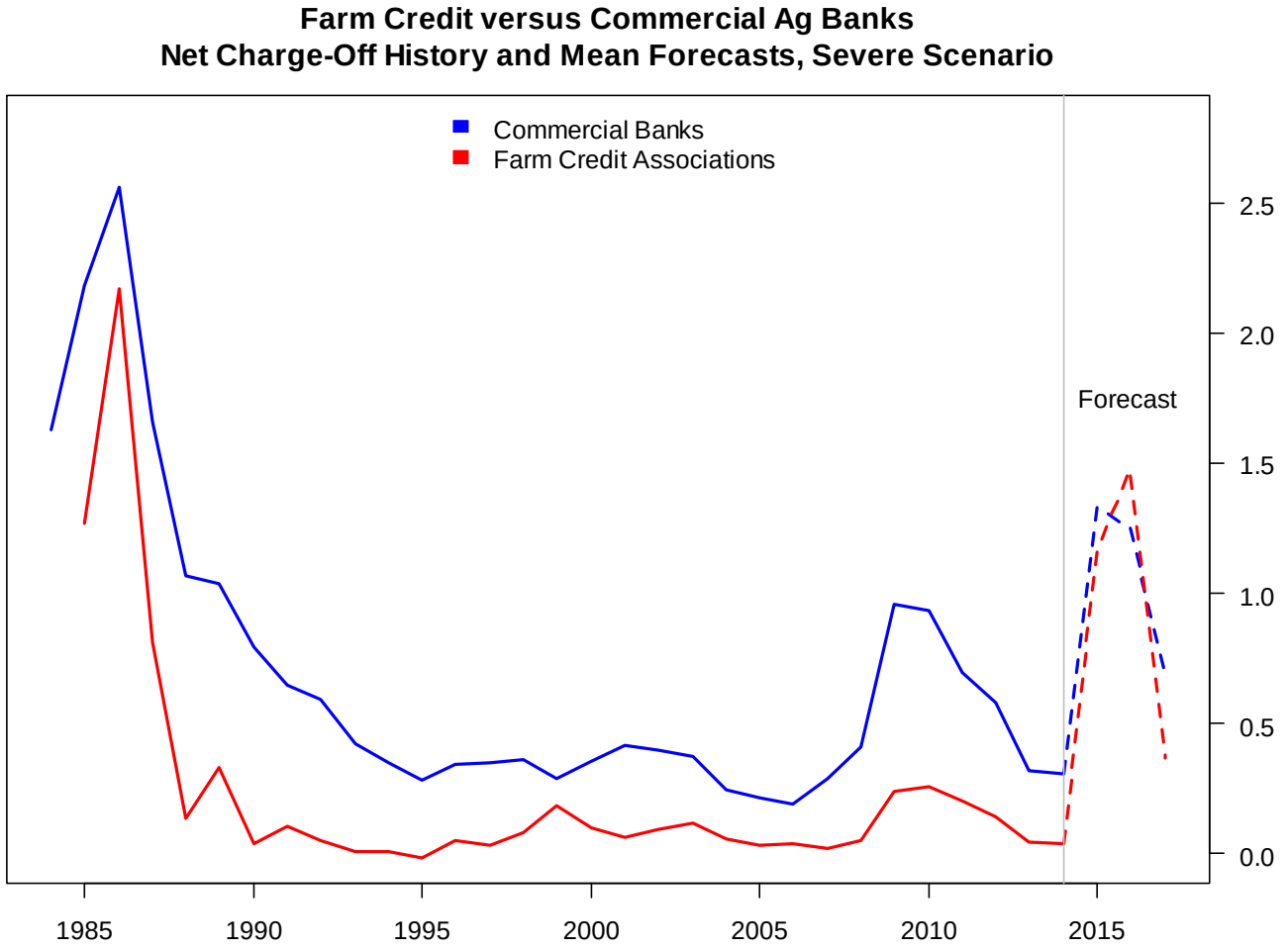
Farm Credit System

- Last year said we would review:
  - How similar are FCS and ag. banks in terms of sensitivity to land value declines? Do loss forecasts give similar results?
  - How does their GSE status impact financial stability in the ag finance world? More broadly?

FCS versus Ag Banks: Loan Losses

- Assembled FCS dataset from 1985 Q1 to 2014 Q4
- Model aggregate losses (system-wide rather than institution-specific)
- Use same variables as benchmark model

FCS versus Ag Banks: Loan Losses



- The loan loss forecasts suggest that commercial banks and farm credit associations, in the aggregate, have similar sensitivity to land value declines.

Implications of Capital Market Funding

- Simple analysis suggest FCS bond yields go up as commodity prices fall.

- The FCS could face funding challenge with rolling over short maturity debt during a bad agricultural economy but the severity of the challenge is uncertain.

Implications of FCS Gov't Sponsorship

- All it takes is one association to fail and the likelihood of government backing is tested.

- A re-assessment of this likelihood means re-pricing in all debt instruments from GSEs (e.g., FHLB)

Questions?