Interest Rate Risk

Managing Through The Uptick in Rates

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Outline

- **Asset Liability Management as Performance Management**
- **Sensitivity and the Sources of Risk**
- **History of Interest Rate Risk Management**
- **How to Effectively Manage Risk – Six Questions**
- **The Difference between Planning and Risk Management**
- **The Importance of Stress Testing**
- **Unpacking your Risk Profile**
- **Focusing on Non Maturity Deposits**

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ALM as Performance Management

- **Coordinated Management of a Bank's Entire Balance Sheet**
    - **Deliver a High Return for Shareholders while**
    - **Managing and Understanding Risk**
        - **Interest Rate Risk**
        - **Liquidity Risk**
        - **Credit Risk (in terms of cash flow or financial risk)**

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ALM as Performance Management

- **Managing Net Interest Margin – at the Margin**
  - **Incremental Production**
  - **What was produced this month?**
    - **Who did it?**
    - **Was it a good thing or a bad thing?**
    - **What was the incremental ROA/ROE?**
  - **What went away this month – what did it cost us?**

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ALM as Performance Management

- Managing Net Interest Margin – at the Margin
  - The Key is Funds Transfer Pricing – Marginal Profitability
  - How do the incremental decisions affect…
    - Product Profitability
    - Organizational Profitability
  - What went away this month – what did it cost us?
- The Impact on the Efficiency Ratio
- The Result is a Higher Return for Shareholders

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What is Sensitivity

The degree to which changes in:

- **interest rates,**
- **foreign exchange rates,**
- **commodity prices, or**
- **equity prices**

can adversely affect a financial institution's earnings or economic capital.

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Primary Sources of Risk

The primary source of market risk arises from the projected cash flows of loans, investments, deposits and borrowings.

In some cases off-balance sheet items are critical.

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Critical Considerations

- Management's ability to identify, measure, monitor, and control market risk;
- The institution's size; the nature and complexity of its activities; and
- The adequacy of its capital and earnings in relation to its level of market risk exposure.

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How the Regulators Classify You

RATING	RESULT
1	GREAT JOB! Everything is under control. There is not a lot of risk and management knows what it is doing.
2	OK, I SUPPOSE. Risk is adequately under control. A slight chance that you can be hurt ("adversely affected"). Management understanding is adequate but not great. Earnings and capital possibly might not support your level of risk.
3	NEEDS IMPROVEMENT! Get some help – management practices are not adequate. There is a good chance that you are going be hurt ("adversely affected). Earnings and capital might not support your level of risk.
4	UNACCEPTABLE! Being "adversely affected" is pretty much a sure thing. Management doesn't understand. Earnings and capital are not sufficient to support the lack of understanding.
5	UH OH! REALLY UNACCEPTABLE! Market risk is an "imminent threat" to viability. Management is less knowledgeable that 4. Earnings and capital "wholly inadequate"!

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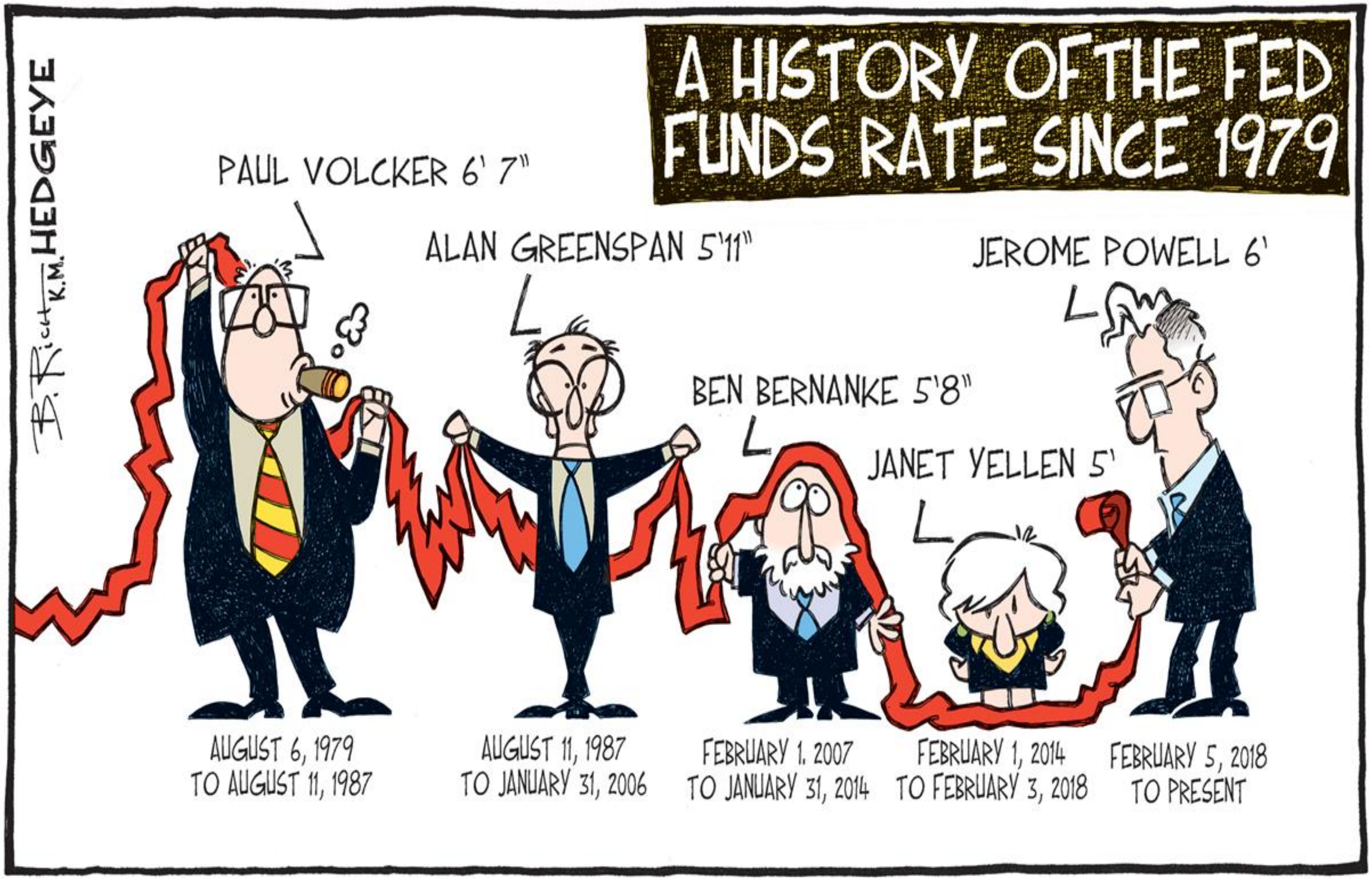

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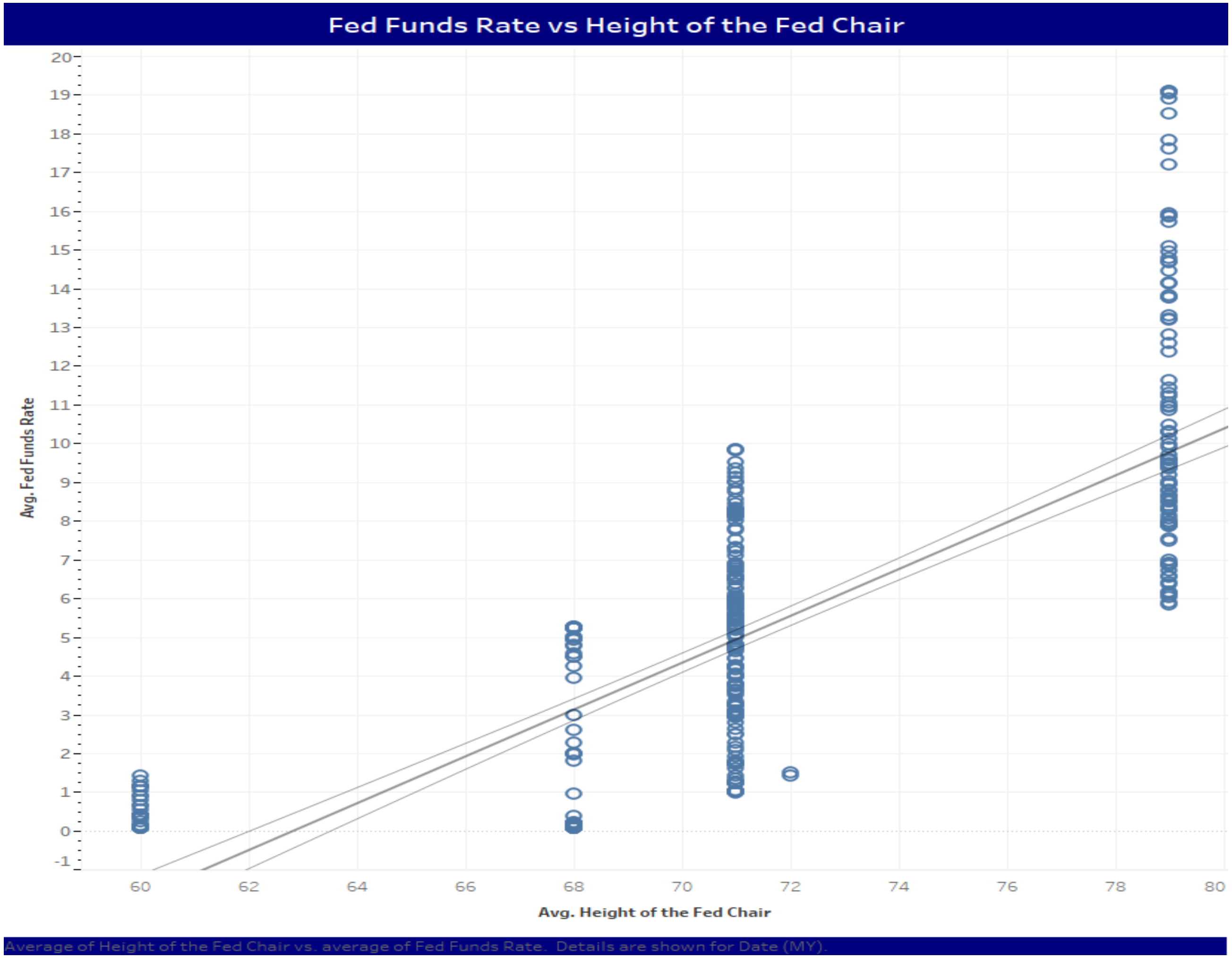
Regression Line with Confidence Bands



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Proposed Nobel Prize Winning Analysis

- Regression Equation Results:
  Average Fed Funds = .60453*Height of the Fed Chair - 37.9873
- R-Square = .584918 (not great) ☹
- P-Value < .0001 (not bad) ☺
- **Prediction: Average Fed Funds Rate for Jay Powell’s Tenure = *5.5389%***

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The History of IRR
January 2010

- **2010 was Pivotal**
- **FFIEC Issues an Advisory on Interest Rate Risk**
- **Interest Rate Risk Prior to the Advisory "IRR, so what, who cares?"**
- ***After the advisory, "You better care, OR ELSE!"***

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What did the FFIEC Advisory Say

- Material weakness in risk management processes or high levels of IRR exposure relative to capital will require corrective action.

- **Such actions could include recommendations or directives to:**
    - ***Raise additional capital***
    - ***Reduce levels of IRR exposure***
    - ***Strengthen IRR management expertise***
    - ***Improve IRR management information and measurement systems***

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What did the FFIEC Say Before 2010

Joint Agency Policy Statement: Interest Rate Risk (1996)

- **Banks that are found to have *high levels of exposure* and/or *weak management practices* will be directed by the agencies to take *corrective action*.**
- **Such actions will include directives to:**
  - ***Raise additional capital,***
  - ***Strengthen management expertise,***
  - ***Improve management information systems,***
  - ***Reduce levels of exposure, or a combination thereof.***

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What Changed in 2010

- **In Principle – Nothing**
- **Practically Speaking – Everything**
- **Now the Board and Management have to: *Understand IRR***
- **The Concern of the Regulators is: *Capital - EVE***

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What Changed in 2012 - FAQ

- In Principle – Nothing
  - Specific guidance on:
  - Model validation,
  - Model assumptions,
  - Levels of Stress and time horizons to consider…
- Clear attempt to resolve problem areas many banks were facing in implementing IRR analysis and modeling.

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What Changed in 2013 - FIL

- In Principle – Nothing
- Clear instruction to "reemphasize" the importance of IRR management program in light of "challenging IRR environment" (read, since rates are about to go up….)
- Directly addressed risk of securities valuation deterioration, and the impact of unrealized losses
- Clear reminder to Board, of its oversight responsibilities

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Understanding & Managing Risk
Six Key Questions

1. **What is my risk?**
2. **What is *causing* my risk?**
3. **What *material assumptions* I am making?**
4. **Where did I get those assumptions?**
5. ***What happens if I am wrong about those assumptions?***
6. ***What is my plan if I am wrong?***

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A Key Distinction

Risk vs. Planning

- **What is Planning?**
  - ***What I <u>think</u> is going to happen.***
  - ***What I <u>want</u> to happen.***
  - ***What I <u>hope</u> will happen.***
  - ***What <u>better</u> happen if I want to keep my job!***

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A Key Distinction
Risk vs. Planning

- **What is Risk?**
  - ***What happens if I am wrong?***
  - ***What causes me to blow up?***
  - ***When does my institution collapse?***

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A Key Distinction
Risk vs. Planning

- **You have to do both.**
  - ***Plan***
  - ***Manage Risk***
- ***Planning is Educated Guessing***
- ***Risk Management is Stress Testing your Guessing***

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Stress vs. Guess

- **What does the Advisory say about Stress Testing?**
  - **Stress Testing**
    - ***should include a sensitivity analysis to help determine which assumptions have the most influence on model output***
    - ***can be used to determine the conditions under which key business assumptions and model parameters break down***

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Stress vs. Guess

- **Stress Testing is the Heart of Risk Management**
- **Stress Testing Answers the Three Questions**
  - ***What happens if I am wrong?***
  - ***What causes me to blow up?***
  - ***When does my institution collapse?***

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How Do You Stress Test?

- **There are Two Ingredients in _every_ Risk Model**
  - ***Facts***
  - ***Assumptions***

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How Do You Stress Test?

- **What are the Facts?**
- **Balance Sheet and Market Facts**
- **Contractual Facts**
  - ***Balance***
  - ***Rate***
  - ***Repricing characteristics***
  - ***Payment characteristics, etc.***

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How Do You Stress Test?

- **What are the Assumptions?**
- **Things that are “made up”**
  - ***Rate scenarios***
  - ***Discount rates***
  - ***Non maturity deposit behavior***
  - ***Prepayments***

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How Do You Stress Test?

- **Assumptions:**
  - **Are elements of the Planning Process *<u>because</u>* they are *made up***
  - ***This means your Risk Profile is NOT a Scientific Fact***
  - ***Your Risk Profile is a <u>Belief System</u>***

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How Do You Stress Test?

- **Determine which Assumptions are Most Critical**
- ***Stress Test Critical Assumptions***

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What do Regulators Want?

- **Management and the Board should be able to:**
  - ***Understand and***
  - ***Explain your Risk***

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What do You Want?

- **The Regulators to *go away***
- ***If you want them to go away, see previous slide.***

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What Should You Do?

- **Demonstrate you Understand**
- ***Cooperate and Graduate***

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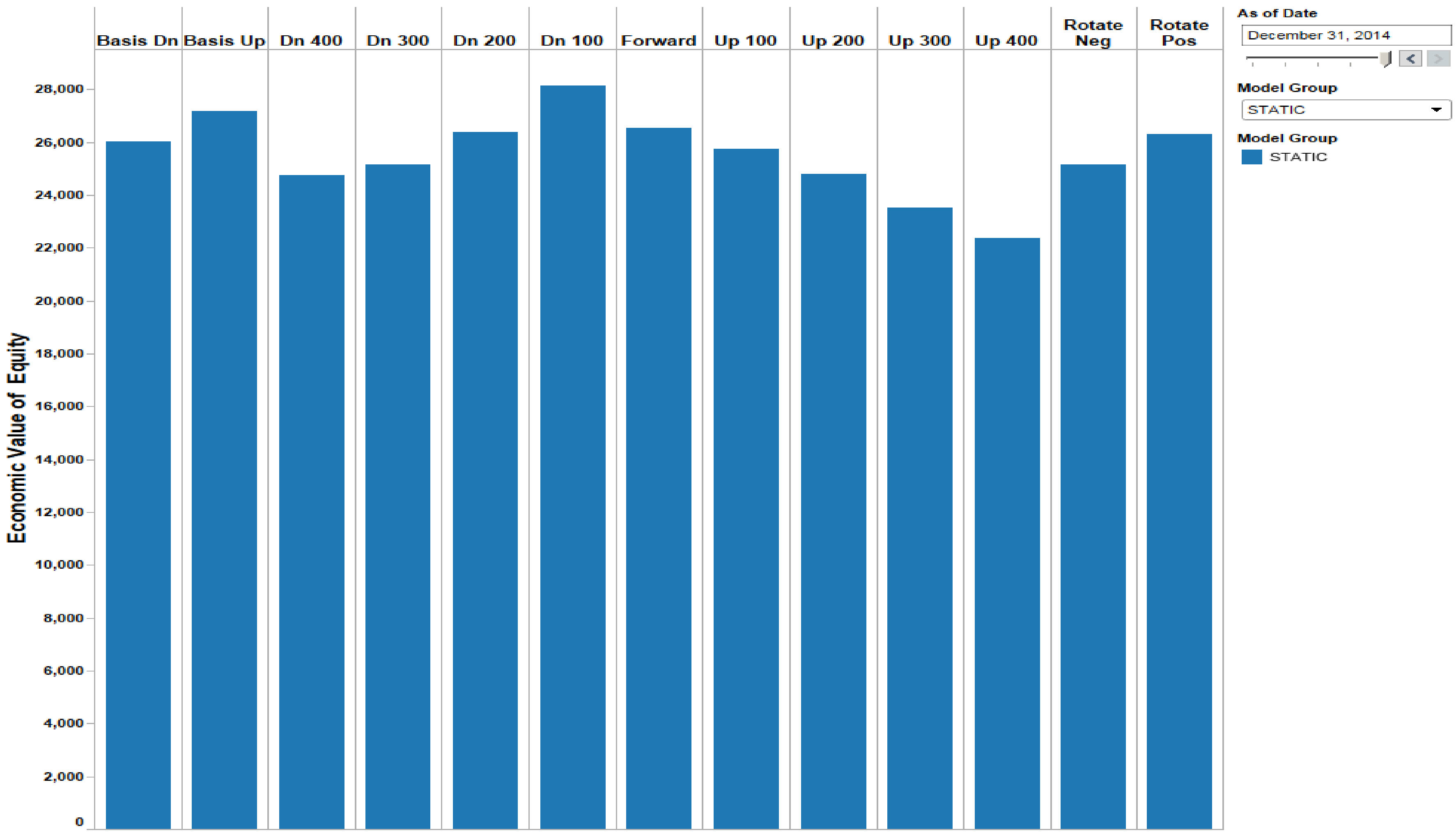
Unpacking Your Risk
EVE Volatility – All Assumptions



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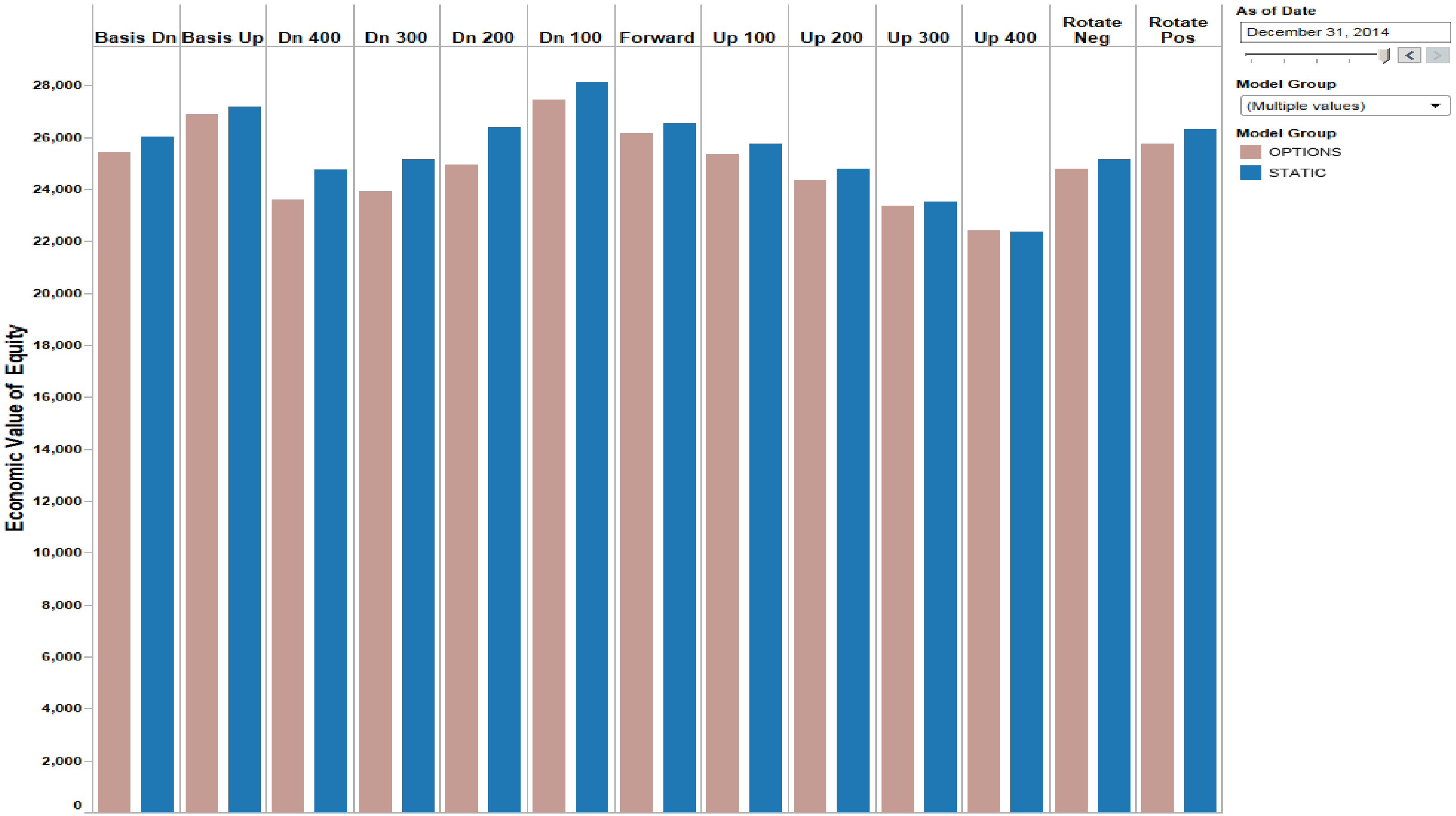
Unpacking Your Risk

EVE Volatility – Removing Options



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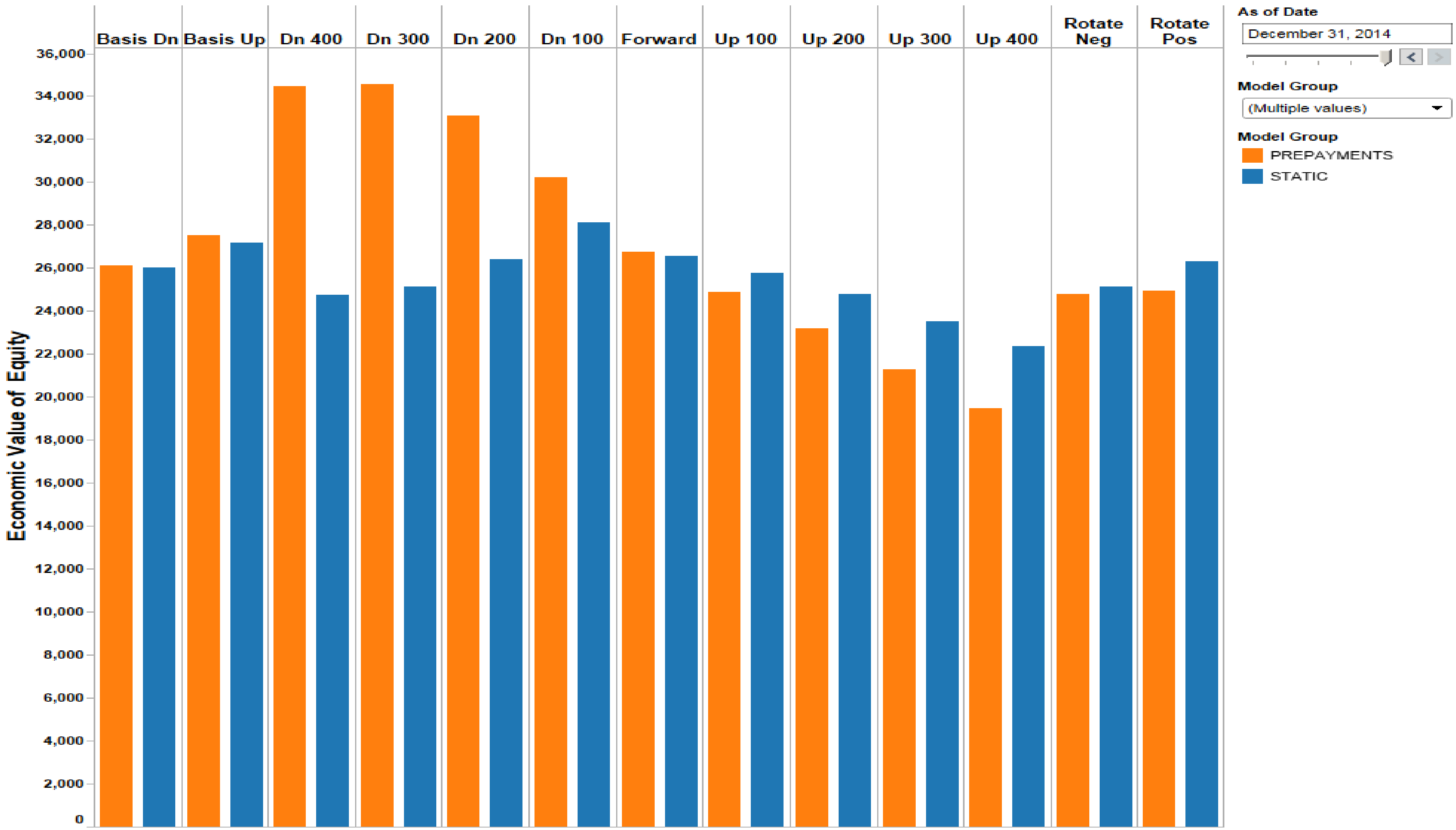
Unpacking Your Risk

EVE Volatility – Removing Prepayments



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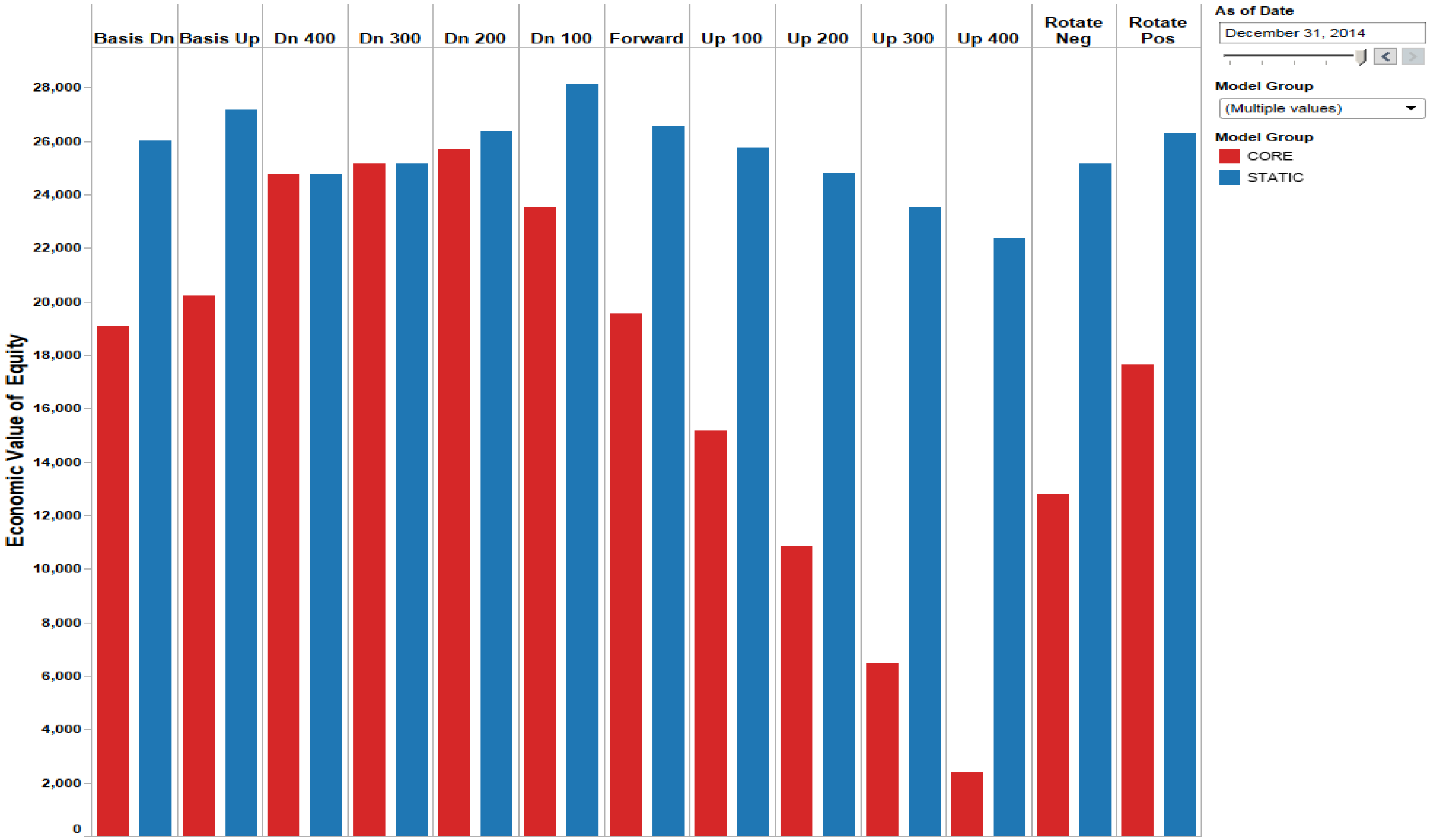
Unpacking Your Risk

EVE Volatility - Removing NMD Assumptions



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Unpacking Your Risk

- **The analysis identifies Non Maturity Deposit assumptions as the *MOST* critical.**
- **Regulators are also *VERY* concerned about these**
  - **You may be extremely liability sensitive and not asset sensitive**
  - ***Rising rates will significantly hurt you***

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What do the Regulators Require?

- **Non Maturity Deposit Studies**
- **Regulators want to make sure:**
  - **Your assumptions have historical validity**
  - ***Based on your history, not someone else's***

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What is Included in an NMD Study?

- **A Non Maturity Deposit Study should include:**
  - ***Estimates of Decay Terms***
  - ***Estimates of Betas***

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How do You Estimate Decay Terms?

- **A Non Maturity Deposit Study should include:**
  - **Estimates of decay terms using multiple methodologies:**
    - ***Average Life***
    - ***Accounts Closed***
    - ***Balance Decay or Declining Balances***
  - ***Decay analysis should track the behavior of individual accounts through time***

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Non Maturity Deposit Decay Terms

Non-Maturity Deposit Analysis

What are the trends in the ages of accounts closed? | What are the weighted average ages of accounts closed? | What percentage of balances decline to zero over time? | What decay rates do balance declines to zero imply? | What do my estimates of decay terms look like? | What are my surge balances - Product Compsition? | Wh... bala... bala...

Account Name	Average Life Decay Term	Declining Balance Decay ..	Percent Closed Decay Term	Wtd Avg Acct Closing Age
Demand Commercial Fixed	150	85	187	17
Demand Retail Fixed	129	58	360	30
MMDA Commercial Premium Variable	82	221	360	25
MMDA Commercial Variable	212	360	360	14
MMDA Retail Premium Variable	98	81	177	16
MMDA Retail Variable	197	110	360	39
NOW Commercial Variable	164	139	360	11
NOW Retail Variable	165	89	360	26
Savings Commercial Variable	72	44	360	12
Savings Retail Variable	147	60	231	43

As of Date

(All)

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What is a Beta?

- **More IRR Jargon!**

- **An estimate of how much you will change your NMD rates when market rates rise or fall.**

- **If the Fed raises rates 100 bps, how much will your Money Market rates go up?**

    - ***50% of the change (a 50% beta)?***
    - ***75% of the change (a 75% beta)?***

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How do You Estimate Betas?

- **Use Statistics!**
- **Perform a regression analysis.**
  - **Analyze your deposit rates as a function of several market indices (Fed Funds, Libor Rates etc.)**
  - ***Determine which index is the best predictor***
  - ***Statistically it is the slope of the line through the data points***

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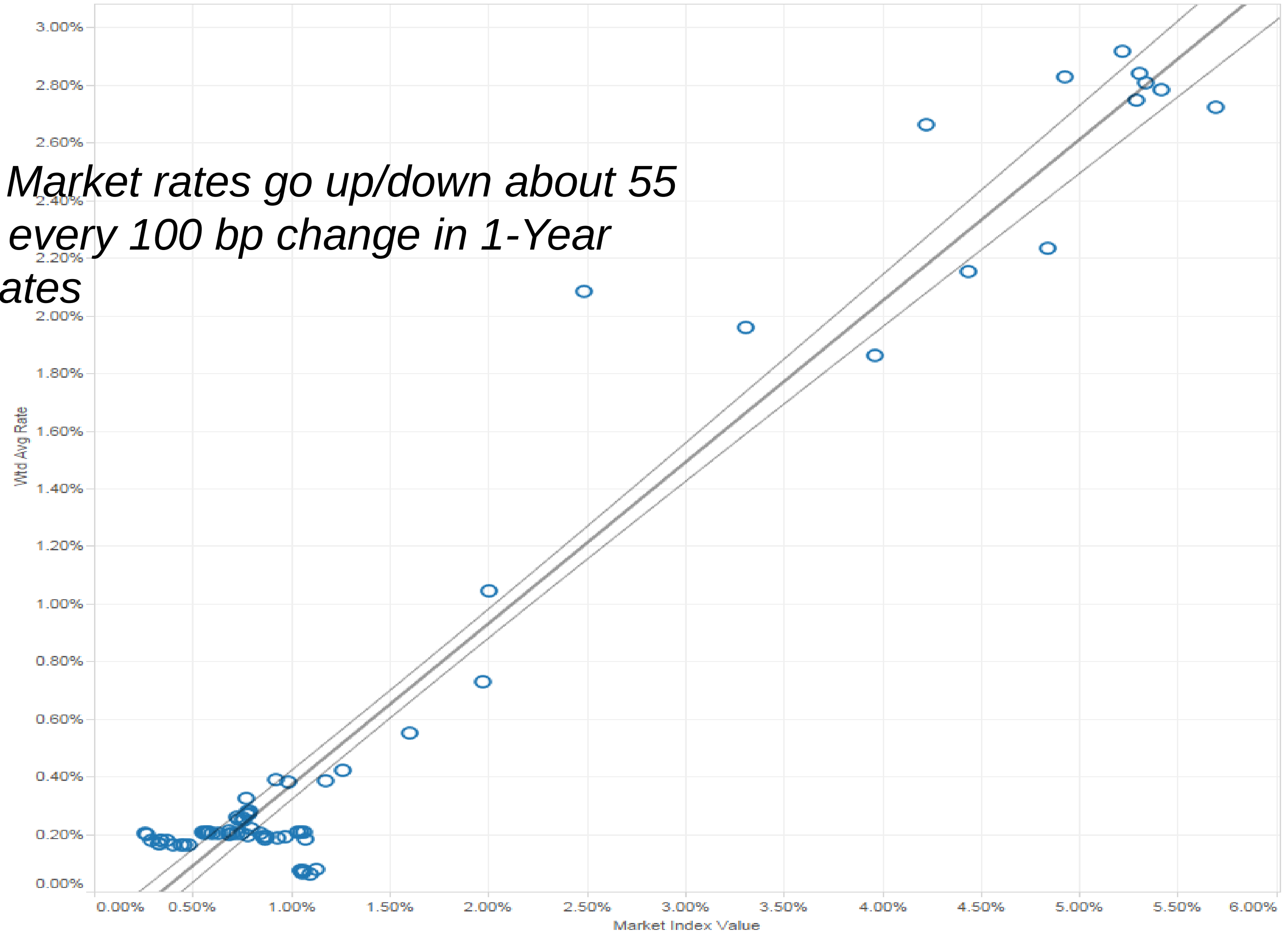
Non Maturity Deposit Betas

Money Market Rates vs. 1-Year Swap Rate

Money Market rates go up/down about 55 bps for every 100 bp change in 1-Year Swap rates



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What else Does an NMD Study Measure?

- **Surge Balances!**
  - **Have balances moved from time deposits into non maturity deposits – will those balances move back?**
  - ***Has the average balance per account grown significantly over time – will that money leave the bank?***

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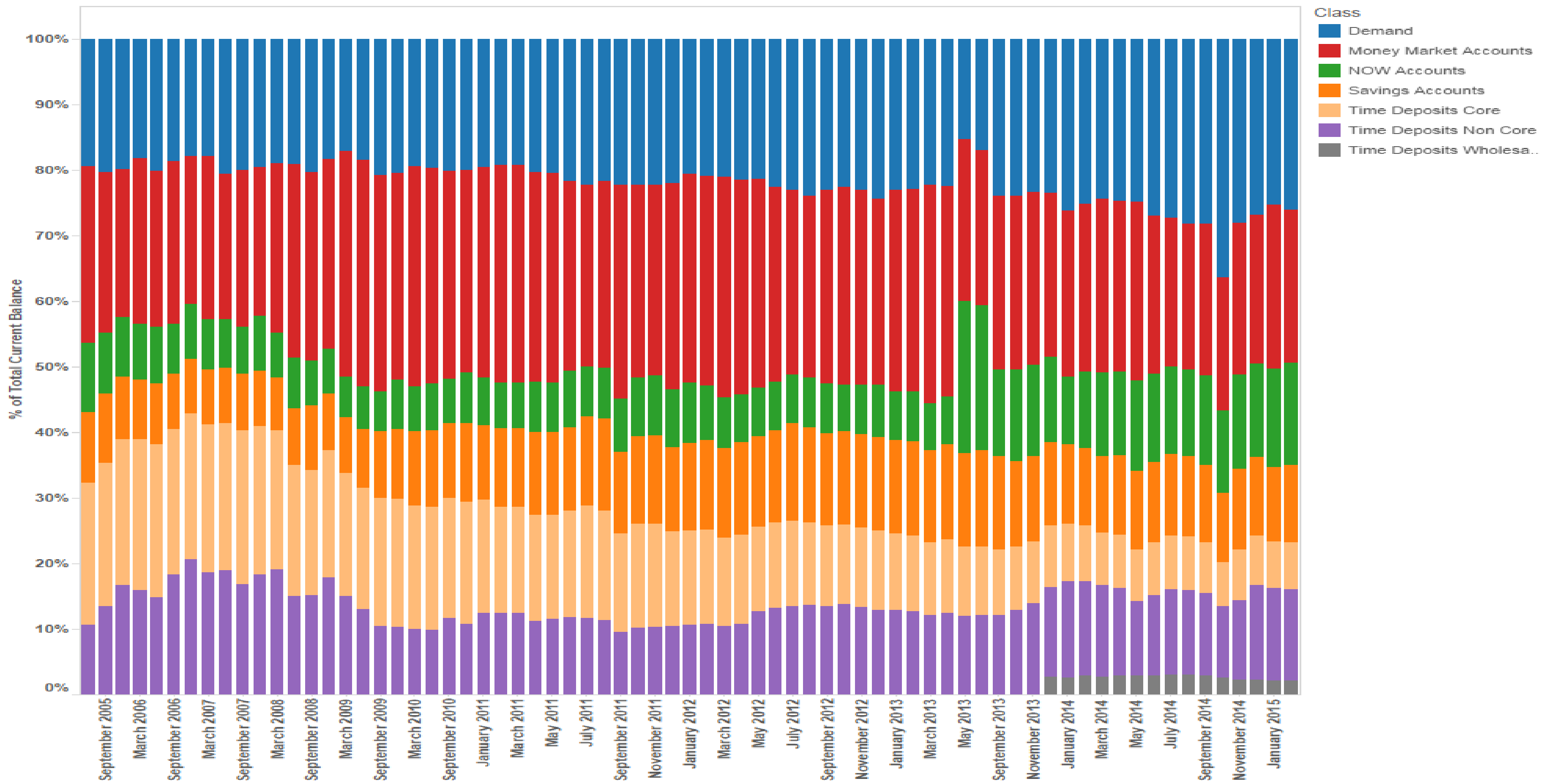
What are the Regulators Worried About? Surge Deposits – Change in Balance Sheet Mix



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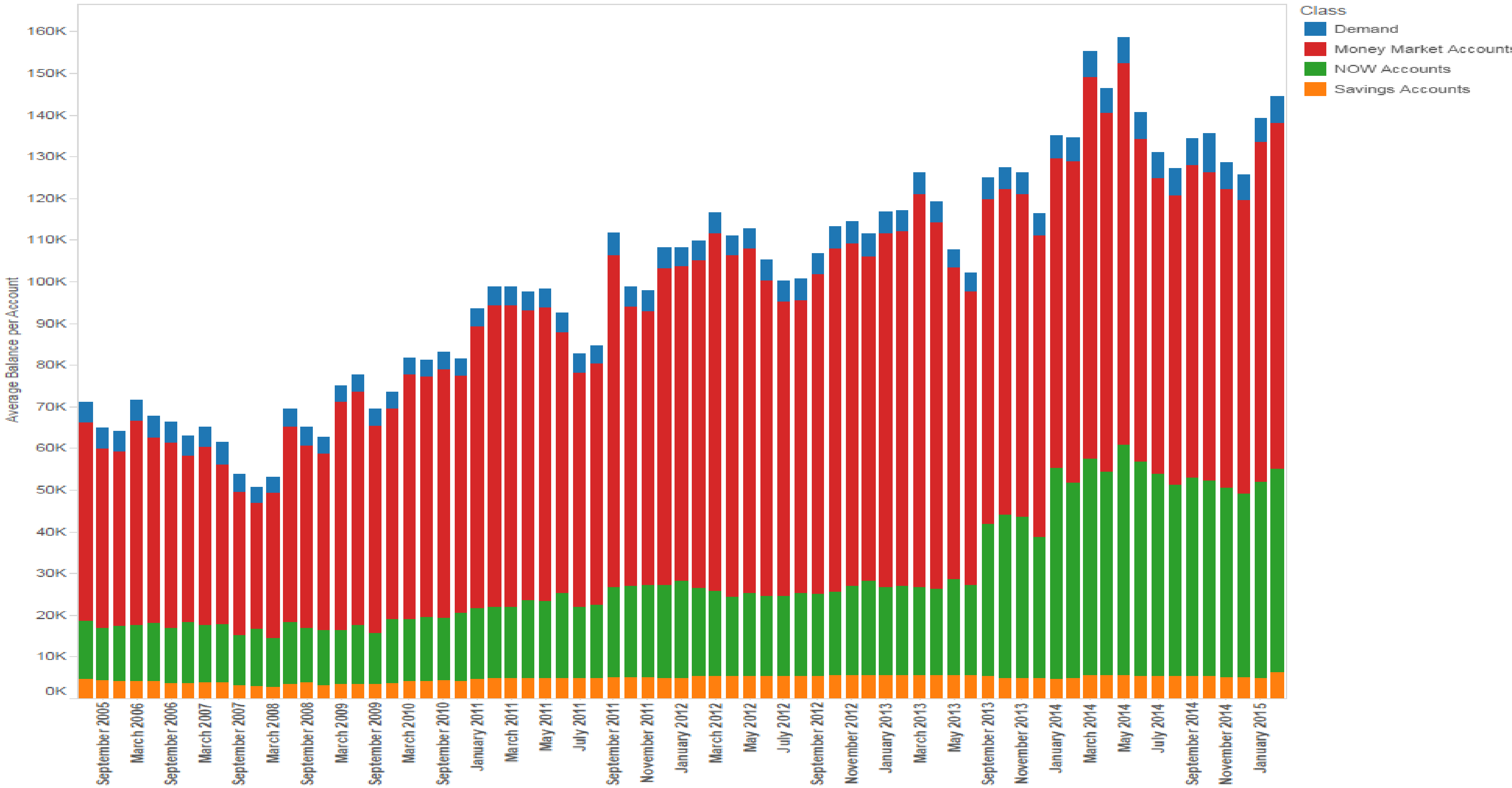
What are the Regulators Worried About? Surge Deposits – Change in Average Balance per Account



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What Next?

- **After you have gone through the trouble of doing an NMD study**

  - ***Don't believe the results!***

    - ***After all they are still just assumptions…***

  - ***Stress test your assumptions.***

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Non Maturity Deposit Stress Test

ACCOUNTS	Global
Choose Scenario	Shock +300

Economic Value of Equity Risk Profiles

Run Account Stress

Run Global Stress

POLICY	-30%

Beta	Global							Current Term	Global	Current BETA	Global
	3	6	12	24	36	48	60	84	120	180	240
10%	-66.75%	-63.17%	-55.89%	-41.69%	-27.75%	-14.38%	-2.35%	16.22%	31.72%	42.24%	44.94%
15%	-66.84%	-63.40%	-56.39%	-42.71%	-29.27%	-16.34%	-4.62%	13.66%	29.29%	40.34%	43.54%
20%	-66.94%	-63.63%	-56.89%	-43.73%	-30.79%	-18.30%	-6.90%	11.09%	26.82%	38.39%	42.09%
25%	-67.03%	-63.86%	-57.39%	-44.75%	-32.32%	-20.26%	-9.20%	8.47%	24.28%	36.34%	40.55%
30%	-67.12%	-64.09%	-57.88%	-45.77%	-33.84%	-22.23%	-11.50%	5.83%	21.69%	34.23%	38.96%
35%	-67.21%	-64.32%	-58.38%	-46.80%	-35.37%	-24.20%	-13.83%	3.13%	19.01%	32.01%	37.26%
40%	-67.31%	-64.55%	-58.88%	-47.82%	-36.89%	-26.18%	-16.17%	0.40%	16.26%	29.68%	35.45%
45%	-67.40%	-64.78%	-59.38%	-48.85%	-38.44%	-28.19%	-18.56%	-2.43%	13.35%	27.15%	33.42%
50%	-67.49%	-65.01%	-59.87%	-49.87%	-39.97%	-30.19%	-20.93%	-5.25%	10.44%	24.59%	31.37%
55%	-67.59%	-65.24%	-60.37%	-50.90%	-41.51%	-32.20%	-23.34%	-8.15%	7.39%	21.84%	29.11%
60%	-67.68%	-65.47%	-60.87%	-51.92%	-43.05%	-34.22%	-25.75%	-11.07%	4.28%	18.98%	26.74%
65%	-67.77%	-65.69%	-61.36%	-52.93%	-44.57%	-36.20%	-28.14%	-13.98%	1.17%	16.10%	24.35%
70%	-67.86%	-65.92%	-61.87%	-53.97%	-46.13%	-38.25%	-30.61%	-17.04%	-2.20%	12.83%	21.51%
75%	-67.96%	-66.15%	-62.36%	-54.98%	-47.64%	-40.25%	-33.02%	-20.03%	-5.49%	9.64%	18.77%
80%	-68.05%	-66.38%	-62.86%	-56.00%	-49.19%	-42.29%	-35.50%	-23.15%	-9.01%	6.11%	15.60%
85%	-68.14%	-66.61%	-63.36%	-57.04%	-50.76%	-44.37%	-38.05%	-26.39%	-12.74%	2.21%	11.98%
90%	-68.23%	-66.84%	-63.85%	-58.05%	-52.27%	-46.37%	-40.48%	-29.50%	-16.31%	-1.51%	8.57%
95%	-68.33%	-67.07%	-64.35%	-59.08%	-53.84%	-48.45%	-43.05%	-32.84%	-20.27%	-5.87%	4.33%
100%	-68.42%	-67.30%	-64.85%	-60.10%	-55.38%	-50.51%	-45.59%	-36.14%	-24.24%	-10.31%	-0.05%

Conclusion

The most important question: Why?

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