

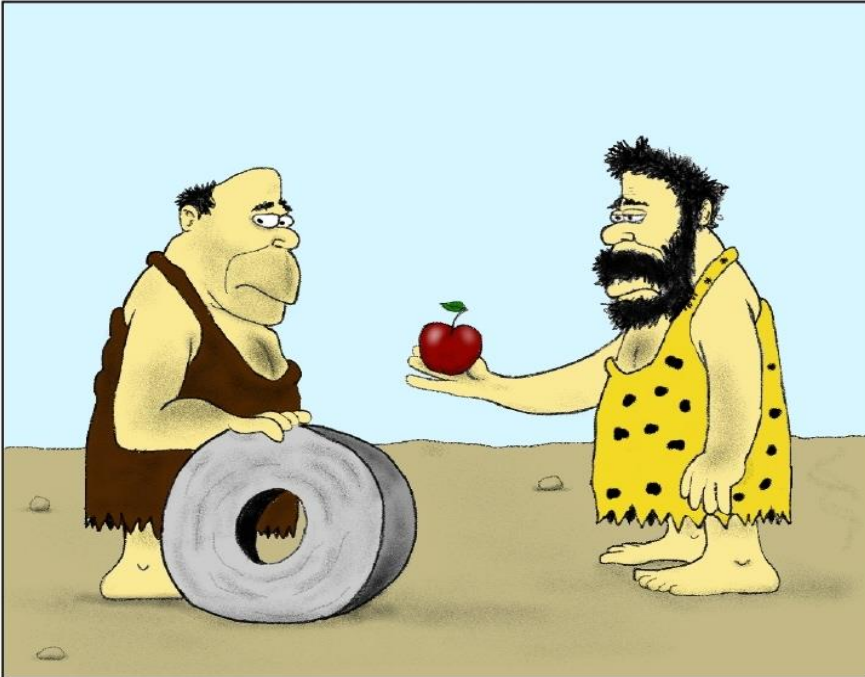


ZM FINANCIAL SYSTEMS

The Future of Asset and Liability Management

Jerry Clark, SVP Sales and Marketing





OH YEAH, THIS
BABY ROLL
GREAT!

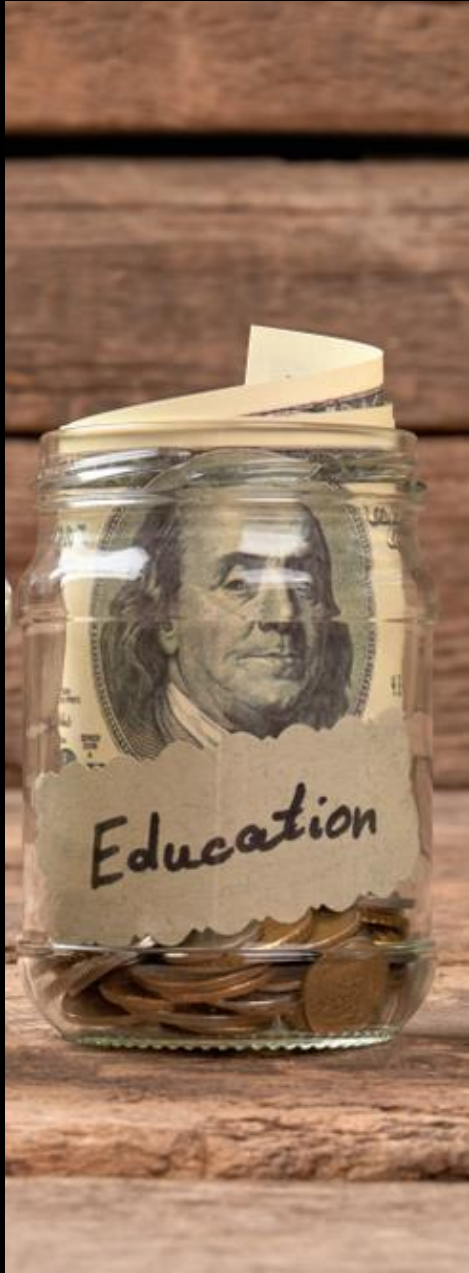


USED WHEEL SALESMEN.

HERE'S YOUR WHEEL - NOW, WOULD YOU BE INTERESTED IN PURCHASING A SERVICE CONTRACT?



Baloo





Travel

Education

New CAR



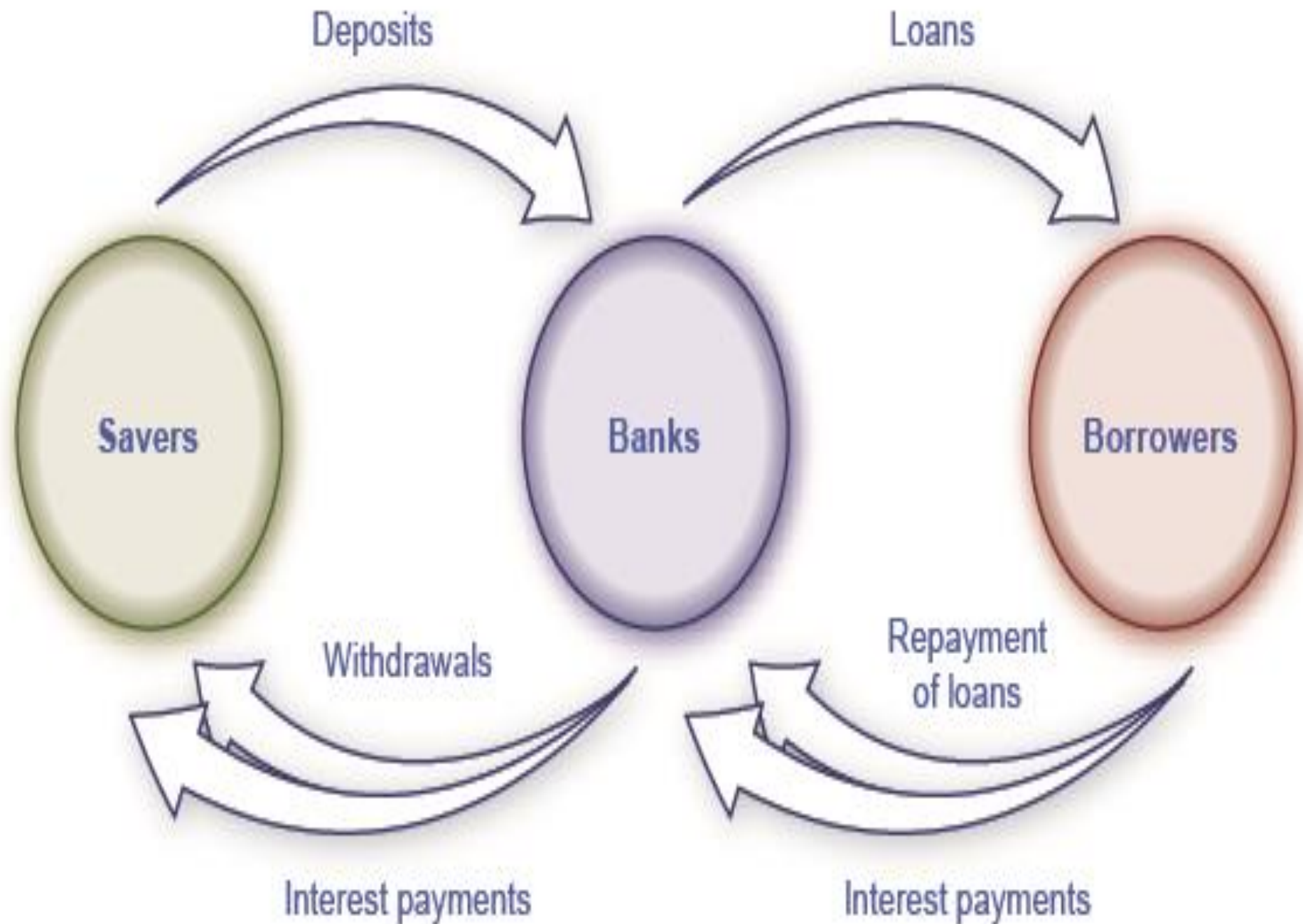
Sammy: A little over two million dollars. Per split.





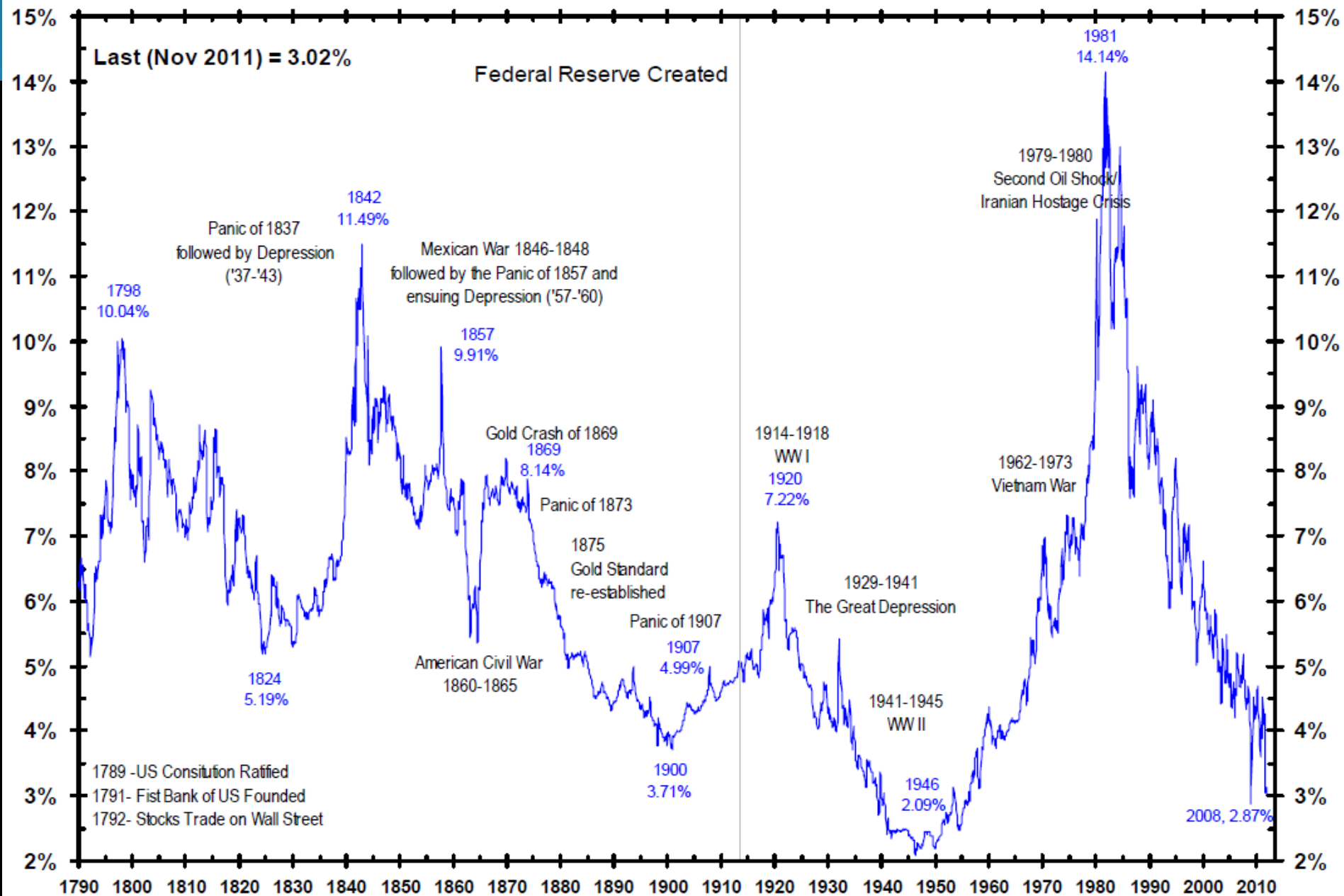
© 2012 Pearson Education, Inc.





	2017	2018	2019	2020
Assets				
Loans		\$20	\$20	\$20
Investments	\$25		\$25	
Cash	\$50			
Liabilities				
Savings	\$100			
CD		\$50		

Long Term Interest Rates Back to 1790



Revolution
Inflation
Expansion
Land Speculation
Defaults

Boom/Bust
Stock Market Crashes
Depression, Drought
Risky Investments
Embezzlement
Run on Banks/Liquidity
Credit Crisis/Defaults
S&L Crisis/Rate Risk

Boom/Bust
Land Speculation
Civil War
Railroad Speculation
Fires, Droughts
Gold Std Questioned
Bank Failures
Credit Crisis/Defaults

Boom/Bust
Price Collapses
Questionable Lending
Depression
Floods, Fires
Liquidity Concerns
Credit Crisis/Defaults
Rate Risk Concerns

1700

1800

1900

2000

2018

Revolution
Inflation
Expansion
Land Speculation
Defaults

Boom/Bust
Stock Market Crashes
Depression, Drought
Risky Investments
Embezzlement
Run on Banks/Liquidity
Credit Crisis/Defaults
S&L Crisis/Rate Risk

Boom/Bust
Land Speculation
Civil War
Railroad Speculation
Fires, Droughts
Gold Std Questioned
Bank Failures
Credit Crisis/Defaults

Boom/Bust
Price Collapses
Questionable Lending
Depression
Floods, Fires
Liquidity Concerns
Credit Crisis/Defaults
Rate Risk Concerns

1700

1800

1900

2000

2018



Photograph: Minnesota Historical Society/Corbis





THE WALL STREET JOURNAL

AIG, Lehman Shock Hits World Markets

What's News

Old-School Banks Emerge
Along New World of Finance

DAILY NEWS

SHOCK MARKET

Dow plunges 504 points

Insurance giant teeters on brink

YOUR LOCAL NEWS EXTRA

SCHOOLS • COMMUNITY EVENTS • HOME SALES • CRIME WATCH • ABOUT THE HOME SECTION

The Washington Post

Markets in Disarray as Lending Locks Up

Federal Intervention Fails to Stem Crisis of Confidence on Wall St.



ROBBIE COLLIN

Our superbly incisive new film critic starts today

The Daily

Financial crisis is worst the world has ever faced

Bank of England starts printing money again to save economy from recession

Bank pins hopes on QE2 to keep economy afloat

TIME

The New Hard Times

How Sarah Palin Took On Big Oil—And (Sort of) Won

The Extreme TB Epidemic Photos

Robert Redford Remembers Paul Newman



No, this Isn't Depression 2.0. How history can help us avoid it

BY HILL FERGUSON

The Leadership Debut

BY MICHAEL GRUNWALD

The Virtues of Thrift

BY NANCY GIBBS

ANALYSIS

Scrambling to Clean Up After A Category 4 Financial Storm



THE WALL STREET JOURNAL

Bailout Plan Rejected, Markets Plunge, Forcing New Scramble to Solve Crisis

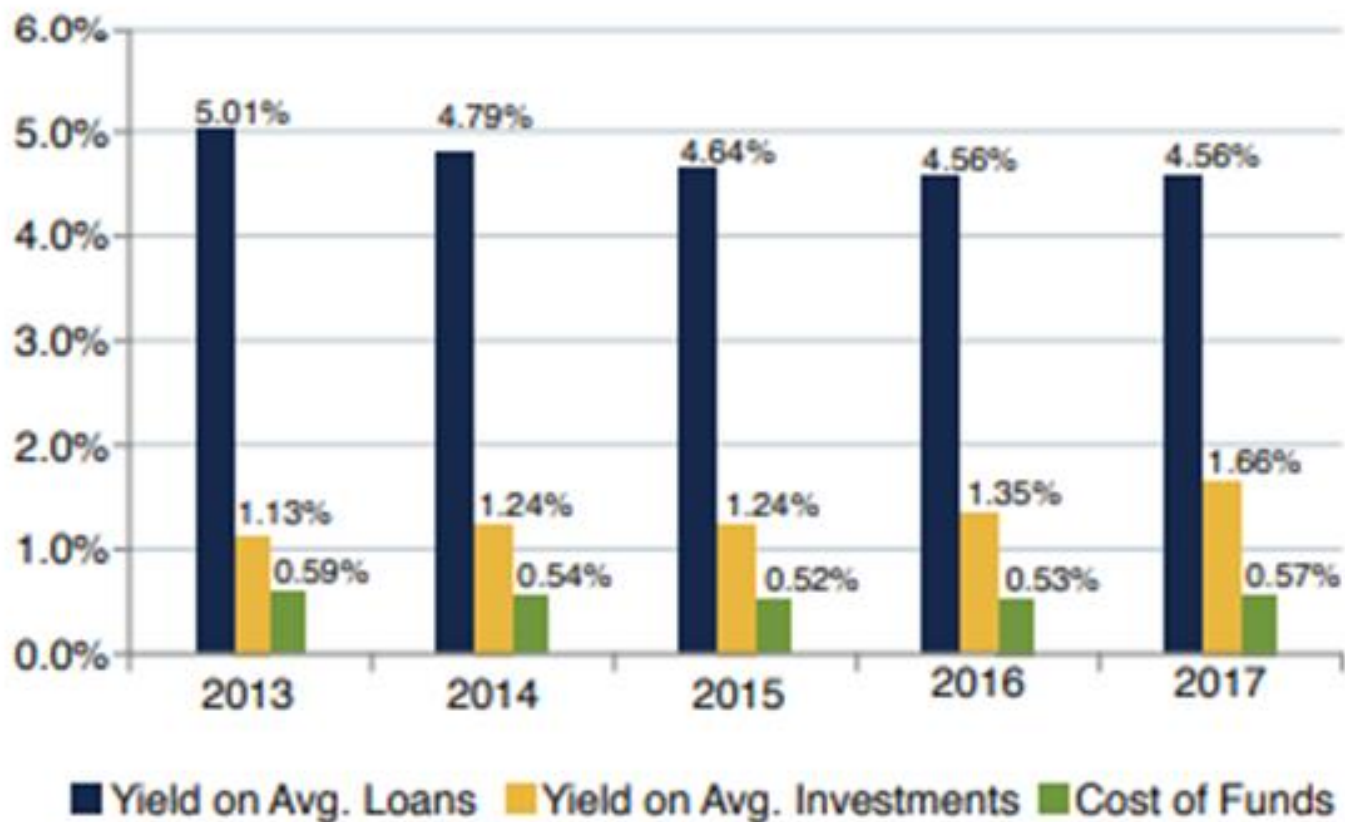
Down 777.68 points The slide of the Dow's biggest point loss on record





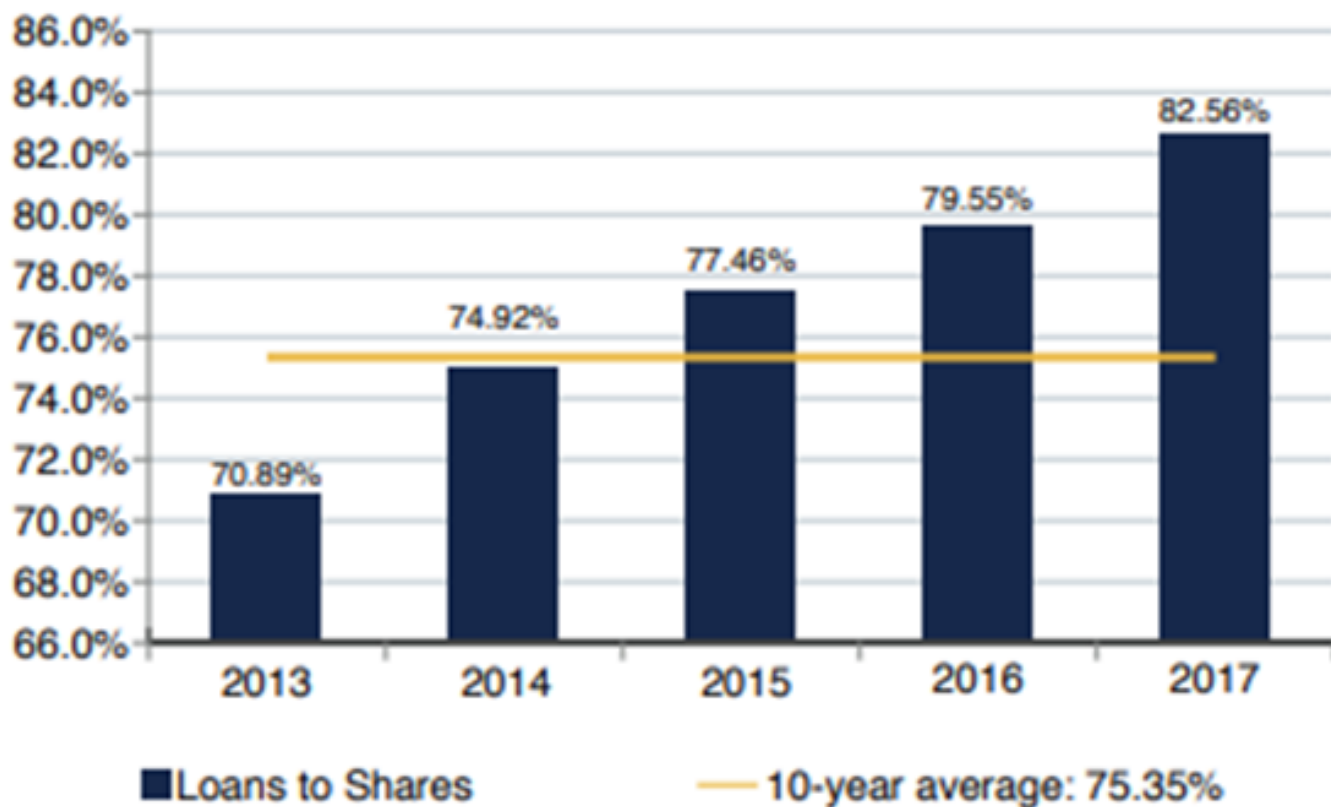
Earnings

Yields vs. Cost of Funds





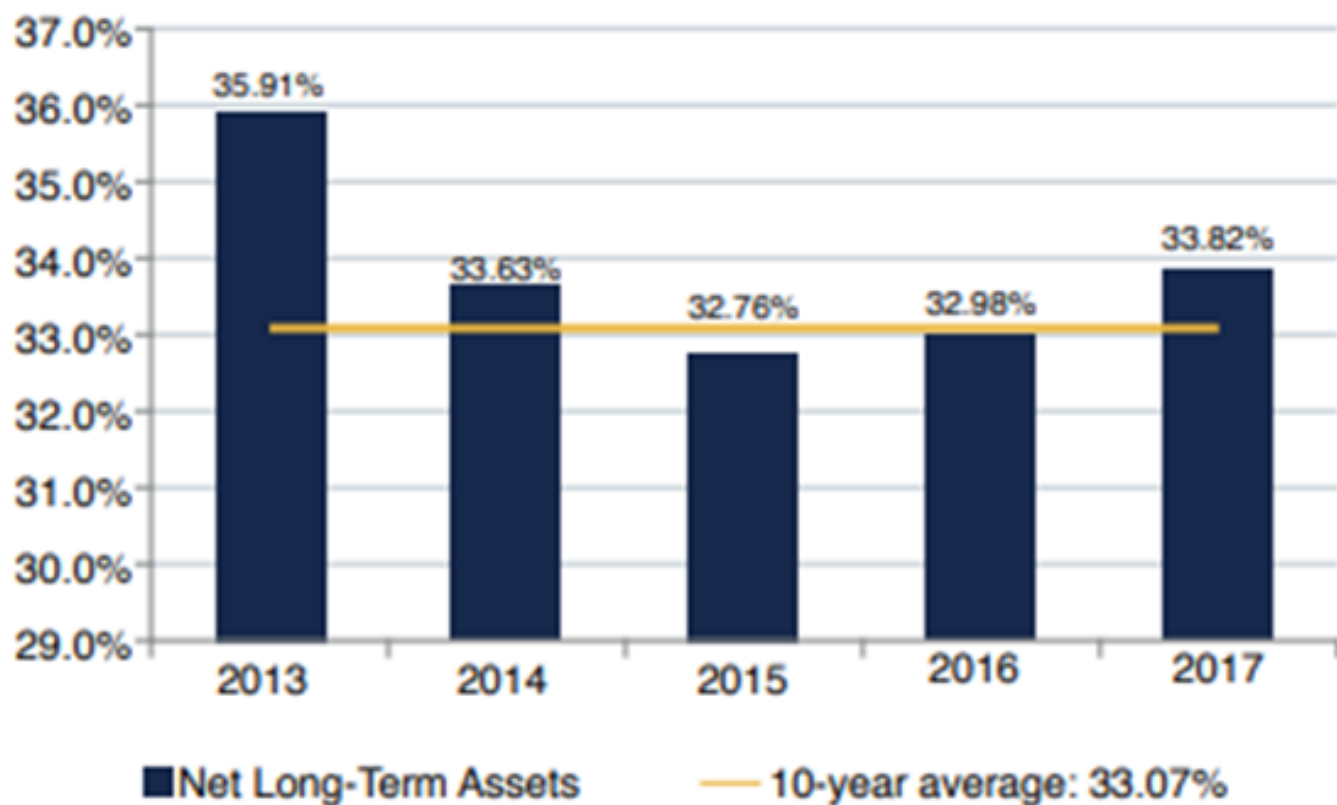
Total Loans / Total Shares





Asset-Liability Management Trends

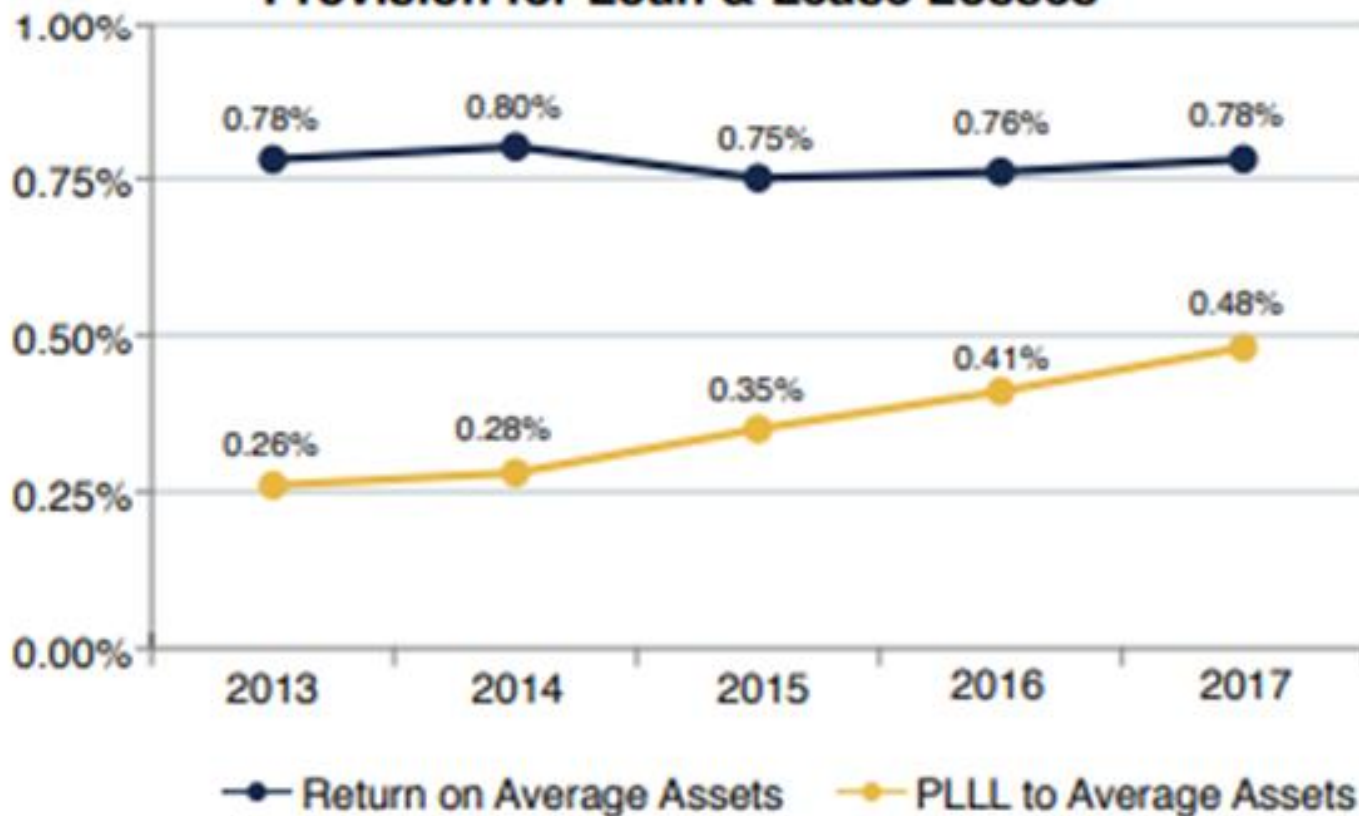
Net Long-Term Assets / Total Assets





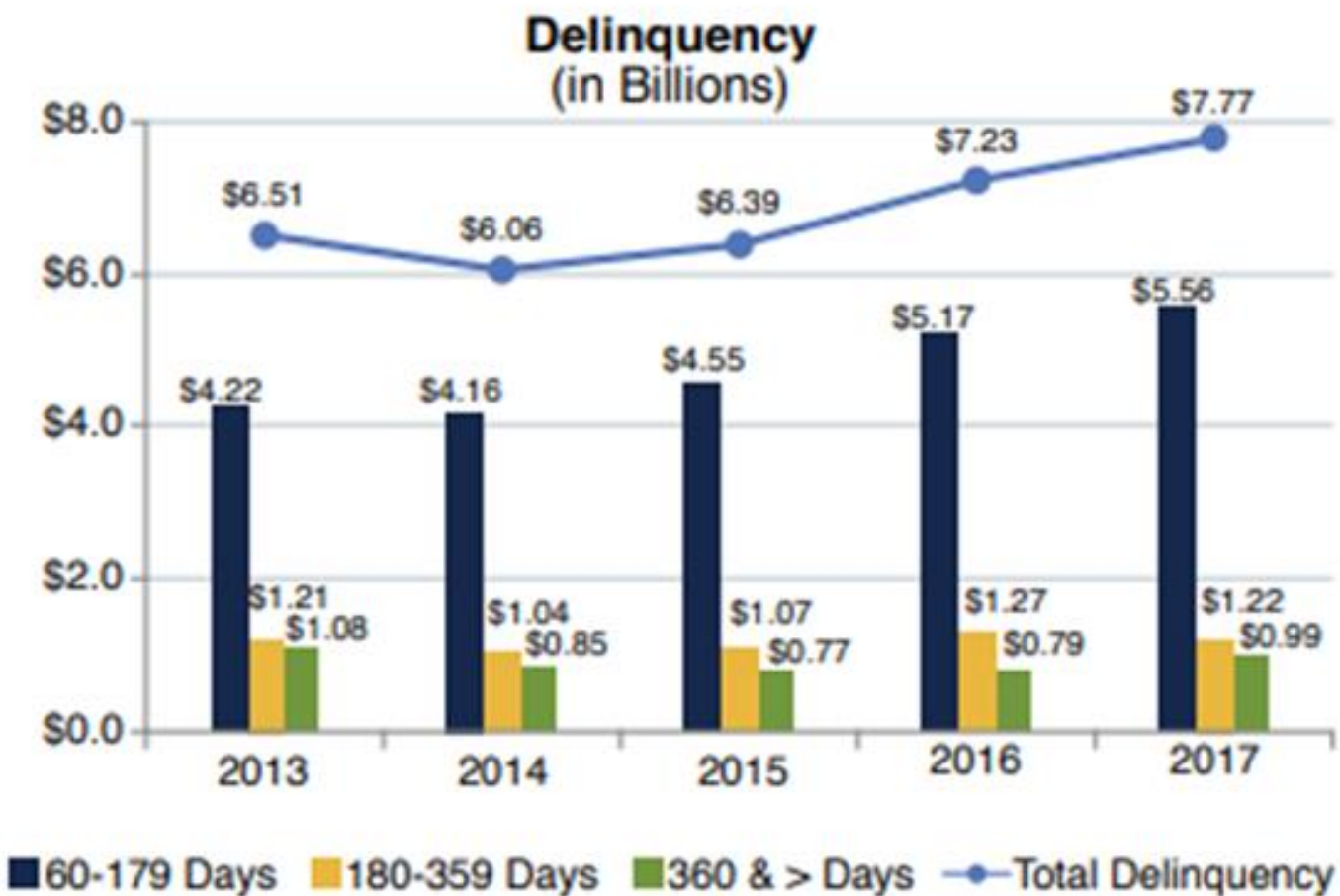
Earnings

Return on Average Assets vs. Provision for Loan & Lease Losses





Loan and Delinquency Trends





Charge-Offs and Recoveries

Total Loan Charge-Offs and Recoveries	December 2016 in Billions	December 2017 in Billions*	% Change
Total Loans Charged Off	\$5.59	\$6.59	17.95%
Total Loan Recoveries	\$1.02	\$1.15	12.58%
Total Net Charge-Offs	\$4.56	\$5.44	19.15%

* Annualized

Numbers may not add up due to rounding.

NCUA Board Approves Stress Testing, Capital Requirements Changes

CU stress testing and capital requirements protect the share insurance fund and credit union members.

By **David Baumann** | April 19, 2018 at 11:43 AM

The NCUA board on Thursday approved final rules aimed at tailoring stress testing and capital requirements to the **size, complexity and financial condition** of financial institutions. The final rule establishes a tiered approach.

NCUA Board Chairman J. Mark McWatters said that large bank stress testing and capital requirements are designed to help protect the larger U.S. economy. He added that no credit union is so large that it can affect the overall economy. Instead, credit union stress testing and capital requirements **protect the share insurance fund and credit union members.**

“It builds on what we’ve learned,” **board member Rick Metsger** said, agreeing that banks adopted capital requirements and stress testing for very different reasons than credit unions.



2018 Banking Industry Outlook

Six themes driving banking industry trends

For 2018 and beyond, banks must contend with multiple challenges tied to regulations, legacy systems, disruptive models and technologies, new competitors, and a restive customer base while pursuing new strategies for sustainable growth. Our 2018 Banking Industry Outlook examines the six macro themes—from customer centricity to cyber risk—facing each of the industry’s five primary business segments in the coming 12-to-18 months. Firms that can address these emerging challenges and opportunities to effectively balance long-term goals with short-term performance pressures could be amply rewarded.

[INTRODUCTION | PLAYING THE LONG GAME](#)[THEME ONE | CUSTOMER CENTRICITY](#)[THEME TWO | REGULATORY RECALIBRATION](#)[THEME THREE | TECHNOLOGY MANAGEMENT](#)[THEME FOUR | MITIGATING CYBER RISK](#)[THEME FIVE | FINTECHS AND BIG TECHS](#)[THEME SIX | REIMAGINING THE WORKFORCE](#)[NEXT STEPS | PLAYING SHORT TO AIM LONG](#)

E&Y (Dec 2017 Outlook)

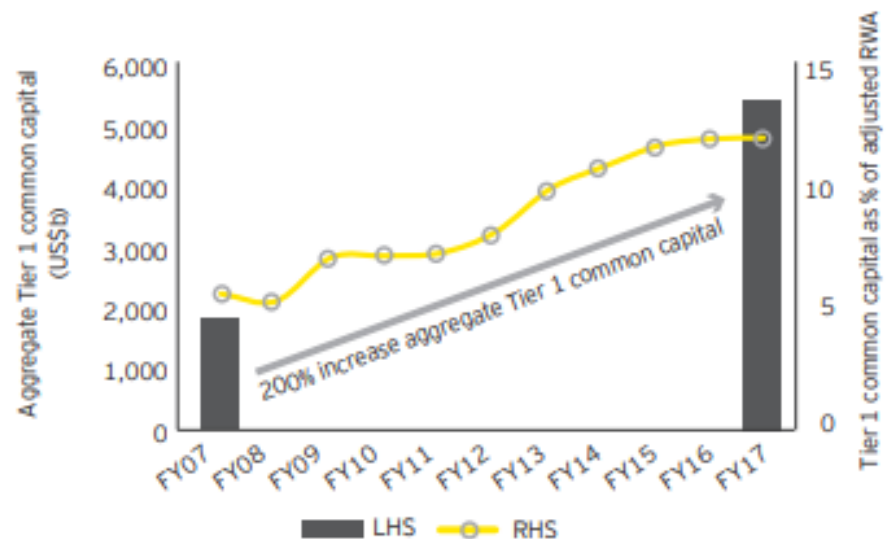
The global banking sector is considerably healthier now than it was 10 years ago, at the start of the global financial crisis.

The largest banks in the world have significantly improved their capital position in the years since the crisis. While there is lingering debate in some corners that banks are still not sufficiently capitalized, it is undeniable that the dangerously thin buffers of the pre-crisis era – where the Common Equity Tier 1 (CET1) capital ratio was below 4% for some banks – are gone as banks have raised additional equity over the last decade to almost treble their capital. Resilience has also been supported by the development of recovery and resolution plans (RRPs) as mandated by regulators globally.

While it is true that the cost of compliance has risen dramatically since the crisis, at the start of 2018 we believe the industry has crested the peak of regulatory-driven investments in systems and talent. Although compliance costs are set to remain elevated from their 2007 levels, we believe the cost of adapting to the post-crisis prudential regulatory framework has stabilized and is set to decline.

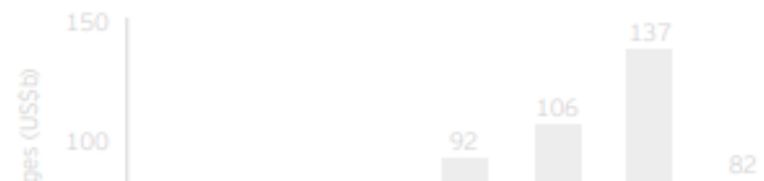
Further, most banks have resolved the vast majority of legacy conduct issues. Litigation expenses are falling (Figure 2), and although banks continue to reshape their footprints (Figure 3), they are also signalling that the associated restructuring costs will soon peak.

Figure 1: After a decade of rising capital, globally, banks' capitalization is improving



Source: SNL Financial database, EY analysis of largest 200 banks globally

Figure 2: Globally, litigation expenses are falling



E&Y (continued)

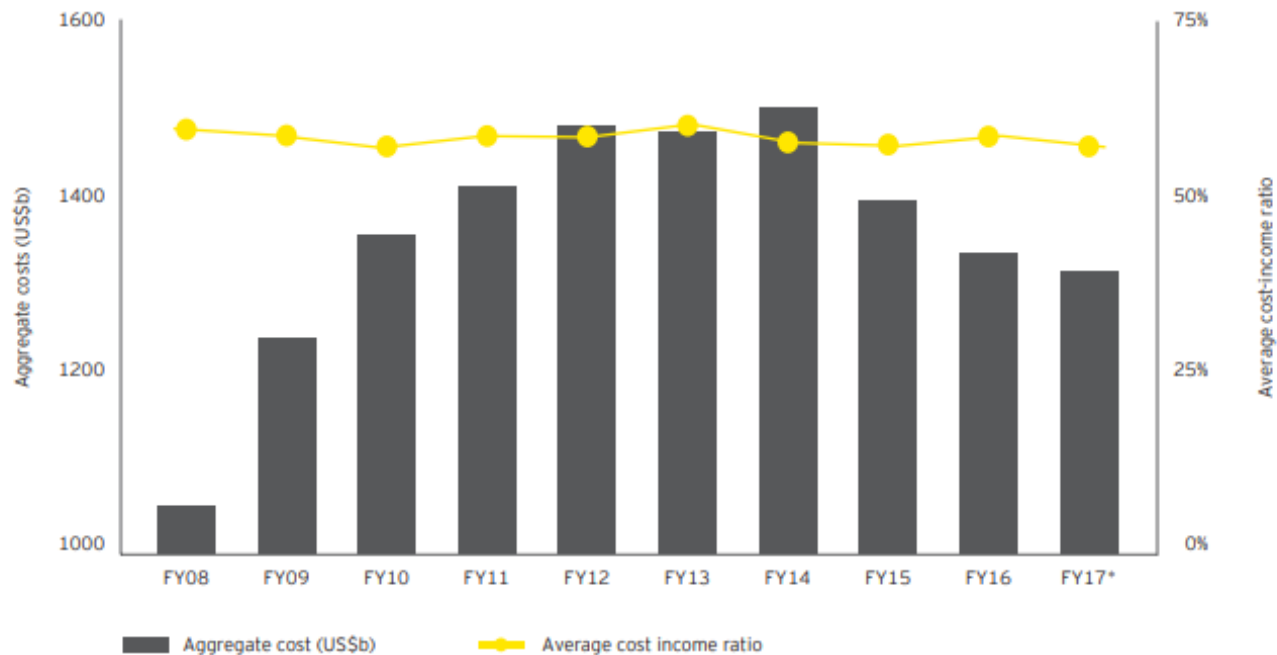
We believe the global banking industry still faces material challenges to delivering sustainable profitability.

Cost pressure: Evidence that banks' cost bases are more flexible or scalable than they were pre-crisis is not compelling. Our analysis of the world's largest 200 banks shows that while their aggregate costs have fallen by a little more than 10% in the last five years, they are still more than 25% over their 2008 cost base (Figure 6). Average cost-to-income ratios have barely budged in

the last decade, reflecting impacts from factors such as higher compliance costs, the burden of maintaining legacy systems, and elevated restructuring and litigation charges.

Further, our Global banking outlook survey reveals that most bankers anticipate that costs will continue to increase over the next three years, as the moderate savings in regulatory change programs are reallocated to growth initiatives and cybersecurity spending. On average, bankers expect a 2.1% cost increase over the next three years (Figure 7).

Figure 6: Costs remain elevated and efficiency has not substantially improved in the last decade for the top 200 global banks



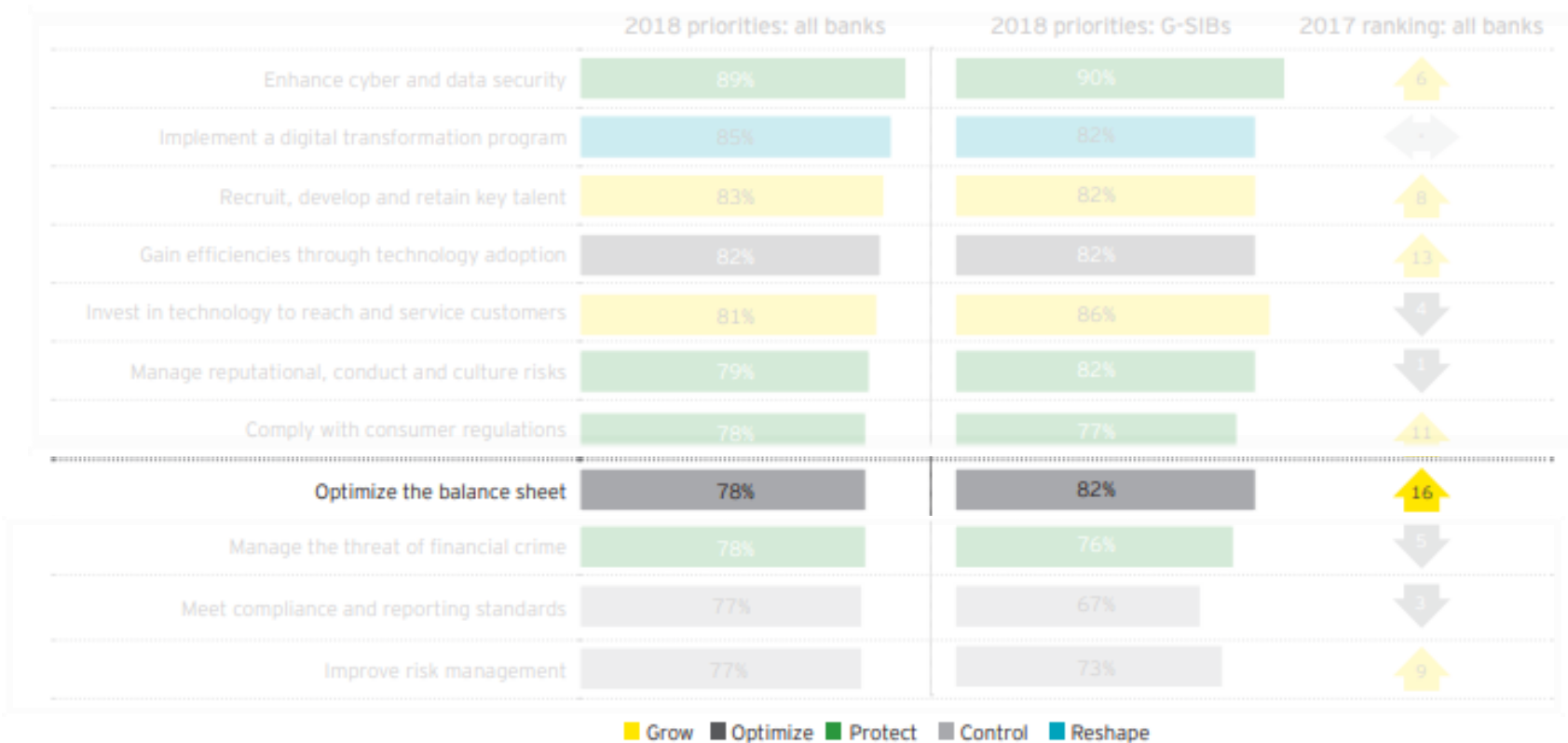
* Annualized figures

Source: SNL Financial database, EY analysis

E&Y (continued)

Figure 9: The importance of protecting against internal and external threats is clear in banks' 2018 priorities

Q: What is the importance of the following business priorities to your organization in 2018*?



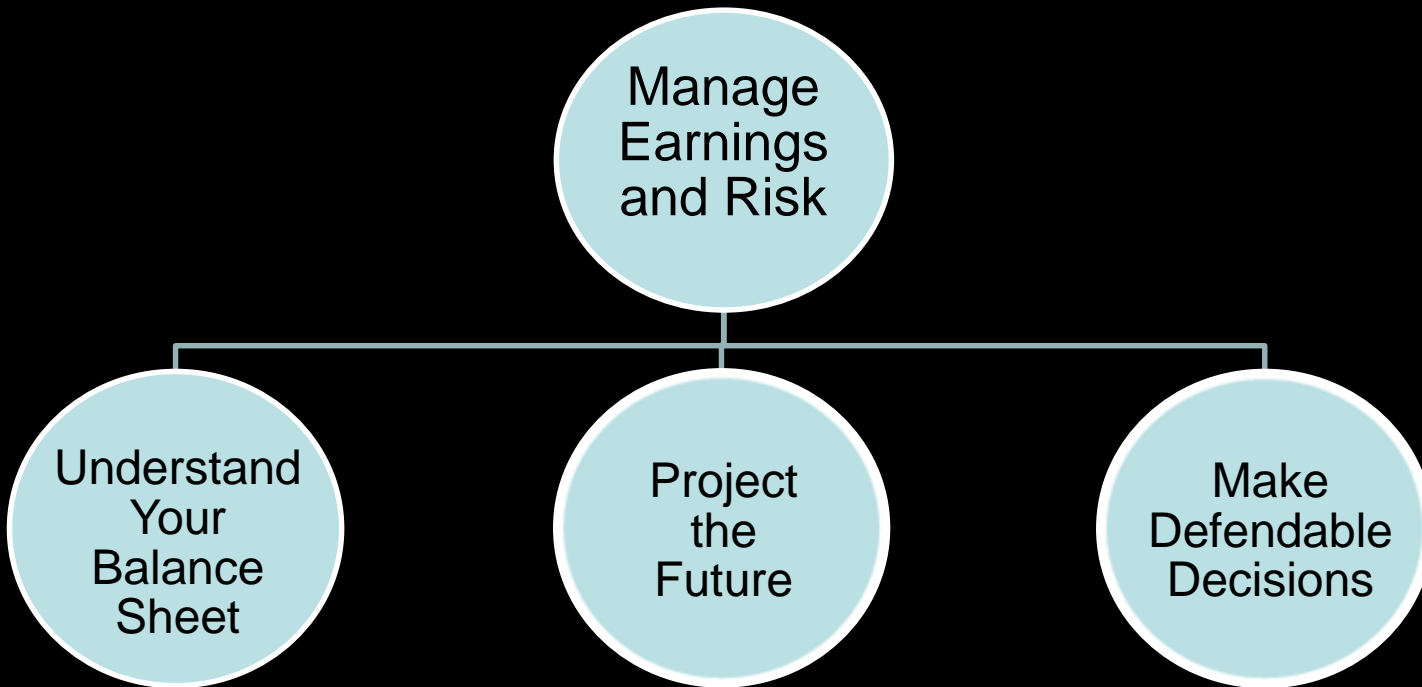
*% respondents represents banks that indicated 'important' or 'very important'.

Source: Global banking outlook survey 2018

See EY Global banking outlook 2017 for a detailed analysis of these five strategies.

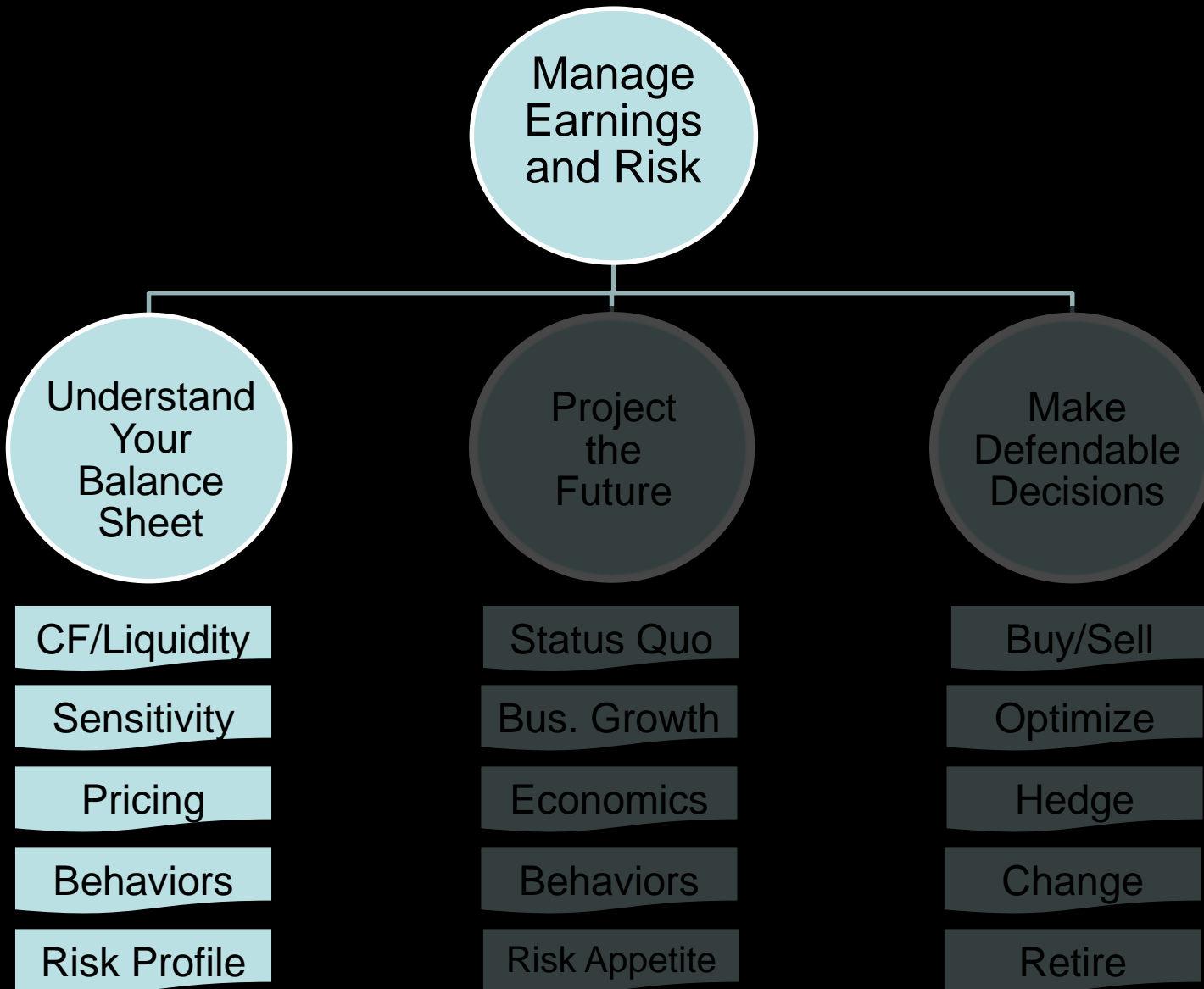


Neutralizing the Effects of Uncertainty



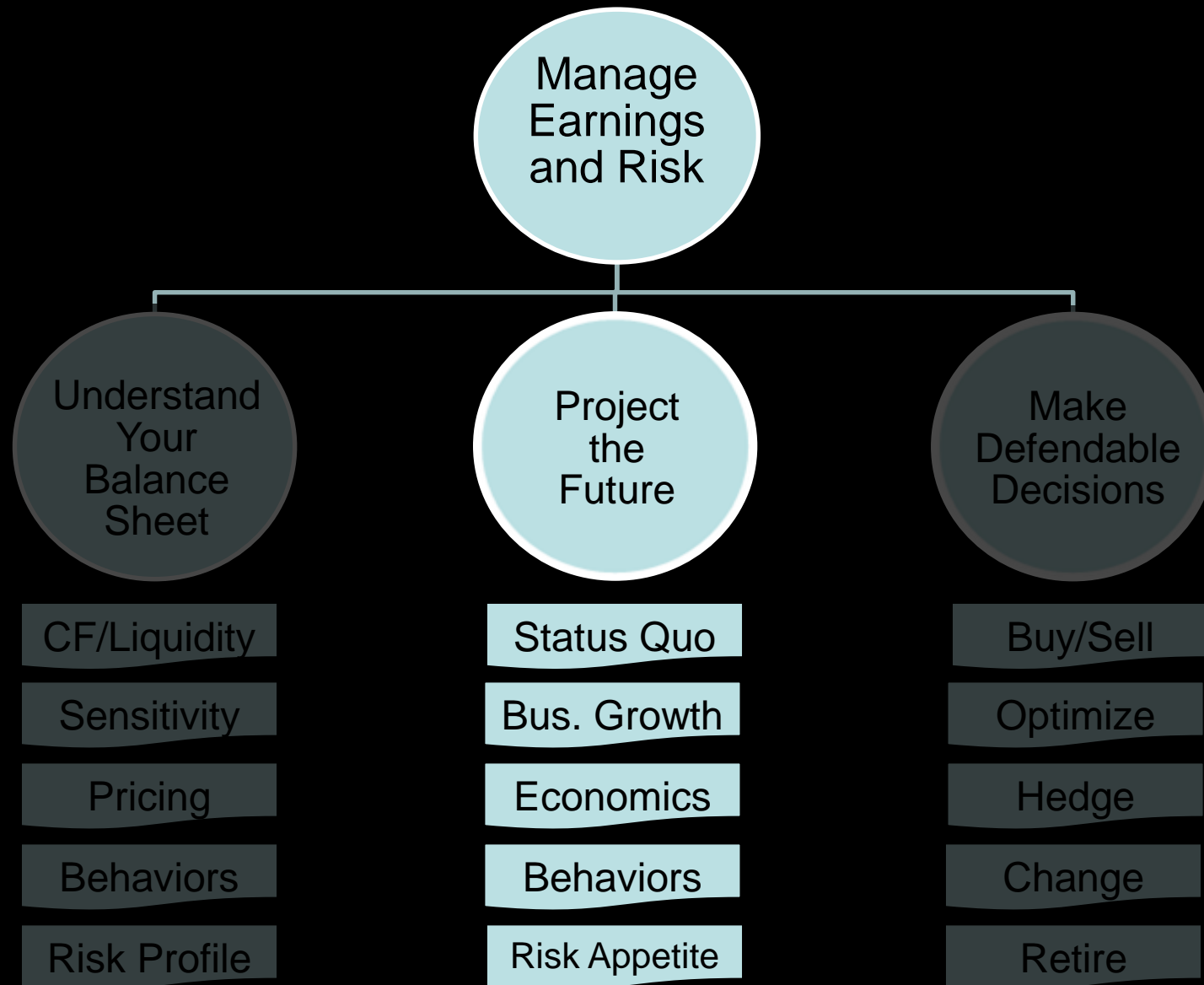


Neutralizing the Effects of Uncertainty





Neutralizing the Effects of Uncertainty





Neutralizing the Effects of Uncertainty





“What if we don’t change at all ...
and something magical just happens?”

HTM LTV BSA OAS
ALM NCUA DFAST
SEC GNMA BP FNMA ARM
AML PD
AFS DTE ABS
CMO ROE NIM FDIC OTC
HPI OTS CECL EVE
BASEL FTP CUNA
LGD ROA FHLMC MBS IRR GDP

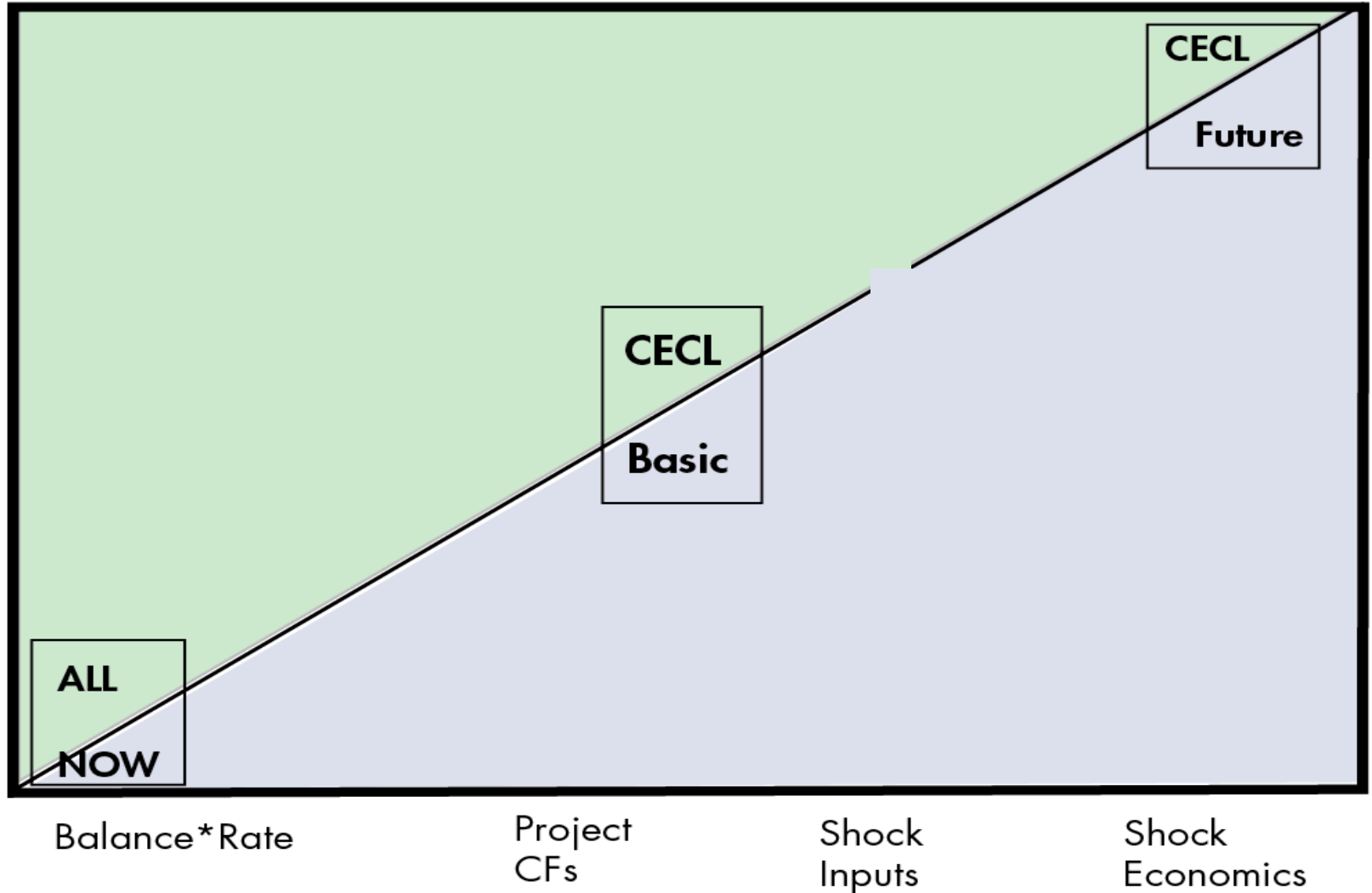
HTM LTV NCUA BSA OAS
ALM DFAST
SEC GNMA BP FNMA ARM
AML PD AFS DTE ABS
CMO ROE NIM FDIC OTC
HPI OTS CECL EVE
BASEL FTP CUNA
LGD ROA FHLMC MBS IRR GDP

HTM LTV NCUA BSA OAS
ALM DFAST
SEC GNMA BP FNMA ARM
PD
AML AFS DTE ABS
CMO ROE NIM FDIC OTC
CECL
HPI OTS EVE
BASEL FTP CUNA
LGD ROA FHLMC MBS IRR
GDP

**Why Should Credit
be Part of ALM?**

7	Asset						
8	Overnight Investment	-	-	-	-	-	-
9	Real Estate Fixed	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
10	Non-Performing Assets	-	-	-	-	-	-
11	Allowance for Loan Losses	-	(1,000)	(2,000)	(3,000)	(4,000)	(5,000)
15	Accrued Interest Receivable	139	4,306	8,472	12,639	16,806	20,973
16	Total Asset	1,000,139	1,003,306	1,006,472	1,009,639	1,012,806	1,016,979
17							
32	Total Liability & Capital	1,000,000	1,003,167	1,006,333	1,009,500	1,012,667	1,015,833
33	Income Statement						
34	Interest Income	-	4,167	4,167	4,167	4,167	4,167
35	Interest Expense	-	-	-	-	-	-
36	Net Interest Income	-	4,167	4,167	4,167	4,167	4,167
37	Provision for Loan Losses	-	1,000	1,000	1,000	1,000	1,000
38	Noninterest Income	-	-	-	-	-	-
39	Trading Revenue	-	-	-	-	-	-
40	Noninterest Expense	-	-	-	-	-	-
41	Income Before Tax	-	3,167	3,167	3,167	3,167	3,167
42	Income Tax	-	-	-	-	-	-
43	Extraordinary Items	-	-	-	-	-	-
44	Dividends	-	-	-	-	-	-
46	Net Income to RE	-	3,167	3,167	3,167	3,167	3,167
47							
48							
49	Run: (111) ALM:Demo Defaults(NI_VAL)						
50	Valuation Date: 12/31/2017						

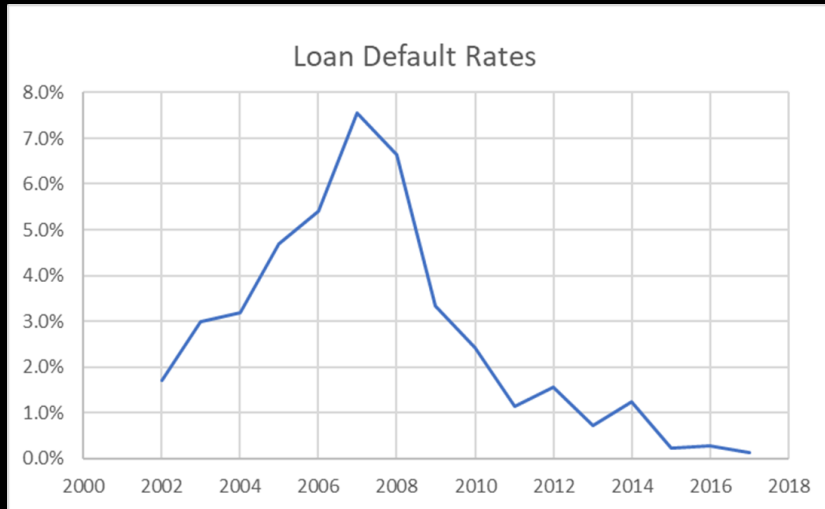
DEFAULT MODELING SOPHISTICATION



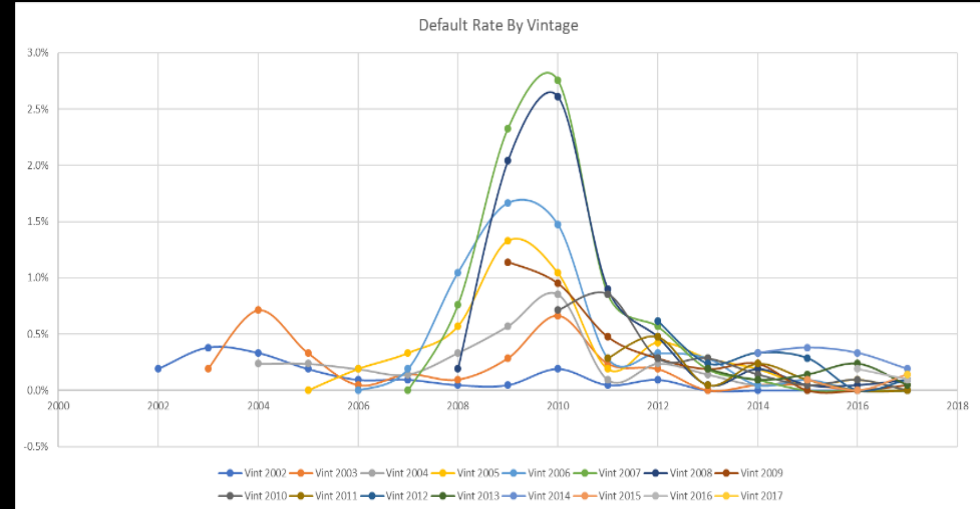
CASH FLOW MODELING

Historical Analysis Options

Incurred Loss



Vintage Analysis

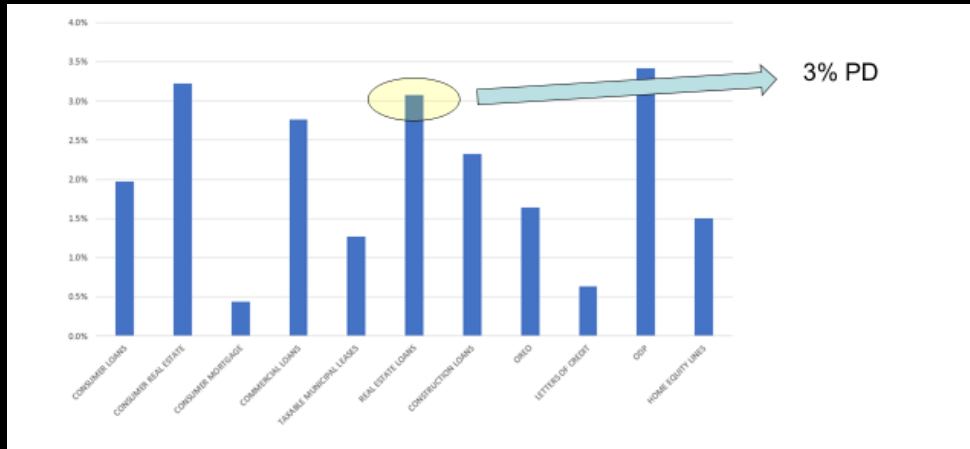


Regression

Variable	Definition	Coefficient
Intercept		2.4679
DQ_TOT_DAYS_PDUE	# of DPD	0.0727
Beacon Score	Credit Score	-0.0103
AVG_of_DQ_TOT_DAYS	Avg DPD last 12 months	0.0101
Age of Loans	Age of the loan	-0.154
LTV Ratio	Original LTV - Auto	0.000123
Payroll Indicator	Indicator: =1 Payroll deduction; = 0 otherwise	-0.734
West IND	Indicator: =1 In West Region = 0 otherwise	-0.7938
Member Age	Age of the member	-0.0115
AVG_HIS_Deposit	Average of deposit balance last 12 months	-0.0003
Coverage Ratio	Deposit Balance/three monthly payments	0.01

Default Modeling Options

Simple PD



Credit Table

Default (%)	CreditScore/Month	12	24	360
	500	15.00000	20.00000	20.00000
	550	13.00000	20.00000	20.00000
	600	10.00000	10.00000	10.00000
	650	5.00000	5.00000	5.00000
	700	1.00000	3.00000	0.50000

Regression Formula

ClsRegDepVarSub Collection Editor

Members:

- 0 /
- 1 +(1)
- 2 +EXP
- 3 -
- 4 +(2.4679)
- 5 +(0.000123 x _OLTV)
- 6 +(0.0727 x _DPD)
- 7 +(0.0101 x _AvgDPD_12mHi
- 8 -(0.154 x _LoanAge)
- 9 -(0.734 x _PayInd)
- 10 -(0.7938 x _WestInd)
- 11 -(0.0003 x _DepAvgBal)
- 12 +(0.01 x _CoverageRatio)

/ properties:

Misc

- _1_Operator /
- _2_Constant 0
- _3_Multiplier 0
- _4_RefIndepend GlobalLin

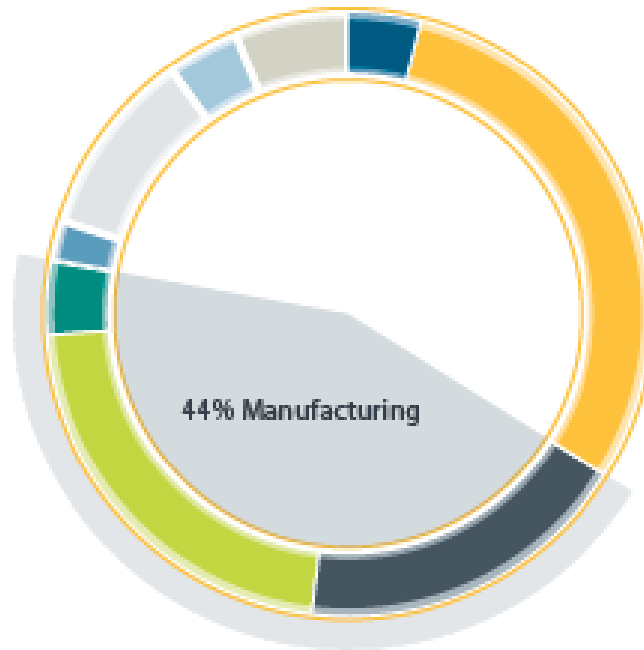
Buttons: Add, Remove, OK, Cancel

Migration Matrix

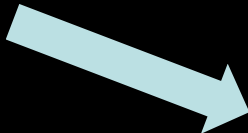
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00500
0.00200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00042	0.00500
0.00500	0.00200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00097	0.00500
0.98452	0.00500	0.00200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00148	0.00500
0.00200	0.98173	0.00500	0.00200	0.00000	0.00000	0.00000	0.00000	0.00000	0.00427	0.00500
0.00000	0.00200	0.97377	0.00500	0.00200	0.00000	0.00000	0.00000	0.00000	0.01223	0.00500
0.00000	0.00000	0.00500	0.95295	0.00800	0.00000	0.00000	0.00000	0.00000	0.02905	0.00500



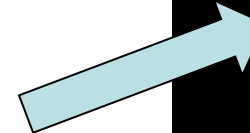
Sectoral concentration



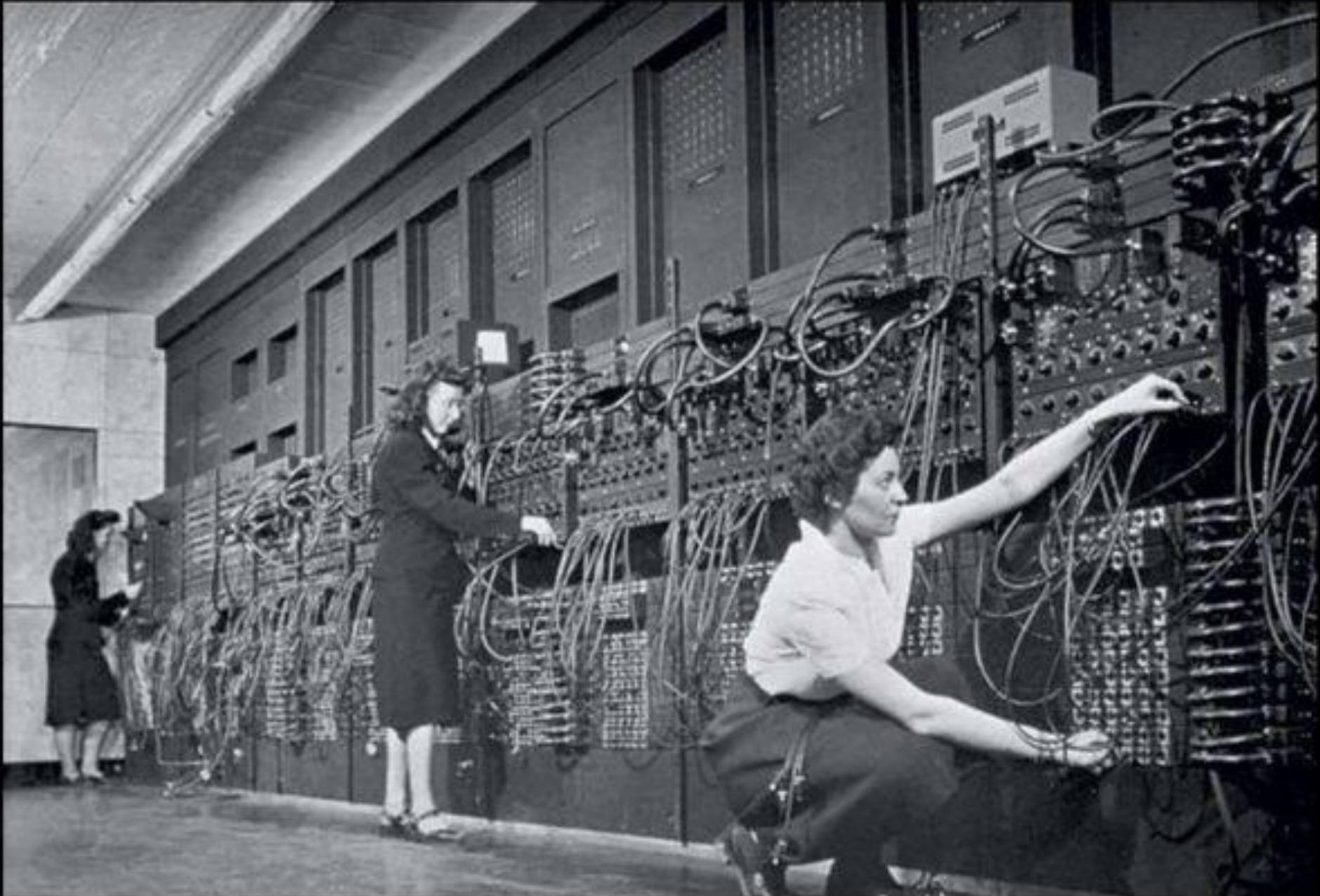
If this
is you

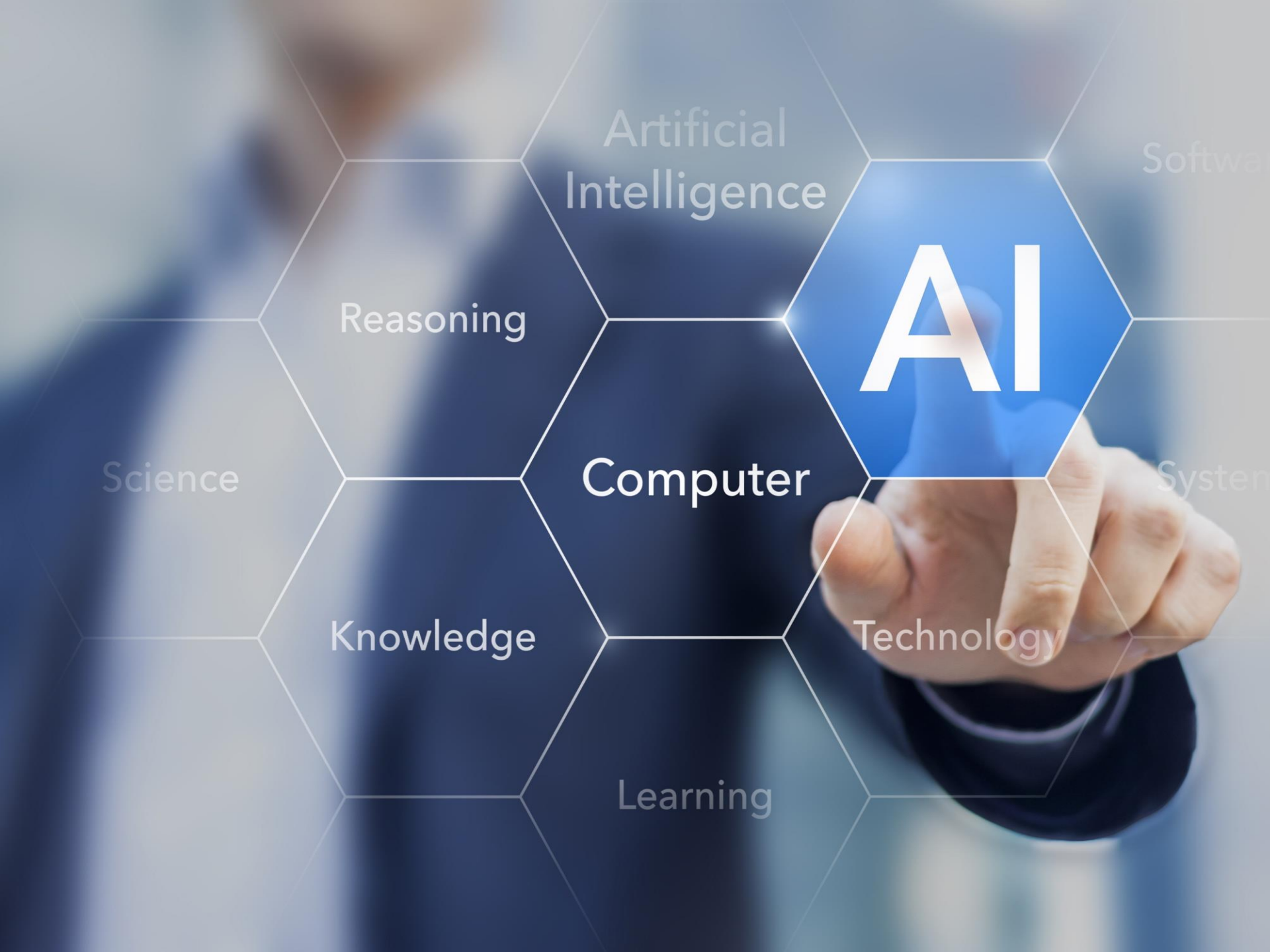


Are you stress
testing against
price changes?



Natural disasters?
Legal and political
change?





Artificial
Intelligence

Softwa

Reasoning

AI

Science

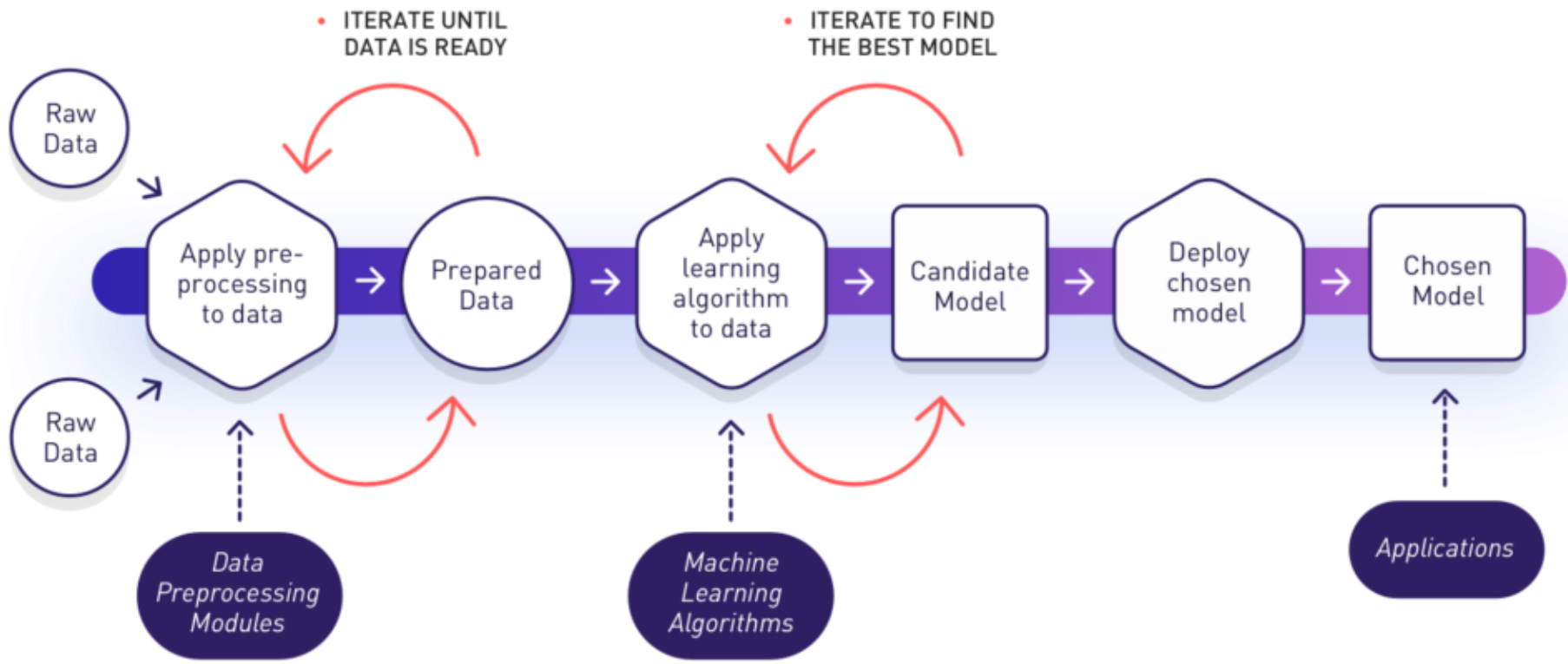
Computer

System

Knowledge

Technology

Learning



+ Reverse Stress Testing Defined



- “assume a known adverse outcome...
- “then deduce the types of events that could lead to such an outcome.” (Federal Reserve Board SR 12-7, p. 12)
- Sounds simple, but...





FinanceTrainingCourse.com

The difference between reverse stress test and conventional stress test

A good hockey player
plays where the puck is.
A great hockey player
plays where the puck is
going to be.

Wayne Gretzky



Jerry Clark

jerry.clark@zmfs.com

919-241-5305