15.516x Financial Accounting

Accounting for Banks

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Finance at MIT
Where ingenuity drives results

Overview

We have been focusing on industrial firms.

We extend accounting concepts to a much different industry: Banks.

Goal is to give you an overview of the banking industry.

We will review and extend prior concepts:

- The relation between leverage and ROE (Dupont)
- Allowance for bad debts loan loss

While these prior concepts likely will be on exam,

Remaining material on banks is for your interest and is not on exam.

Background: S&P 500 Industry Weights (Seeking Alpha 3/14/17)

MIT MANAGEMENT SLOAN SCHOOL

S&P 500 Sector Weightings (%): Selected Year Ends Since 1990													
Sector	1990	1995	1999	2000	2002	2004	2006	2008	3/9/09	2011	2013	2015	2017
Technology	6.34	9.39	29.18	21.23	14.63	16.05	15.14	15.40	17.84	19.02	18.58	20.69	21.74
Financials	7.39	13.14	13.02	17.34	20.46	20.64	22.27	12.97	8.58	13.43	16.17	16.47	17.70
Health Care	10.28	10.82	9.31	14.36	14.77	12.68	12.03	14.92	16.11	11.85	13.01	15.16	14.17
Cons. Discret.	13.00	12.97	12.70	10.28	13.26	11.90	10.62	8.39	8.31	10.67	12.54	12.89	12.10
Industrials	13.70	12.63	9.91	10.57	11.50	11.79	10.84	11.06	9.46	10.69	10.93	10.05	10.11
Cons. Staples	13.86	12.80	7.17	8.10	9.48	10.48	9.25	13.06	13.90	11.54	9.79	10.06	9.38
Energy	13.32	9.14	5.55	6.57	5.99	7.16	9.82	13.14	14.05	12.27	10.24	6.50	6.48
Utilities	6.19	4.53	2.21	3.79	2.84	2.94	3.55	4.20	4.43	3.87	2.93	2.99	3.10
Materials	7.20	6.05	3.00	2.30	2.82	3.09	2.96	2.97	3.18	3.50	3.50	2.76	2.81
Telecom	8.72	8.53	7.94	5.46	4.25	3.27	3.51	3.88	4.14	3.17	2.31	2.43	2.41

Outline

Overview of bank financial statements

Review the relation between leverage and ROE (Dupont)

Intuition for regulation and regulators' focus on leverage (equity / assets ratio)

Review marketable securities accounting

Review allowance for bad debts – extend this concept to bank loan losses

Discuss recent changes in accounting for loan losses

Wells Fargo 12/31/2018 balance sheets ($ in millions)

Marketable securities
Major Asset: Loans

passive investments

Cash and investment securities	775,116	41%
Loans	953,110	50%
Allowance for loan losses	(9,775)	-1%
Loans, net of allowance for loan losses	943,335	50%
Goodwill and intangibles	43,055	2%
Other assets	134,377	7%
Total assets	1,895,883	100%
Deposits	1,286,170	68%
Debt	334,831	18%
Other liabilities	78,716	4%
Total liabilities	1,699,717	90%
Stockholders' equity	196,166	10%
Total liabilities and stockholders' equity	1,895,883	100%

Primary Liab: Deposits

Total Liabilities

Stockholders' Equity

only 10%

Example -- Big bank vs. small bank

Wells Fargo

- One of four largest banks in US – $1.9 trillion in assets
- HQ in California, but operates across US

United Financial Bancorp

- Small US regional bank – $7.4 billion in assets
- HQ in Connecticut, mostly operates in Connecticut and Massachusetts

Big bank vs. small bank
12/31/2018 balance sheets ($ in millions)

bigger organization is easier to sell off loans and turn them into investment securities.

	Wells Fargo		United Financial	
Cash and investment securities	775,116	41%	1,113	15%
Loans	953,110	50%	5,674	77%
Allowance for loan losses	(9,775)	-1%	(52)	-1%
Loans, net of allowance for loan losses	943,335	50%	5,623	76%
Goodwill and intangibles	43,055	2%	138	2%
Other assets	134,377	7%	484	7%
Total assets	1,895,883	100%	7,357	100%
Deposits	1,286,170	68%	5,671	77%
Debt	334,831	18%	900	12%
Other liabilities	78,716	4%	74	1%
Total liabilities	1,699,717	90%	6,644	90%
Stockholders' equity	196,166	10%	713	10%
Total liabilities and stockholders' equity	1,895,883	100%	7,357	100%

difference, but why?

Wells Fargo 12/31/2018 income statement ($ in millions)

Interest income	64,647
Interest expense	(14,652)
Net interest income	49,995
Provision for credit losses	(1,744)
Noninterest revenue	36,413
Total noninterest expense	(56,126)
Income before income tax expense	28,538
Income tax expense	(6,145)
Net income	22,393

Interest income instead of sales

Akin to COGS

Akin to Gross Margin

A focus of this session

Fees, wealth management, I-banking if applicable

investment banking

SGA Expense

selling, general, and administrative expense: compensation expense, expense for running the building

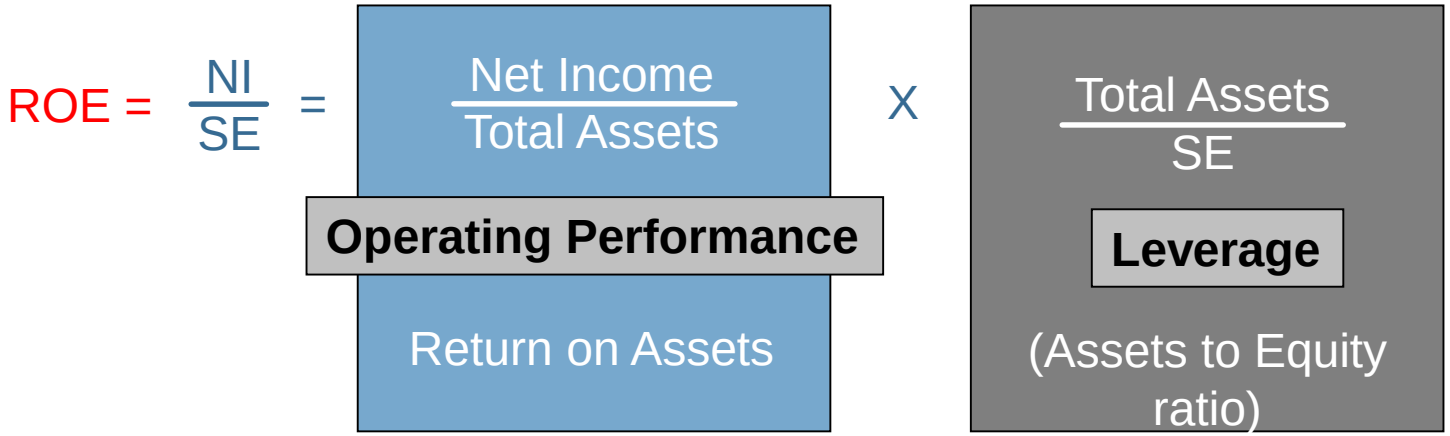
Big bank vs. small bank
12/31/2018 Income statements ($ in millions)

	Wells Fargo		United Financial	
Interest income	64,647	100%	273	100%
Interest expense	(14,652)	-23%	(82)	-30%
Net interest income	49,995	77%	192	70%
Provision for credit losses	(1,744)	-3%	(9)	-3%
Noninterest revenue	36,413	56%	37	13%
Total noninterest expense	(56,126)	-87%	(158)	-58%
Income before income tax expense	28,538	44%	62	23%
Income tax expense	(6,145)	-10%	(2)	-1%
Net income	22,393	35%	60	22%

Large US Banks – FYE 12/31/2018

	Bank of America	Citigroup	JP Morgan	Wells Fargo
Net Income	28,147	18,053	32,474	22,393
Assets	2,354,507	1,917,383	2,622,532	1,895,883
SE	265,325	196,220	256,515	196,166
ROA (NI / Assets)	1.20%	0.94%	1.24%	1.18%
ROE (NI / SE)	10.61%	9.20%	12.66%	11.42%

Recall “Dupont” Analysis (Drivers of Return on Equity)



ROA, Bank Leverage, and ROE

	Bank of America	Citigroup	JP Morgan	Wells Fargo
ROA (NI /Assets)	1.20%	0.94%	1.24%	1.18%
Leverage (Assets / SE)	8.87	9.77	10.22	9.66
ROE (NI / SE)	10.61%	9.20%	12.66%	11.42%

The Balance Sheet Equation – Banks

A	**=**	**L**	**+**	**S/E**
Loans + Oth. Assets	=	Deposits + Oth. Liabilities	+	Shareholders' Equity
100%		~90%		~10%

Why are banks so highly levered?

We will discuss this next.

What would happen if Tesla (say) sought 90% leverage?

Debtholders would see debt as very risky, and would demand higher interest (risk premium). Tesla would not be able to afford extra debt.

interest rate on that incremental debt would be too high

Intuition for bank leverage and bank regulation

Almost all countries provide deposit insurance:

- If bank becomes insolvent (goes bankrupt), government pays off depositors
- For example, in US insurance amount is $250,000

Deposit insurance means that deposits are less costly than similar debt:

- Depositors see deposits as very low risk, so do not demand a risk premium

Given that deposits are low-cost, how do banks want to finance themselves?

- Get as many deposits and as much leverage as possible
- This means much financial risk

This creates a need for bank regulation

Intuition for bank regulation

Big picture: Does the bank have enough capital (equity) to absorb losses?

- Capital = Shareholders' Equity / Assets
- Note: Capital = 1 / Leverage

so the bank doesn't go bankrupt or become insolvent.

Some key issues:

- How much capital should be required?
- How should Shareholders' Equity be measured?
- How should Assets be measured?
  - Does goodwill have value in insolvency?
  - Are loan loss reserves adequate?

- Regulatory Accounting Principles (RAP) make adjustments to GAAP to address the above issues.

Regulatory Capital = Adjusted GAAP Common S/E

"Tier 1 Capital" ≈

Common S/E - Goodwill and Intangibles ± Other

"Tier 1 Leverage Ratio" ≈

Tier 1 Capital / (Assets - Goodwill and Intangibles ± Other)

Minimum Requirement 4.0%

"Tier 1 Risk-based Capital Ratio" =

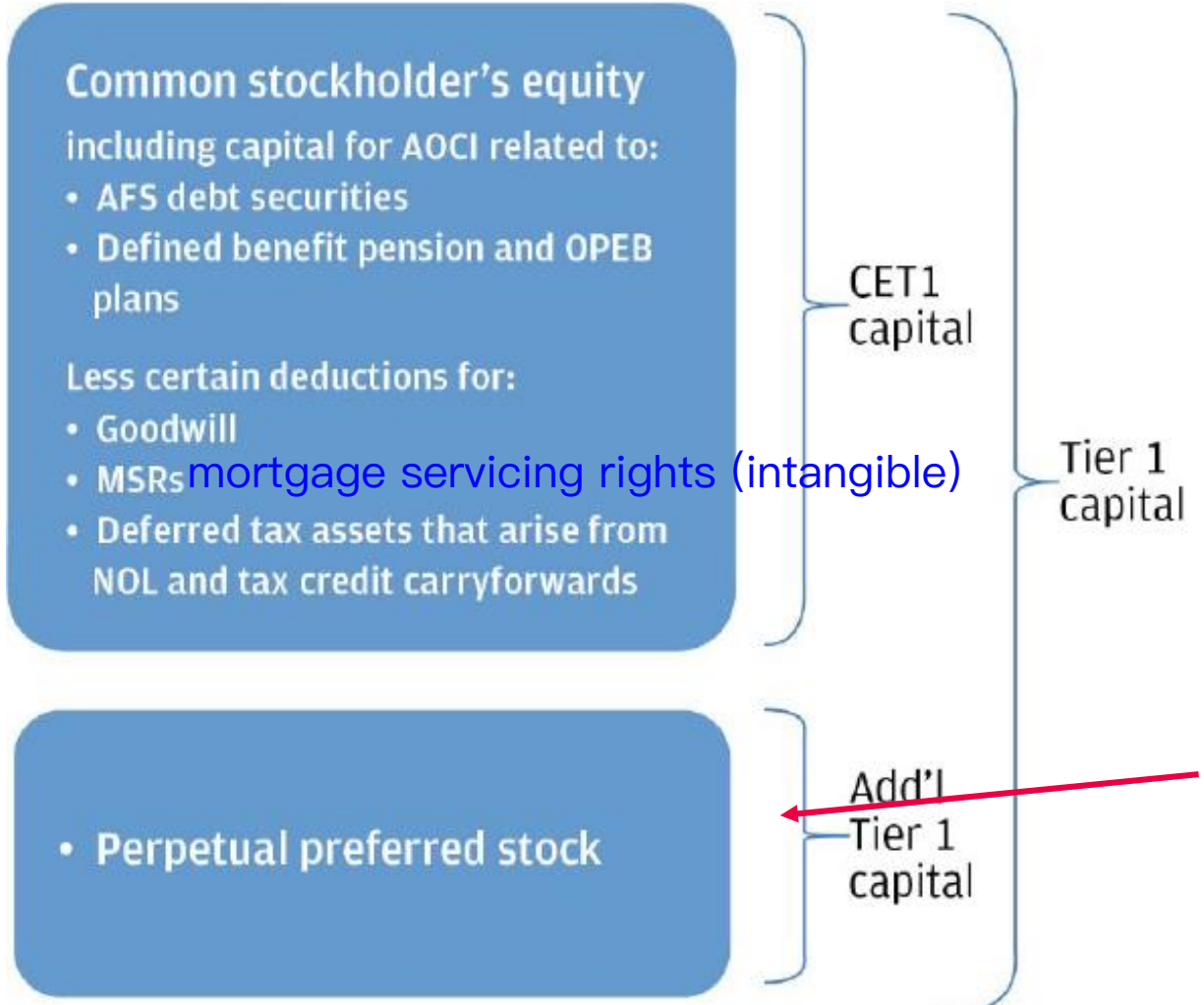
Tier 1 Capital / Risk-Weighted Assets

Risk-Weighted Assets are weighted average assets:

- Low weight: low-risk assets (US government bonds, home loans)
- High weight: high-risk assets (credit cards, junk bonds)

Minimum Requirement 10.5%

Regulatory Capital = Adjusted GAAP Common S/E
JP Morgan 2018 10-K, note 26



Perpetual preferred is preferred stock with no maturity

more like common equity

A lot of preferred stock is like debt in that it has a maturity date.

JP Morgan 2018 Tier 1 leverage ratio

Risk-based capital metrics:		
CET1 capital	$	183,474
Tier 1 capital		209,093
Total capital		237,511
Risk-weighted assets		1,528,916
CET1 capital ratio		12.0%
Tier 1 capital ratio		13.7
Total capital ratio		15.5
Leverage-based capital metrics:		
Adjusted average assets[(a)]	$	2,589,887
Tier 1 leverage ratio		8.1%

JP Morgan 2018 Tier 1 risk-based capital ratio

vs average

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Major accounting issues in banks

Regulation:

- Does bank have enough capital (S/E)?

Question for this session: Are allowances for loan losses adequate?

- If loan values are overstated, so is capital (S/E)

Other questions:

- Are marketable securities (including mortgage-backed securities) accurately valued?
- (Note: a mortgage is a loan on a home or other real estate)

Overview of bank accounting

Major assets:	Accounting:
Loans	Similar to accounts receivable
Marketable securities	Trading
	Available for Sale
	Held to maturity

Major liabilities:	
Deposits	Bonds
Debt and other borrowings	Bonds

Recall: Accounting treatment of unrealized gains/losses varies across categories of passive investments

	B/S Effect	I/S Effect
▪**Held-to-maturity (debt only)**	(Q1) no	
▪**Available for sale (debt only)**	(Q1) yes	(Q2) no
▪**Trading securities (debt and equity)**	(Q1) yes	(Q2) yes

fluctuate on balance sheet, which means it's going to fluctuate in stockholders' equity. it's going to fluctuate through other comprehensive income, so there's not going to be any kind of income statement effect.

Shell Games Abound in Europe's Bank Blowups (CFOWorld 09/15/2011)

Under current IASB (International Accounting Standards Board / IFRS) rules, financial assets can be classified in four ways:

IFRS term for trading securities

1) "fair value through profit or loss" must be marked to market each quarter, with changes hitting the income statement.
2) "available for sale" means the assets must be marked to market on the balance sheet, but changes in value typically don't hit earnings.
3) "held to maturity," and
4) "loans and receivables."

These latter two classifications allow companies to avoid using fair value on the balance sheet.

Shell Games Abound in Europe's Bank Blowups (CFOWorld 09/15/2011)

In October 2008, the IASB changed its rules retroactively: Allowed companies to immediately shift many of their financial assets out of categories where fair value accounting was required.

As of the end of 2010, about 90 percent of the National Bank of Greece's 12.8 billion euros of Greek government bonds were labeled as either "held to maturity" or "loans and receivables," in large part because of reclassifications out of the available-for-sale and fair-value categories during prior periods.

allowed them to not do any accounting for them that would affect their regulatory capital

Accounting -- Allowance for Loan Losses

Allowance for Loan Losses is similar to Allowance for Doubtful Accounts

- It arises because of accrual accounting
- It is subjective
- It is a contra-asset account
- It can have a significant impact on the firm's financial statements

Given this similarity, if a borrower defaults on a loan in a particular period:

- Will it affect the bank's income statement?
  - Not if the allowance is adequate
- Balance sheet?
  - Will decrease loans and allowance for loan losses

Reviewing the Accounting

Suppose a bank estimates a $500,000 potential loss, what transaction does it record?

Assets		=	**Liabilities**	**S/E**	
Loans	**– Allow for Loan Losses**			**R/E**	
	500,000			(500,000)	(provision for loan losses)

When a specific $20,000 loan is written-off?

Assets		=	**Liabilities**	**S/E**
Loans	**– Allow for Loan Losses**			**R/E**
(20,000)	(20,000)			

Intuition for loan loss provision – Aging analysis
Wells Fargo 2018 Annual Report Note 6 p. 176

"Many of our loss estimation techniques used for the allowance for credit losses rely on delinquency-based models."

(in millions)	Real estate 1-4 family first mortgage	Real estate 1-4 family junior lien mortgage	Credit card	Automobile	Other revolving credit and installment	Total
December 31, 2018						
By delinquency status:						
Current-29 DPD	**$ 263,881**	**33,644**	**38,008**	**43,604**	**35,794**	**414,931**
30-59 DPD	**1,411**	**247**	**292**	**1,040**	**140**	**3,130**
60-89 DPD	**549**	**126**	**212**	**314**	**87**	**1,288**
90-119 DPD	**257**	**74**	**192**	**109**	**80**	**712**
120-179 DPD	**225**	**77**	**320**	**2**	**27**	**651**
180+ DPD	**822**	**213**	**1**	**—**	**20**	**1,056**

Note: DPD = days past due.

aging analysis

Effect of loan losses on capital

under reserved: meaning that our allowance for loan losses is not big enough.

Suppose that a bank discovers that it must increase its allowance for loan losses by 1% of assets, e.g., from 1% of assets to 2% of assets.

What happens to its capital ratio (SE / Assets)? Ignore taxes.

Assets		**=**	**Liabilities**	**S/E**	
Loans	**– Allow for Loan Losses**			**R/E**	
	1%			(1%)	(provision)

Allowance for loan losses – GAAP through 2019

A provision for a loan loss is recorded if:

It is probable that the loan is impaired

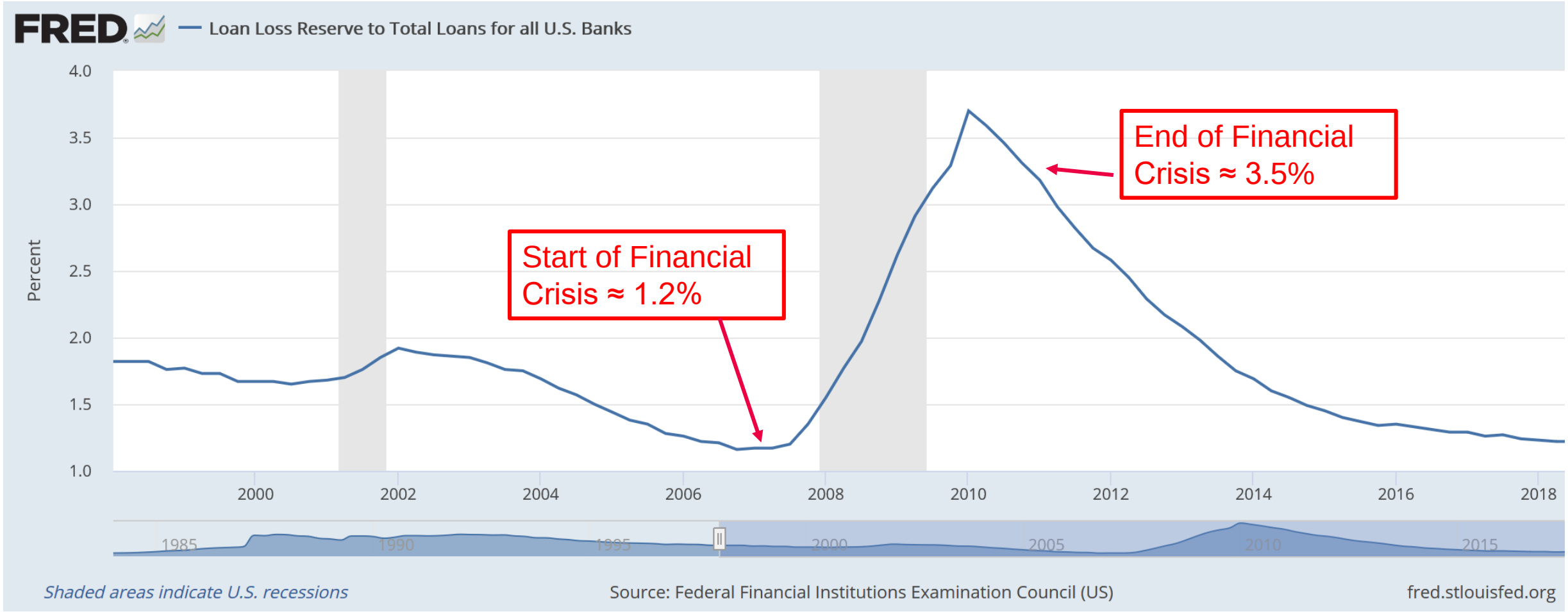
"Probable" means: "Likely" ; Greater than 50%

This is known as the "incurred loss" model.

Backward looking: Wait for bad news to provide for loan losses.

So what it meant that if you were looking in a loan and you thought there was only a 40% chance that it would go bad, so that's still a pretty high probability that it would go bad, but you would not reserve for that loan until there was greater than a 50% chance of that loan was going to go bad

Tendency with incurred loss accounting: Under-reserved at start of bad times; over-reserved at start of good times



What happens when crisis ends?

At year-end 2010, Z Bank has a loan loss reserve of $750 million (3.5% of loans), which assumes a very bad economy.

At some point the economy recovers, and it no longer needs high reserves.

Allowance for Loan Losses	
Beginning Balance (end 2010)	$750
Provisions for Loan Losses	
Net Write-offs	
Ending Balance(end 2011)	

What happens when crisis ends?

At year-end 2010, Z Bank has a loan loss reserve of $750 million (3.5% of loans), which assumes a very bad economy.

At some point the economy recovers, and it no longer needs high reserves.

Suppose this happens in 2011, and it estimates it needs only $300 in reserves.

Allowance for Loan Losses	
Beginning Balance (end 2010)	$750
Provisions for Loan Losses	
Net Write-offs	
Ending Balance(end 2011)	300

What happens when crisis ends?

At year-end 2010, Z Bank has a loan loss reserve of $750 million (3.5% of loans), which assumes a very bad economy.

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Suppose this happens in 2011, and it estimates it needs only $300 in reserves.

Suppose also that 2011 write-offs were $250.

Allowance for Loan Losses	
Beginning Balance (end 2010)	$750
Provisions for Loan Losses	
Net Write-offs	-250
Ending Balance(end 2011)	300

What happens when crisis ends?

At year-end 2010, Z Bank has a loan loss reserve of $750 million (3.5% of loans), which assumes a very bad economy.

At some point the economy recovers, and it no longer needs high reserves.

Suppose this happens in 2011, and it estimates it needs only $300 in reserves.

Suppose also that 2011 write-offs were $250. What allowance is needed?

Allowance for Loan Losses	
Beginning Balance (end 2010)	$750
Provisions for Loan Losses	-200
Net Write-offs	-250
Ending Balance(end 2011)	300

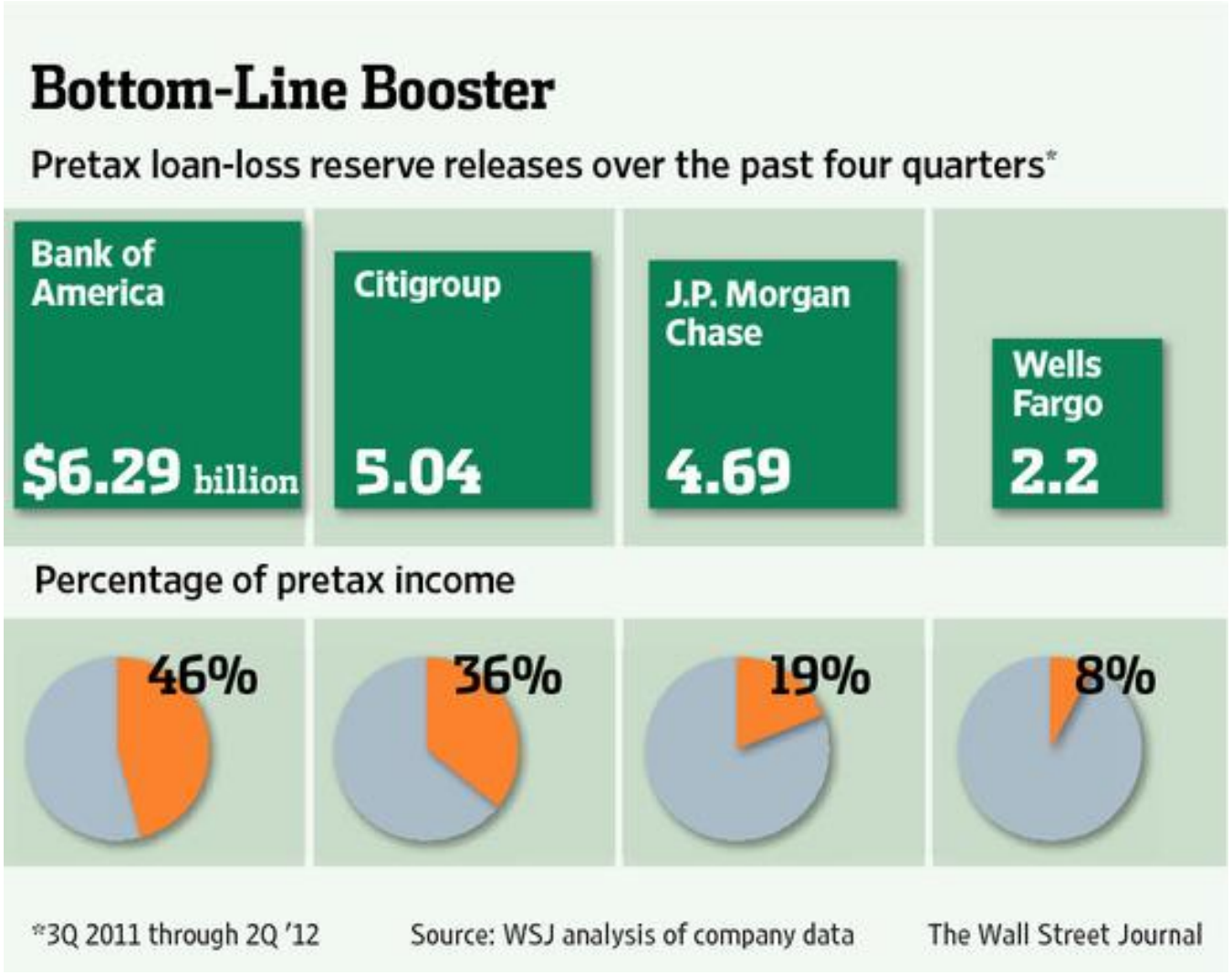
"Reserve release"

Bank Profit Spigot to Draw Scrutiny (WSJ 10/10/2012)

So-called **reserve releases** **occur when the sums banks add to their loan-loss reserves are less than their write-offs of uncollectible loans**. The difference gets funneled into net income.

There is nothing improper about the practice, which tends to pick up when the economy expands, pushing down joblessness and loan delinquencies.

The four biggest U.S. banks have released $18.2 billion of reserves over the past four quarters (through 2Q 2012)



Accounting change in 2020 ASU No. 2016-13
Allowance for loan losses

Pre-2020 “incurred loss” model:

A provision for a loan loss is recorded if:

It is probable that the loan is impaired

“Probable” means: “Likely” ; Greater than 50%

Starting in 2020, US GAAP and IFRS require an “expected loss” model:

Record loss if expected (even if 5% chance)

Results in more immediate loss accrual

Referred to as Current Expected Credit Losses (“CECL”)

Forward-looking: reserve for anticipated losses.

Example of incurred loss vs. CECL

Z Bank issues 100 loans of $1,000. The loans have an interest rate of 20% and mature in 1 year (simplified version of credit card debt). Based on its experience, Z Bank expects these payoff scenarios:

	Good	Bad
Number of loans	95	5
Interest	200	0
Loan Payment	1,000	0

Z Bank expects credit losses on 5% of loans, but it does not know which 5%.

Z Bank – Incurred loss accounting

Cash Loans - Allow for loan losses R/E

Z bank issues 100 $1,000 loans on Jan. 1

-100K 100K

Does Z bank accrue a loss provision on Jan. 1?

No, at this point no specific individual loan is likely to go bad.

On June 30, Z bank identifies 5 loans that are unlikely to pay

5K -5K (prov. for loan losses)

On June 30, Z bank records 6-months interest

9.5K 9.5K(int rev.)

95 good loans with half year interest rate 10%=20%*0.5

On Dec 31, 95 loans pay in full; 5 pay 0 and are charged off; records 6-months interest

95K -95K good loans

-5K -5K bad loans

9.5K 9.5K(int rev.)

Z Bank – 2020 CECL

Cash Loans - Allow for loan losses R/E

Z bank issues 100 $1,000 loans on Jan. 1

-100K 100K

even though we're going to make a lot of money on these loans, when we issue these loans at the beginning,we have an immediate loss

Does Z bank accrue a loss provision on Jan. 1?

5K -5K (prov. for loan losses)

On June 30, Z bank identifies 5 loans that are unlikely to pay

No accounting – this was already accrued for

On June 30, Z bank records 6-months interest

9.5K 9.5K(int rev.)

Receive $19K interest and $95K principal.
Return = $114K / $100K -1 = 14%

On Dec 31, 95 loans pay in full; 5 pay 0 and are charged off; records 6-months interest

95K -95K

-5K -5K

9.5K 9.5K(int rev.)

Why banks hate CECL – immediate loss when loans are made

we're accruing for loan losses immediately, but we don't get to accrue for the high interest income until we earn that interest income. So there's sort of a failure of matching going on here.

Cash Loans - Allow for loan losses R/E

Z bank issues 100 $1,000 loans on Jan. 1

-100K 100K

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JP Morgan estimated impact of CECL: 35% increase in loan loss reserves (Investor presentation 2/26/2019)

Implementation adjustment

- Estimated day 1 increase to reserves of **$5B+/- or 35%** largely **driven by Card**
- Estimates dependent on macro environment, portfolio characteristics, and continuing review of models, methodology and judgments
- **Adverse case** reflects a range of adverse outcomes

Capital implications

- 4-year phase-in of initial capital impact – no permanent capital relief
- Included in the Firm's 2020 CCAR submission – Fed modeling to follow in 2022

Effects

- Results in more volatile credit costs in stress
- Potential impact to credit availability and pricing

Day 1 CECL impact ($B)

		2018 Credit reserves	+ Estimated implementation adjustment
CCB	Card	$5.2	Material adjustment
CCB	Home Lending[1]	2.9	Less material adjustments
CCB	Auto & BB	1.3	
Wholesale		5.1	
Firmwide		$14.5	$4-6

Current coverage is ~12m versus avg. life of ~24m

Adverse case $6-10

Take-Away Slide

Loan loss provisions

- Similar to bad debt expenses
- Involves judgment and mixed incentives

First time we explicitly talked about deposits and regulators

What have we seen in class is relevant for the crisis of 2008 and issues that may develop in pandemic:

- Loan Loss Provisions
- Marketable Securities Accounting

Are loan loss provisions adequate enough? Are marketable securities being accounted for properly?