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- Audio via Internet, select "Mic & Speakers" under Audio pane.
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"Flight Simulator" for Banking

Learn, Practice and Research the Business and Risk Management for Banks

“Flight Simulator” for Banking

AGENDA

- Bank Structure & Operation
- Bank Simulation
- Discovery & Research

Quick Poll Question

1. Which industry sector most accurately describes the one you work in?

    a. Banking
    b. Non-bank financial services
    c. Government/Regulator
    d. Academic
    e. Other

“Flight Simulator” for Banking

Banks Shouldn’t be Hard to Understand … but They Are

- Four main drivers of performance
- Highly sensitive to external conditions
- Adjustments and valuations cloud the picture
- Complicated but not complex

"Flight Simulator" for Banking

BANKS: Think 'Balance Sheets'
JP Morgan FY End 2014

Cash + Reserves: $0.51 trillion

ASSETS	DEBT
$2.57 Trillion	$2.34 Trillion
	Equity

Deposits: $1.36 trillion

Short Debt: $0.62 trillion

Long Debt: $0.36 trillion

$ 0.23 trillion

Note: Debt is Short-Term; JPM has more Cash / Reserves than "required"

Quick Poll Question

2. Why do you believe banks rely so strongly on short-term and deposit funding rather than long-term debt?

    a. Banks consider deposits as essentially long-term, rather than short-term, debt
    b. Issuing deposits and short-term debt is cheaper (lower yield to pay) than long-term debt
    c. Central Bank lending facilities mitigate the risk of mis-matched assets and liabilities

"Flight Simulator" for Banking

Banking Risk

BANKS: Fail Frequently – RISKY !

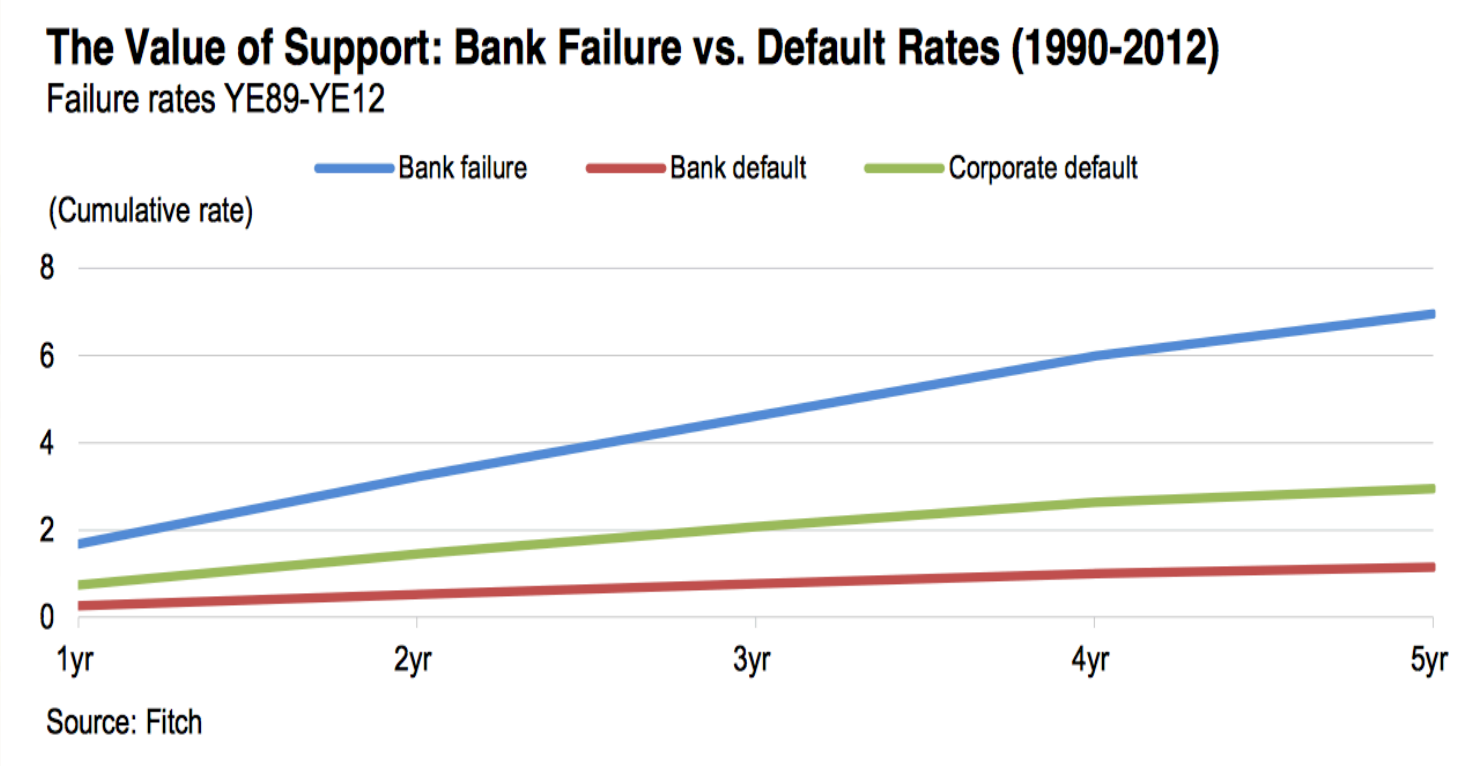
Company/Bank	Total Liabilities ($ billion)	Equity ($ billion)	L/E	Date of 10-K
Citigroup	1,670	204	8.19	Dec-13
JP Morgan Chase	2,160	211	10.2	Dec-13
Goldman Sachs	833	78.5	10.6	Dec-13
Google	23.6	87.3	0.270	Dec-13
Intel	34.1	58.3	0.585	Dec-13
Procter & Gamble	70.6	68.1	1.04	Jun-13
Merck	53.3	49.8	1.07	Dec-13
Walmart	122	76.0	1.61	Jan-14
Target	28.3	16.2	1.75	Jan-14
JC Penney	8.71	3.09	2.82	Jan-14
Amazon	30.4	9.75	3.12	Dec-13
Kellogg Company	11.9	3.55	3.35	Dec-13
General Electric	520	131	3.97	Dec-13
United Parcel Service	29.7	6.47	4.59	Dec-13
Deere & Company	49.3	10.3	4.79	Oct-13
Campbell Soup	7.11	1.22	5.83	Jul-13
Clorox	4.17	0.146	28.6	Jun-13
American Airlines	45.0	(2.73)	NM	Dec-13
United Continental	33.8	2.98	11.3	Dec-13

Bank Leverage is Much Higher Than That of Other Corporate Entities

"Flight Simulator" for Banking

Banking Risk

BANKS: Fail Frequently – RISKY !



Bank Failure Rate is DEFAULT Rate in the Absence of Government Rescue/Bailout

"Flight Simulator" for Banking

Banking Risk

BANKS: Fail Frequently – RISKY !

Fitch Global Corporate Finance Average Cumulative Default Rates: 1990–2012

(%)	One-Year	Two-Year	Three-Year	Four-Year	Five-Year	10-Year
AAA	0.00	0.00	0.00	0.00	0.00	0.00
AA	0.03	0.03	0.07	0.13	0.19	0.19
A	0.08	0.24	0.41	0.57	0.76	1.93
BBB	0.20	0.68	1.23	1.84	2.45	4.73
BB	1.05	2.80	4.46	5.97	6.91	11.55
B	2.02	4.79	7.24	9.50	10.52	11.60
CCC to C	24.88	31.87	35.59	38.32	36.84	43.75
Investment Grade	0.12	0.36	0.64	0.92	1.22	2.29
Speculative Grade	2.99	5.53	7.66	9.51	10.25	14.14
All Corporates	0.74	1.45	2.08	2.63	2.95	4.14

Source: Fitch.

(Bank "Failure Rating" is
Below Investment Grade)

Quick Poll Question

3. Which one of the following statements most accurately describes your opinion of banking risk?

    a. Market forces should determine how much leverage banks have
    b. Banks need high leverage in order to be efficient
    c. Banking can safely operate with higher leverage than other industry sectors

“Flight Simulator” for Banking

Simulation as New Teaching / Communication

- How do we teach?
  - Write articles and books
  - Give lectures and create videos
  - *Provide do-it-yourself experience*
- Idea struck me at lecture in October 2014
  - Create a game like Monopoly
  - Player must respond to *central* bank acts
  - Evolved into a Simulation

“Flight Simulator” for Banking

Simulation Outline

- The “CEO” chooses Assets, Debt, Equity
- Assets (loans) have stochastic performance
- Avoid insolvency and “bank runs”
- Annual regulator “stress tests”
- Maximize equity return (Sharpe Ratio)

Quick Poll Question

4. What's your first reaction? Can a "game" or "simulation" help teach the business and risk of banking?
    a. Yes, possibly to students and young professionals
    b. No, real world banking is too complex
    c. Yes, if engaging and realistic, it could help bankers at all levels of experience

Bank Simulation

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Maxwell Banking Simulator !

J. M. W. Turner, *Burning of the Houses of Parliament*, 1834.

The fire was a "monetary omen" since it began with the deliberate incineration of *tally sticks* - an earlier form of money in England. One lesson is that monetary errors can have large consequences!

Go to Bank Simulator !

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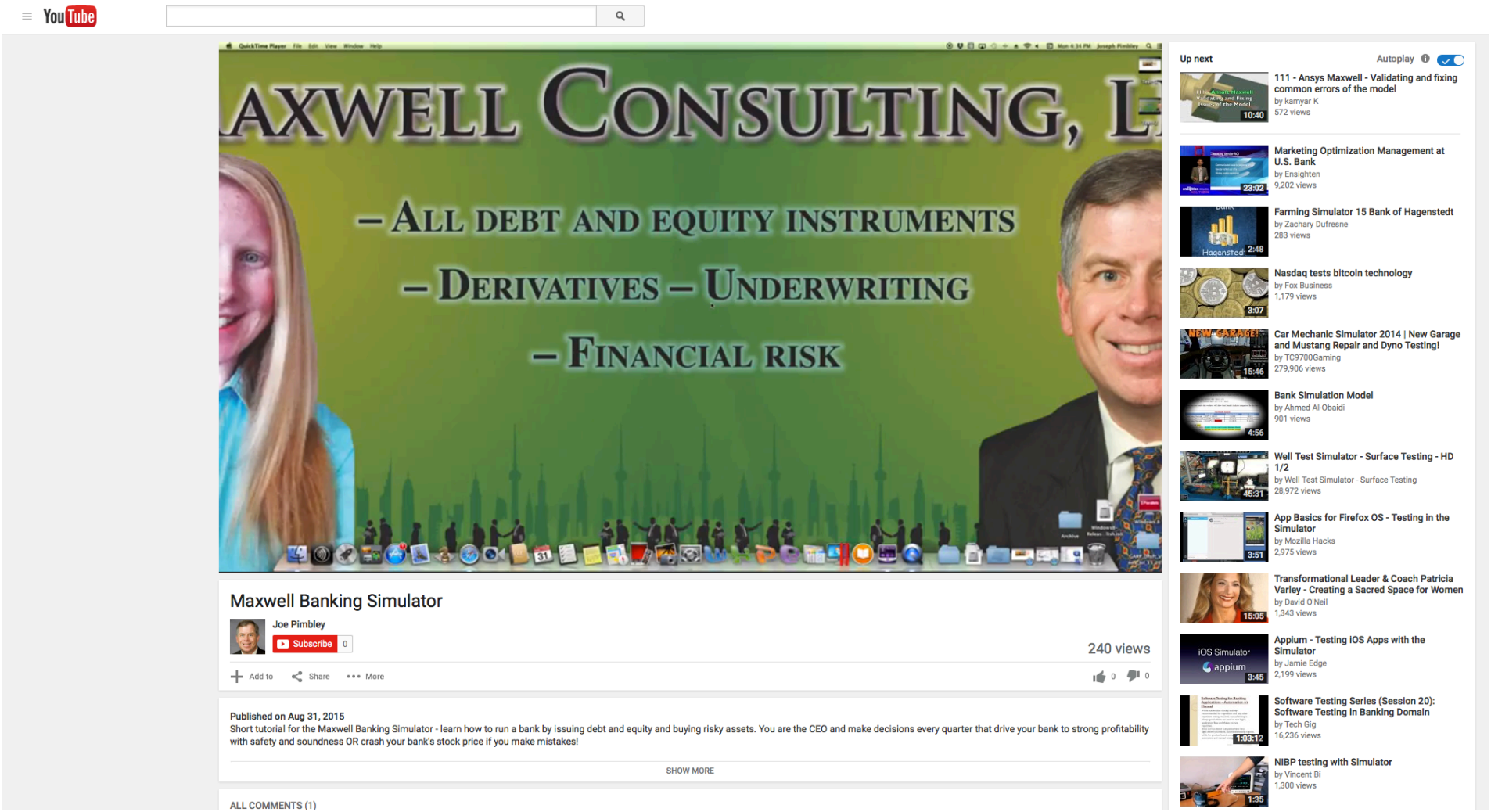
Bank Simulation



In this Simulation, you are a Bank CEO. You will guide your bank with quarterly decisions to:

- **Buy and Sell Risky Assets;**
- **Issue Deposits;**
- **Issue, Redeem, and Repurchase Debt;**
- **Issue and Repurchase Equity;**
- **Pay Dividends;**
- **Satisfy Reserve and Capital Requirements; and**
- **React to Runs on the Bank and Central Bank Actions.**

Your Initial Balance Sheet is Simple: $100 Million of Equity All Held in Cash/Reserves. Most Likely You Will Want to Borrow During the Early Quarters by Adding Debt and Deposits to Acquire Risky Assets (such as Mortgages and Loans). Then Monitor the Income Statement and Balance Sheet to Achieve Profitability with LOW VOLATILITY. (Both Level and Volatility of Net Income Impact the Stock Price.) Credit Risk Losses May Force You to De-Leverage to Avoid Insolvency!

User Input

Quarterly Periods	20
Reserve Requirement	10.0%
Minimum Equity / Assets	3.0%
Fair Value OCI Fraction	100%
Interest on Reserves	0.25%

Risk Management

○ **Weak** ◉ **Moderate** ○ **Strong**

BEGIN !

Brief Instructions

Bank Simulation

Available Cash / Reserves ($ million)

100.00

Next Quarter

Click "Next Quarter" After Specifying Desired Asset, Debt, and Equity Transactions

Run Out Future Quarters?

YES NO

INITIAL

Equity / Assets

Reserve Ratio

Debt

	Amount ($ mm)	Maturity (Years)	Coupon (pa)
Initial Deposits	0.00		0.50%
Initial Debt (Three Maturities)	0.00	0.25	0.50%
	0.00	5.00	2.00%
	0.00	10.00	2.70%

See Debt Yields

Risky Assets

	Current ($ mm)	Buy/Sell ($ mm)	Maturity (Years)	Coupon (pa)
Sovereign Debt	0.00	0.00	10.00	2.03%
IG Corporate Debt	0.00	0.00	10.00	3.90%
NIG Corporate Debt	0.00	0.00	10.00	7.10%
Residential Mortgages	0.00	0.00	10.00	5.00%
Commercial Mortgages	0.00	0.00	10.00	6.15%

See Asset Properties and Yields

Equity

Initial Equity ($ mm)	100.00
Equity Dividend Rate ($ per share per year)	0.00

Asset / Debt Maturity Profiles

Income Stmt / Balance Sheet

Brief Instructions

Performance

Total Return (Invested)	0
Total Return (Annualized)	0
Sharpe Ratio	0
Percentile Ranking	0

Start Again !

There are five Risky Asset types as shown. Enter the amount to buy (positive) or sell (negative) of each type. Enter the desired maturity for asset purchases (not needed for asset sales). You cannot change the Current or Coupon values.

The Coupon entry boxes will change color when spreads have tightened (green) or widened (magenta) by more than 10% in the past quarter.

The "Asset Properties and Yields" button shows helpful information during Simulation.

Risky Assets

	Current ($ mm)	Buy/Sell ($ mm)	Maturity (Years)	Coupon (pa)
Sovereign Debt	499.85	0.00	10.00	2.03%
IG Corporate Debt	98.96	0.00	10.00	4.08%
NIG Corporate Debt	396.19	0.00	10.00	5.35%
Residential Mortgages	199.82	0.00	10.00	4.50%
Commercial Mortgages	398.15	0.00	10.00	6.51%

See Asset Properties and Yields

Back to Manage Page | Previous Instruction Page | Next Instruction Page

Explanations for:

Bank Runs | Stress Tests | Insolvency | Risk Management | Reserve Requirement

Risk Management

What is the issue?

The extent and quality of Risk Management (RM) *and* the Risk Culture of a Bank are critically important. While it is easy to see the *cost* of RM as an expense on the Income Statement, there's no obvious place to see the *benefit* in the financial statements. For this and other reasons, different Banks make different choices for RM.

What are the choices?

The Bank may choose Weak, Moderate, or Strong RM. The quarterly costs, respectively, are $250,000, 0.125% of Risky Assets, and 0.25% of Risky Assets with floors of $250,000 and caps of $125 million and $250 million for Moderate and Strong. With Moderate RM, spread volatility is 90% of its full value and Vasicek quarterly tail losses are limited to 3x the expected value. For Strong RM, spread volatility is 80% of full value and tail losses are limited to 2.5x the expected value.

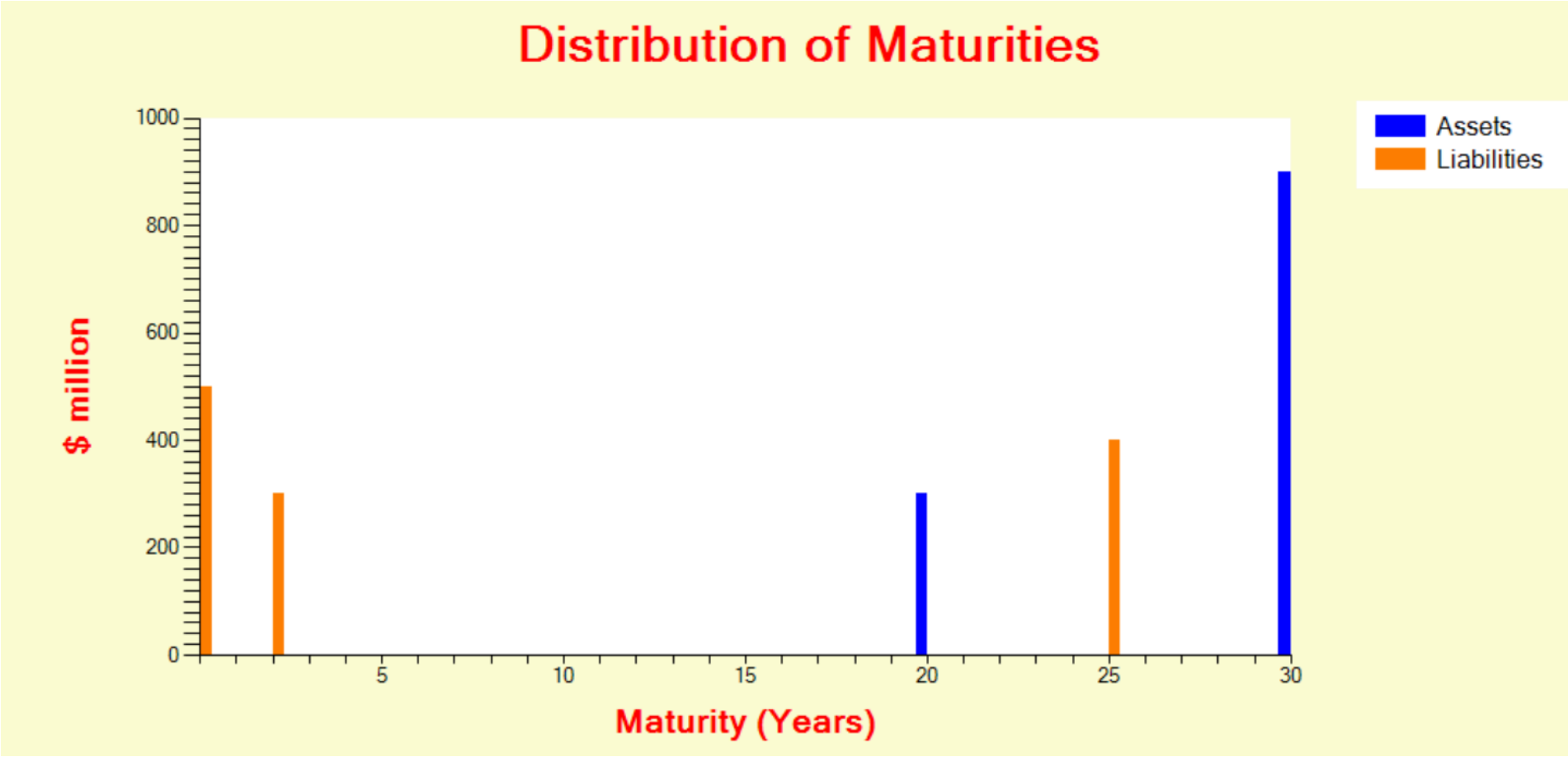
What's the best choice?

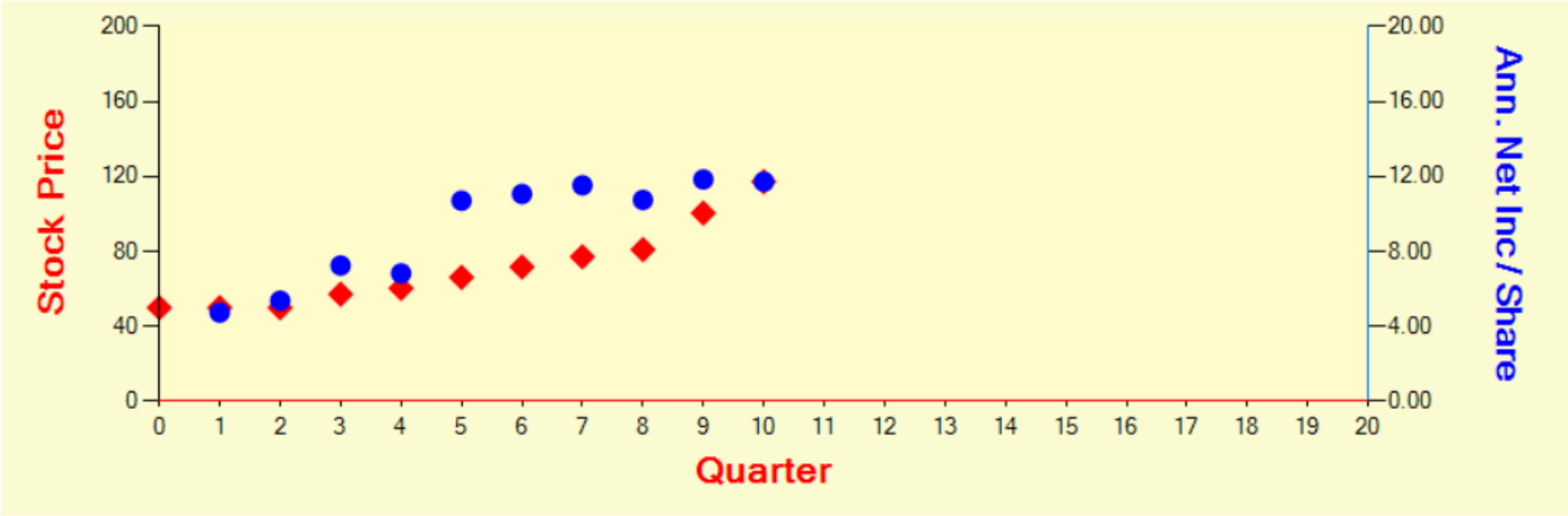
It's not clear! It's a trade-off. The CEO can take the low cost of Weak RM with its exposure to full spread volatility and tail losses. Or the CEO can pay more for better RM while mitigating risk. One cannot prove in just one Simulated Bank life cycle which is the better choice.

Return to Instruction Page

(Values in Millions)	Q 4	Q 3	Q 2	Q 1	Initial
Cash / Reserves	$228.29	$219.42	$311.43	$305.08	$100.00
Deferred Tax Asset	$0.00	$0.00	$0.00	$0.00	$0.00
Sovereign Debt	$0.00	$0.00	$0.00	$0.00	$0.00
IG Corp Debt	$499.44	$498.97	$500.00	$0.00	$0.00
NIG Corp Debt	$470.57	$496.19	$484.84	$484.77	$500.00
Resi Mortgages	$615.09	$566.59	$579.82	$600.00	$0.00
Com'l Mortgages	$393.92	$400.00	$0.00	$0.00	$0.00
Total Assets	$2,207.32	$2,181.18	$1,876.09	$1,389.85	$600.00
Deposits	$1,400.00	$1,400.00	$1,400.00	$900.00	$500.00
Debt - Current	$0.00	$0.00	$0.00	$0.00	$0.00
Debt - LT (> 1 Year)	$700.00	$700.00	$400.00	$400.00	$0.00
Total Liabilities	$2,100.00	$2,100.00	$1,800.00	$1,300.00	$500.00
Equity @ Book	$100.00	$100.00	$100.00	$100.00	$100.00
Retained Earnings	$18.87	$12.12	$6.71	$3.18	$0.00
Accumulated OCI	($11.55)	($30.94)	($30.61)	($13.33)	$0.00
Total Equity	$107.32	$81.18	$76.09	$89.85	$100.00
Stock Price / Share	$66.98	$57.28	$50.00	$50.00	$50.00
Number Shares (million)	2.00	2.00	2.00	2.00	2.00

(Values in Millions)	Q 4	Q 3	Q 2	Q 1
Interest Received	$26.65	$21.83	$17.06	$8.94
Interest Paid	$9.54	$7.34	$6.12	$0.98
Net Interest	$17.11	$14.49	$10.94	$7.96
Asset & Risk Mgmt Expenses	$4.62	$3.59	$2.69	$1.17
Change in Asset Market Value	($0.01)	($0.07)	($0.04)	$0.00
Realized Gain/Loss in Asset Sales/Defaults	($2.11)	($2.51)	($2.79)	($1.90)
Tax Paid	$3.63	$2.91	$1.90	$1.71
Net Income	$6.75	$5.41	$3.53	$3.18
Dividends Paid	$0.00	$0.00	$0.00	$0.00


Distribution of Maturities
$ million
1000
800
600
400
200
0
5
10
15
20
25
30
Maturity (Years)
Assets
Liabilities



Performance

Total Return (Invested)	-26.6%
Total Return (Annualized)	-6.1%
Sharpe Ratio	-0.23
Percentile Ranking	42.3%

Start Again !

“Flight Simulator” for Banking

Ideas

- Optimal Strategy?
- Simulator for changes to stress tests
- Study excess reserves and role of IOER
- Research for bank default probability due to:
  - Accounting treatment
  - Leverage and leverage requirement
  - Reserve requirement
  - Volcker Rule

Quick Poll Question

5. I would recommend ….

   a. …. this Simulator for teaching banking
   b. …. this Simulator to regulators to help assess some rules and stress tests
   c. …. that the developers add more complexity to the Simulator

Questions for the Presenter?

Send them via the Question Pane in the webinar utility panel on the right hand side of your screen

“Flight Simulator” for Banking

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