Financial Market Stability and Systemic Risk

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The Fed in the 21st Century
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* Any views expressed represent those of the author only and not necessarily those of the Federal Reserve Bank of New York or the Federal Reserve System.

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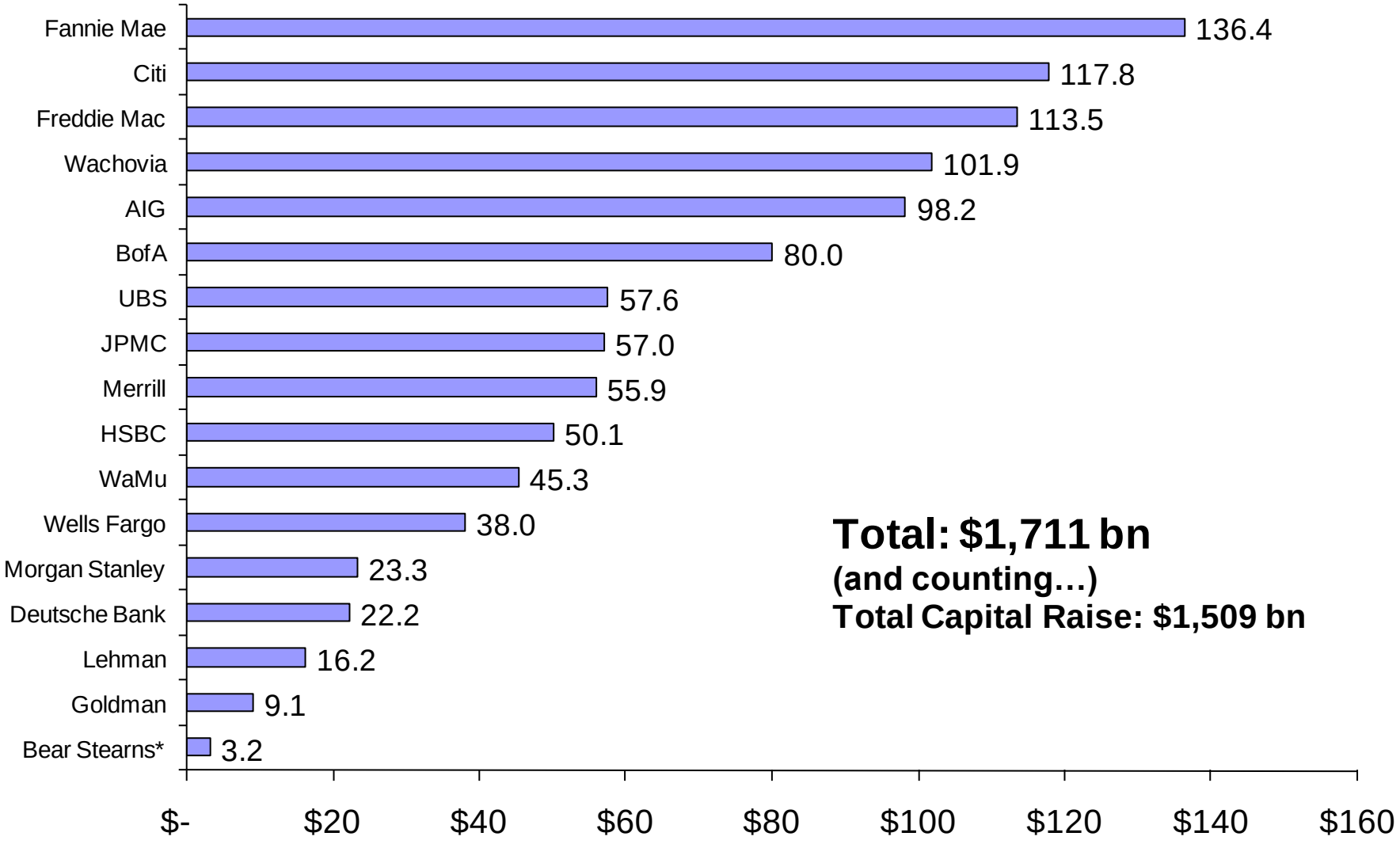
Words I thought I'd never hear . . . .

- Lehman won't file for bankruptcy before Asia opens
- The interbank market is completely shut down
- An insurance company is systemically important
- $2 trillion rescue plan ….. and the market drops 5%
- WSJ uses the word….. Nationalization

“Europe simulates financial meltdown”

(Headline in FT, April 10, 2006, p.2)

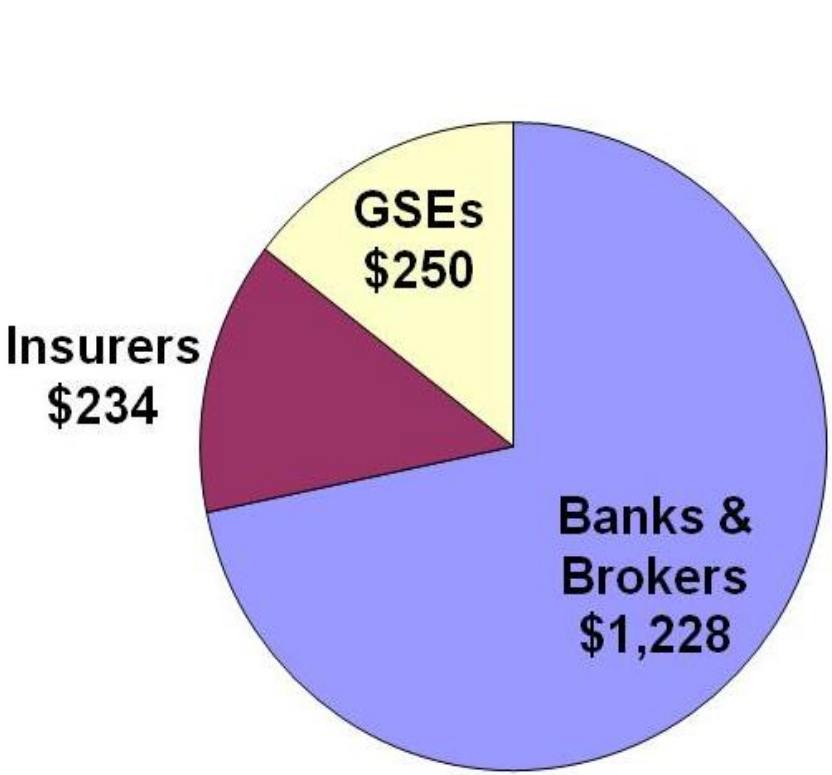
Financial Institution Write Downs
billions; through January 8, 2010

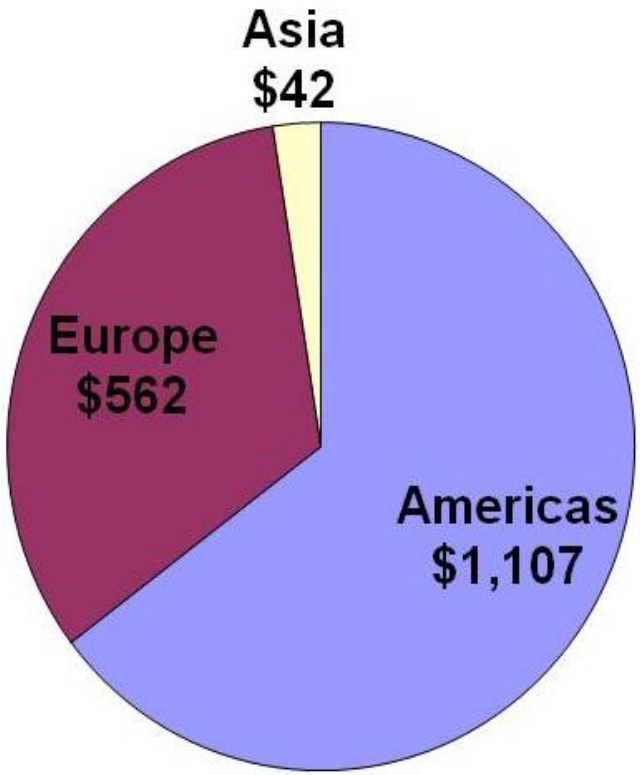


Source: Bloomberg

Write-downs since 2007

Financial Institution Write Downs
Billions USD, through January 8, 2010





Source: Bloomberg

Systemic Risk: some definitions

- Some terms you run across: collapse, system-wide, fragility, runs, panic, interlinkages and interdependencies

- Wikipedia: Systemic risk is the risk of collapse of an entire system or entire market and not to any one individual entity or component of that system. It can be defined as “financial *system* instability, potentially catastrophic, caused or exacerbated by idiosyncratic events or conditions in financial intermediaries.” It is also sometimes erroneously referred to as “systematic risk.”

Some more definitions

- DeBandt and Hartmann (2002): define a “systemic crisis” as occurring when a shock affects: “a considerable number of financial institutions or markets […], thereby severely impairing the general well-functioning (of an important part) of the financial system. The well-functioning of the financial system relates to the effectiveness and efficiency with which savings are channeled into the real investments promising the highest returns” (p. 11).

- Bordo, Mizrach, and Schwartz (1998): “shocks to one part of the financial system lead to shocks elsewhere, in turn impinging on the stability of the real economy” (p. 31)

- CRMPG II (2005) describes a financial shock with systemic consequences as one with: “major damage to the financial system *and* the real economy” (p. 5)

Risk & Return

- Risk is half of risk & return
- Risk in financial markets is largely about understanding the distribution of asset returns
- Two (three) flavors of risk: common (systematic & systemic) and specific (idiosyncratic)

Supply and demand for capital

<u>Supply</u>

- Firms
  - Cash flow
  - Pension funds
- Households
  - Savings

- ✓ Commercial Banks
- ✓ Securities Firms
- ✓ Insurers
- ✓ Asset Managers
- ✓ Exchanges

<u>Demand</u>

- Firms
  - Working capital
  - New equipment
  - Buffer against shocks
- Households
  - Big-ticket purchases (house, car)
  - Retirement
  - Buffer against shocks

Tension between risk and return

- Return is about the expected, risk about the **un**expected

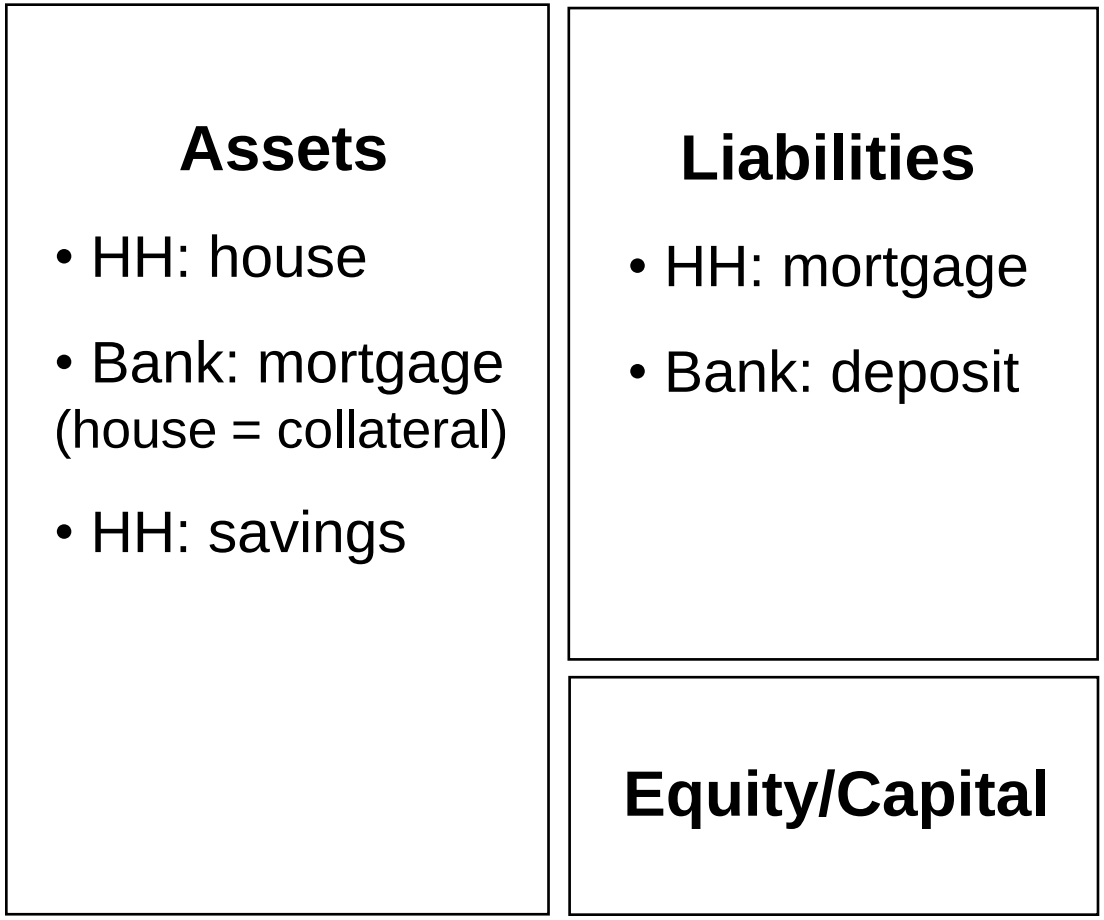
- For every agent in the economy – households, firms, even central banks – there is a tension between risk and return
  - Given the risk of a project or an action, is the expected return high enough?
  - And vice versa

- The tension is always there; it can't be eliminated, only managed … with good risk measurement and management

- In a firm, debtholders don't like risk (they may not get their money back), but shareholders like risk (they get the upside)

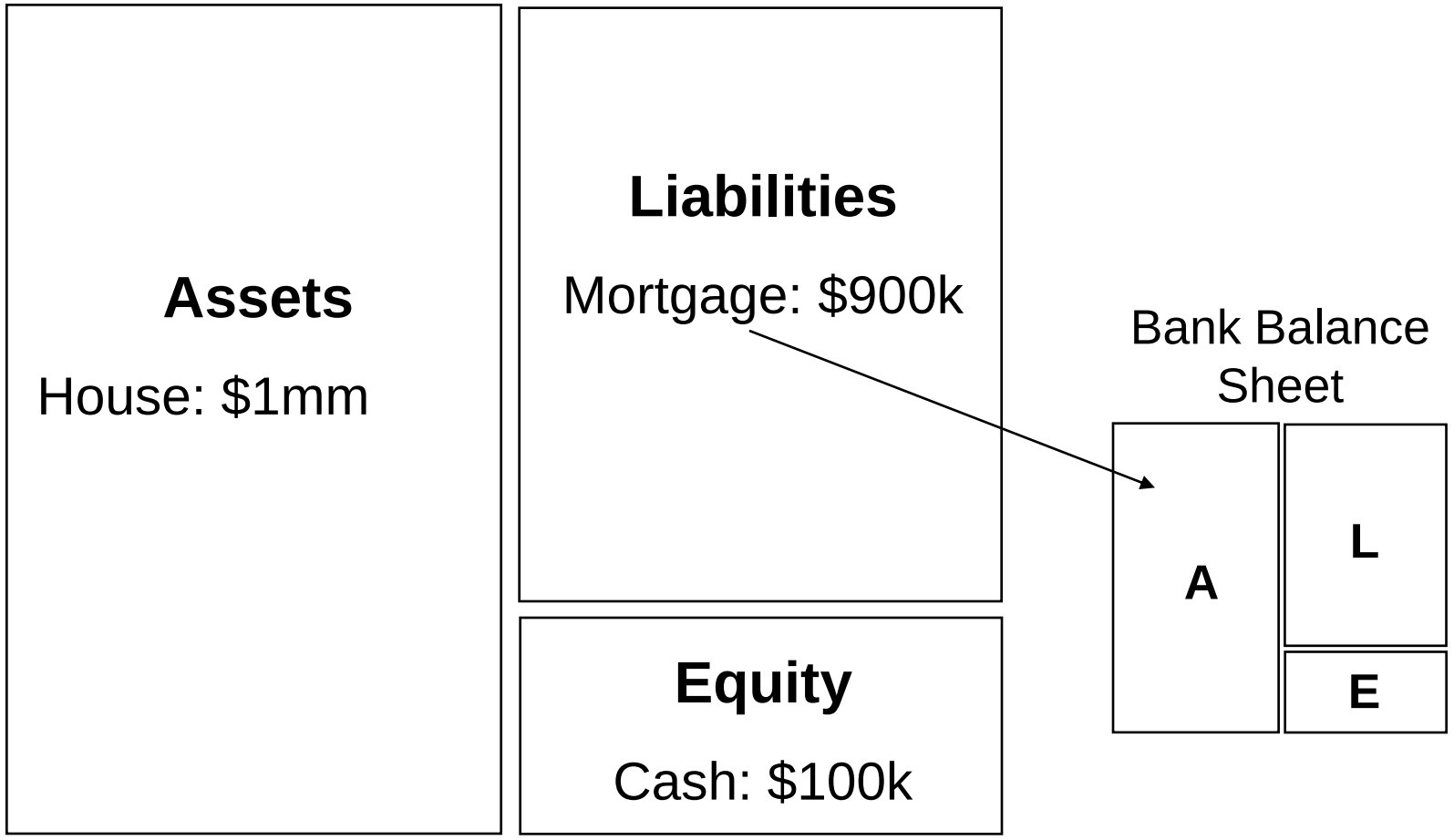
Financial institutions' balance sheets

- Assets and liabilities are typically the reverse of a firm or household



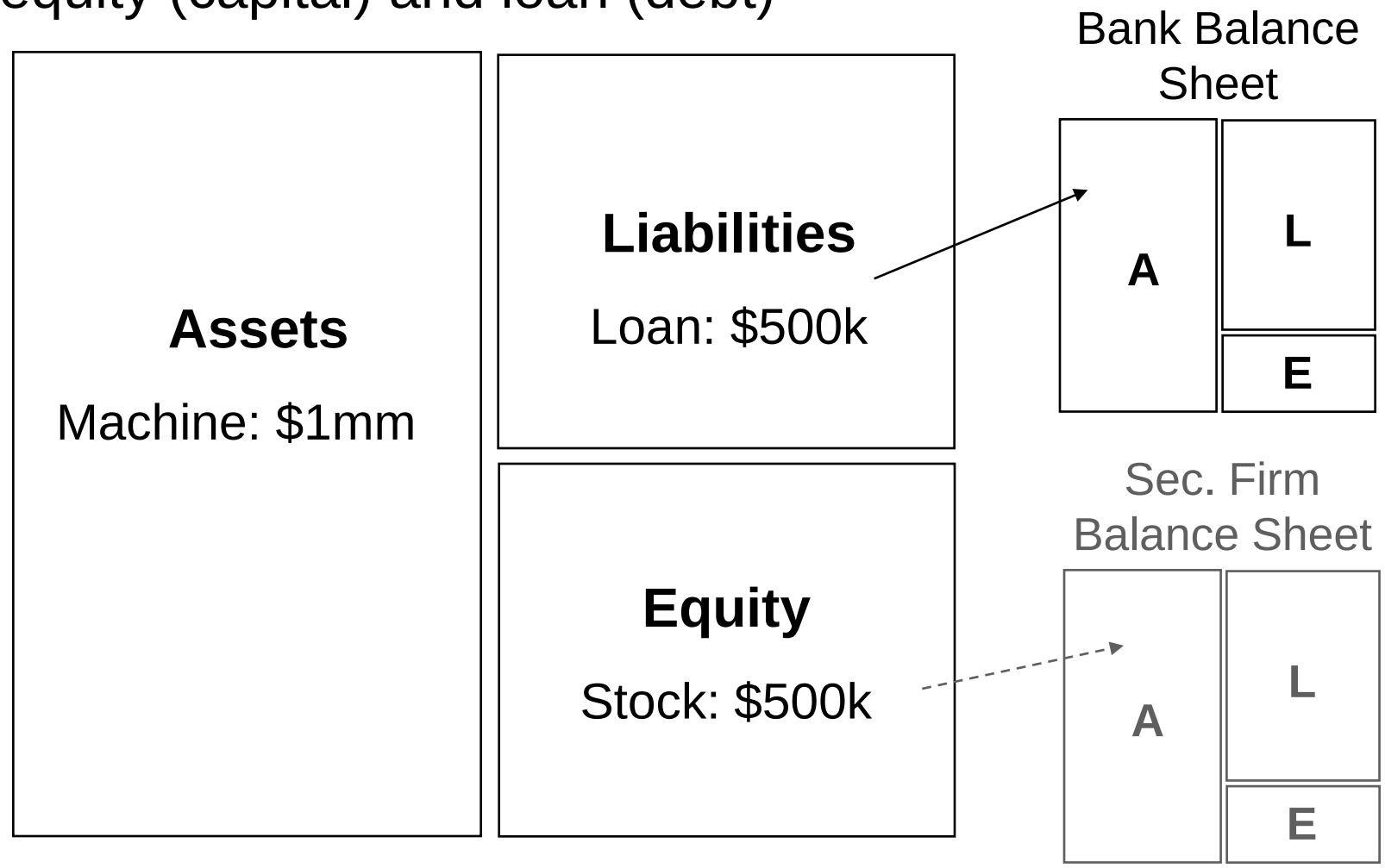
Household balance sheet

- Household buys house (asset) with cash (capital) and mortgage (debt)

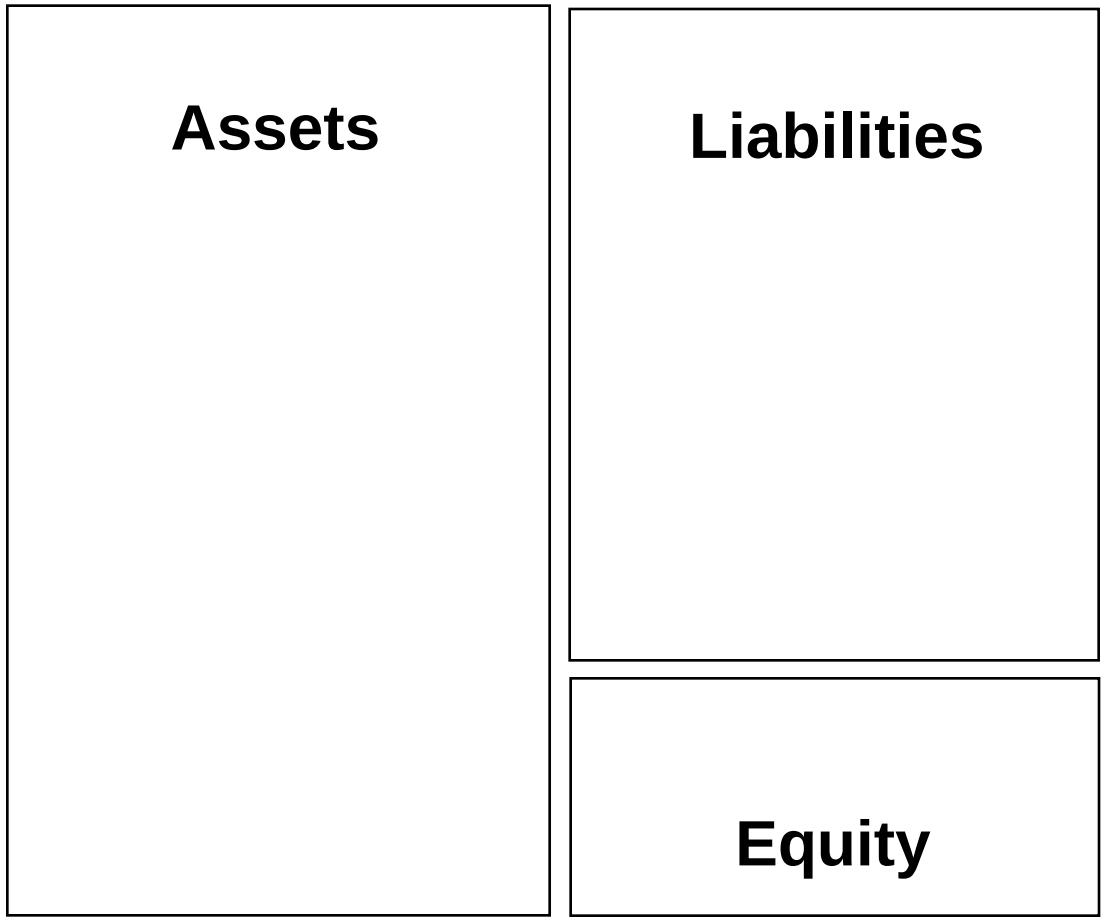


Firm's balance sheet

- Firm buys machine (asset) to make product with equity (capital) and loan (debt)



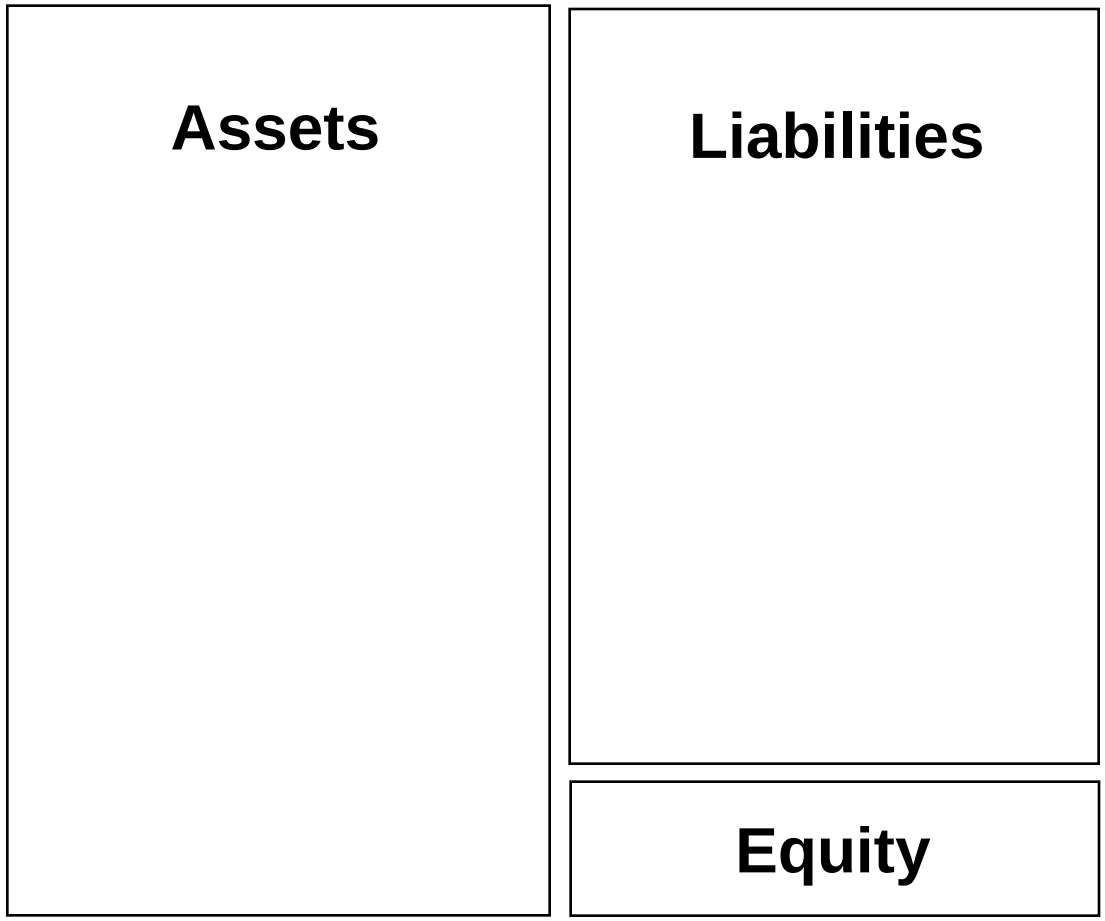
Capital/equity cushions vary widely



Bank

~10%

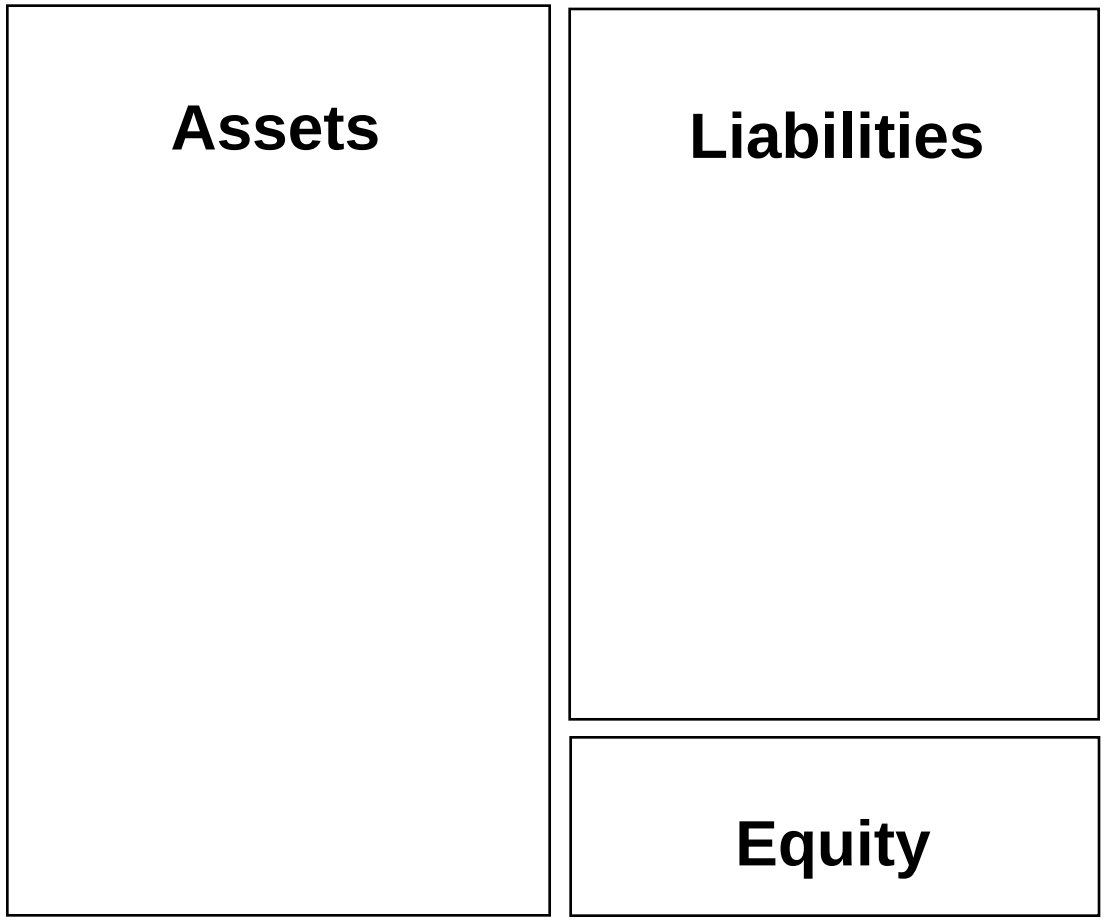
Capital/equity cushions vary widely



Securities Firm

~5%

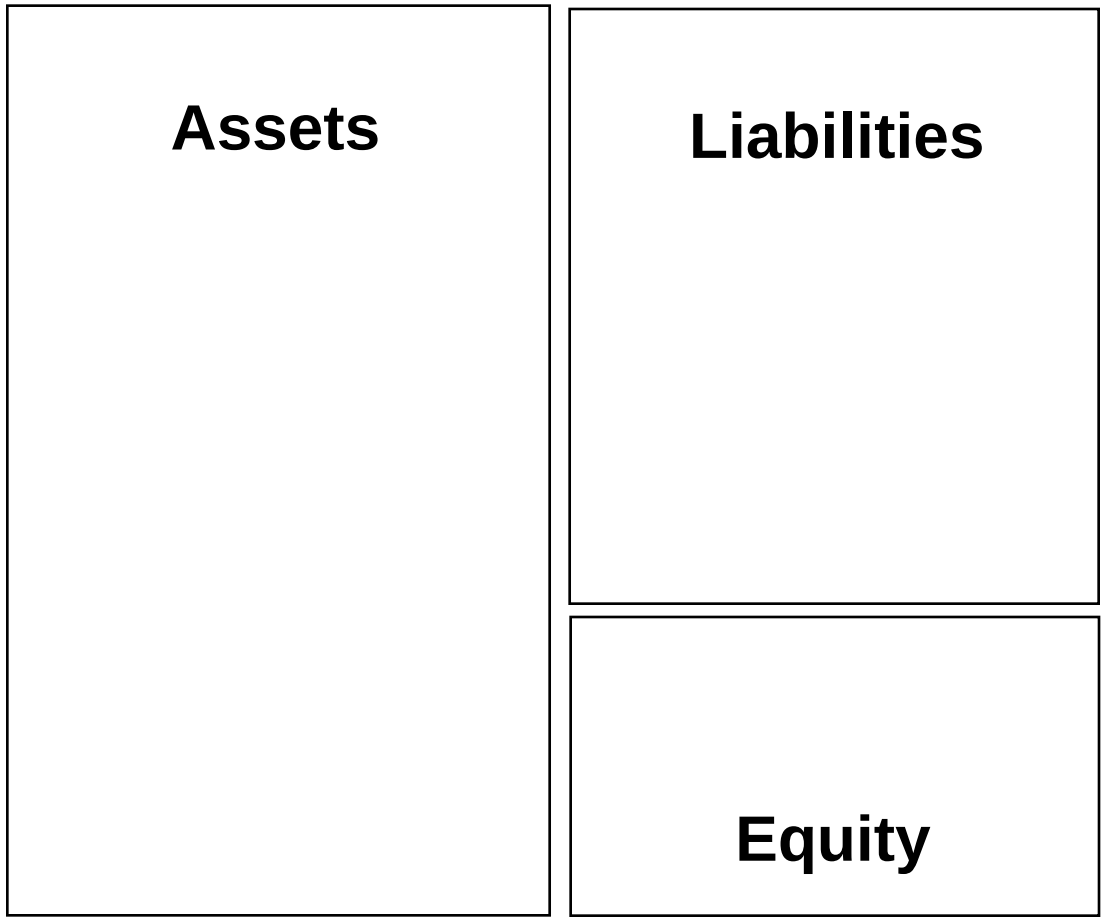
Capital/equity cushions vary widely



Life Insurer

~7%

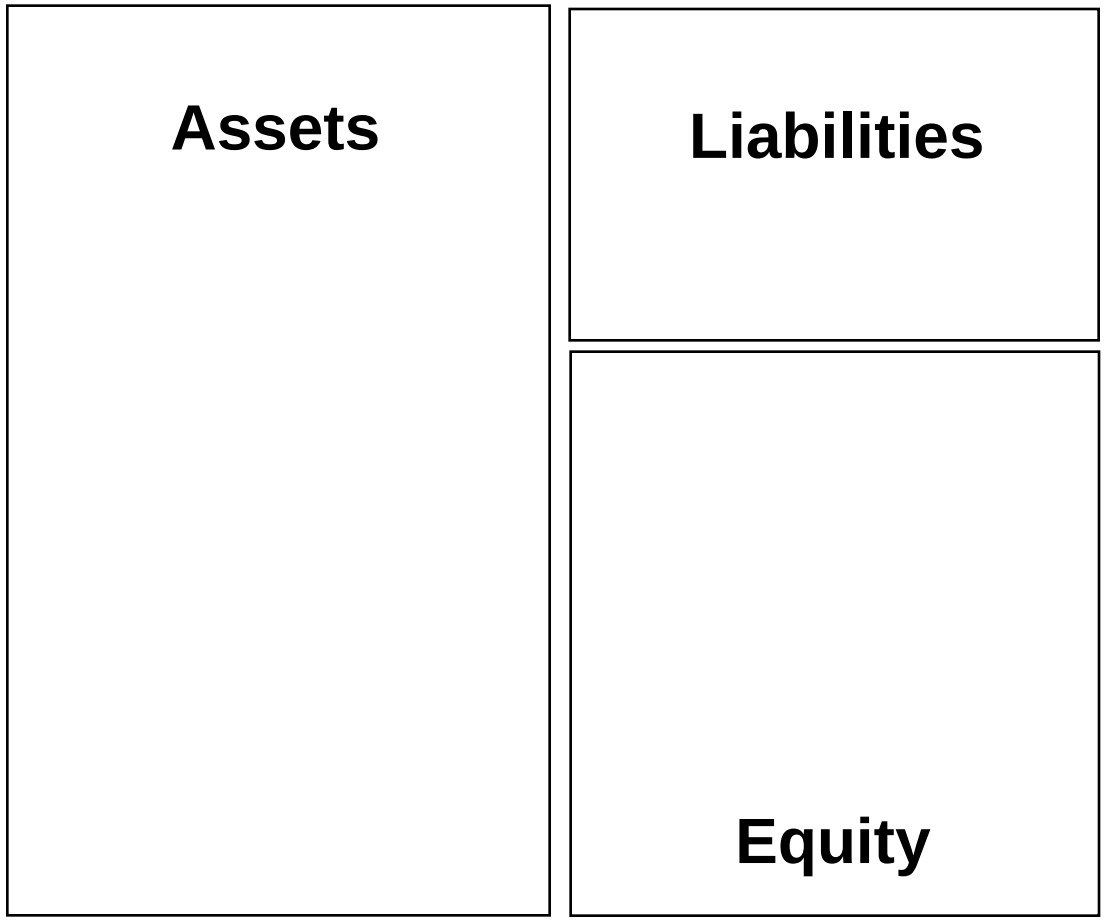
Capital/equity cushions vary widely



P&C Insurer

~25%

Capital/equity cushions vary widely



Non-financial

~60%

On and off-balance sheet

- In addition there are off-balance sheet assets and liabilities

- These are based on contingent claims, i.e. derivatives and options
  - Asset: received
  - Liability: given

- No immediate cash in or out, so no immediate risk
  - Hence “off” balance sheet
  - But depending on instrument/contract, potential for risk later
  - They can be very difficult to value
    - Difficult to assess potential downstream risk exposure

Risk management focuses largely on assets

- Most of risk management and regulation focuses on the asset side of the balance sheet

- Want to understand risk in **A** to make sure there is enough **E** in case **L** is claimed with short notice

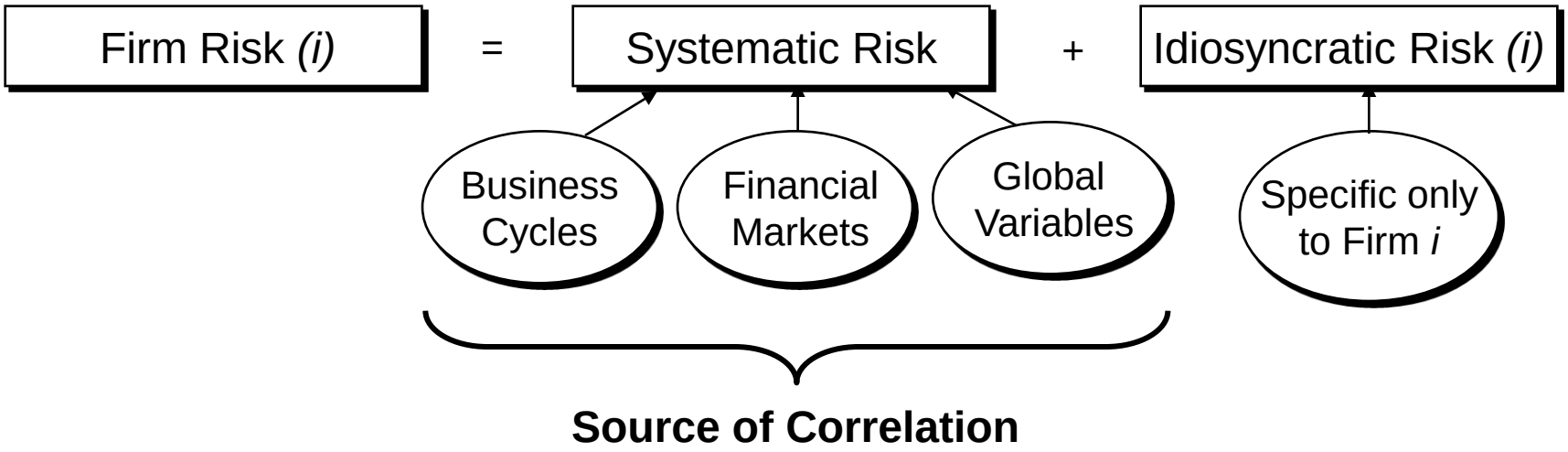
- In addition there is the asset-liability management (ALM) problem of managing the duration mis-match
  - Duration is the average life of an **A** or **L** cash flow
  - E.g.: duration of 30-yr mortgage is about 7 yrs in U.S.
  - E.g.: for bank, duration(**A**) > duration(**L**)

- It is critical to understand the distribution of asset returns!

Is all risk the same?

No!

- It is useful to split total risk into common or systematic and specific or idiosyncratic components
  - Correlations arise from systematic dependency



- Some firms are closely tied to the economy/financial markets/industry cycles, e.g., banks, real estate (high "β"), others less so (e.g., fast food)

We care largely about systematic risk

- Idiosyncratic risk can be diversified away
  - With a big enough portfolio (30 – 200+), idiosyncratic shocks “cancel out”

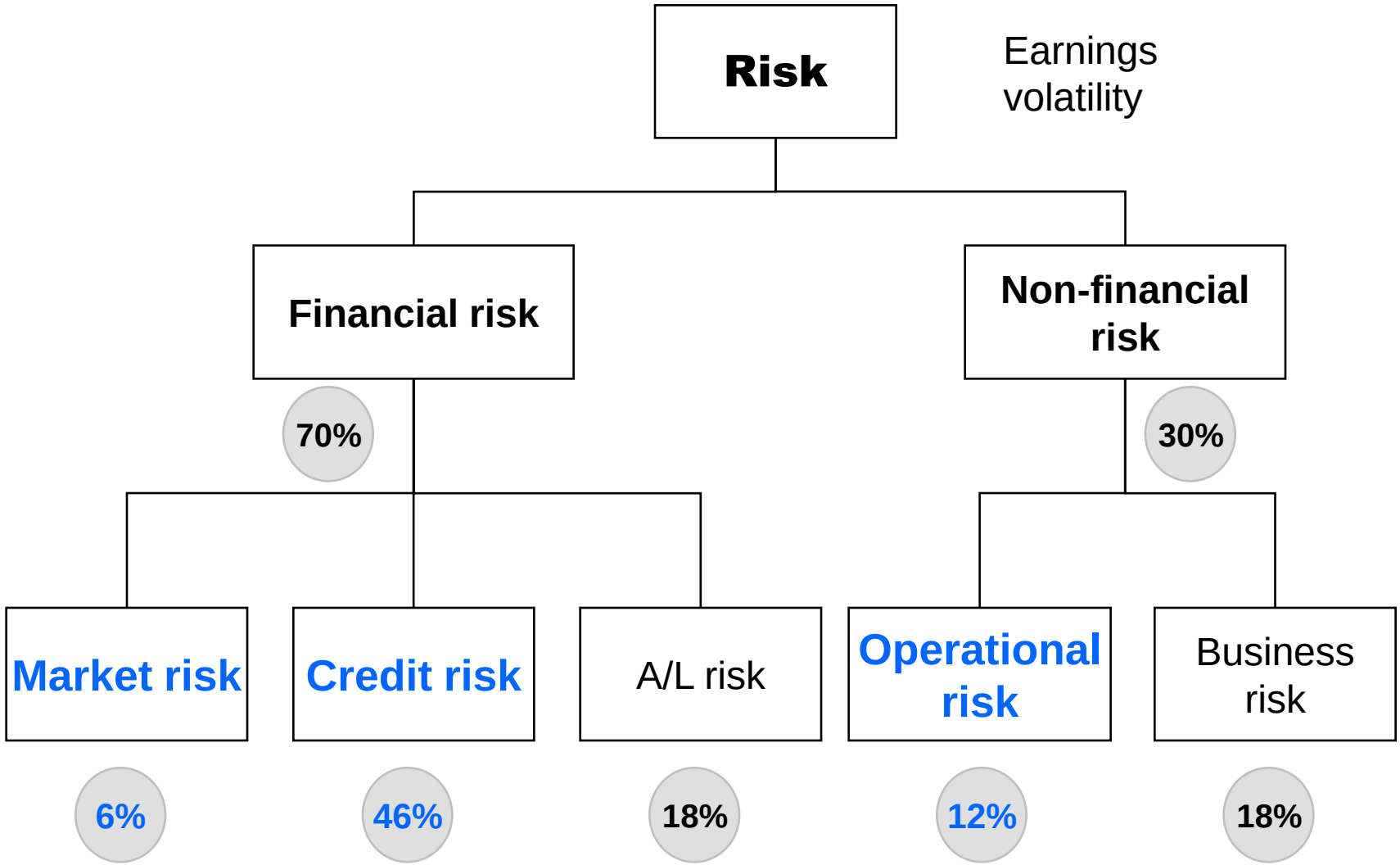
Firm Risk *(i)*	=	Systematic Risk	+	Idiosyncratic Risk *(i)*

- Systematic risk is common, shared
  - You’re stuck with it
  - So you better get paid for holding it

  → Risk premium

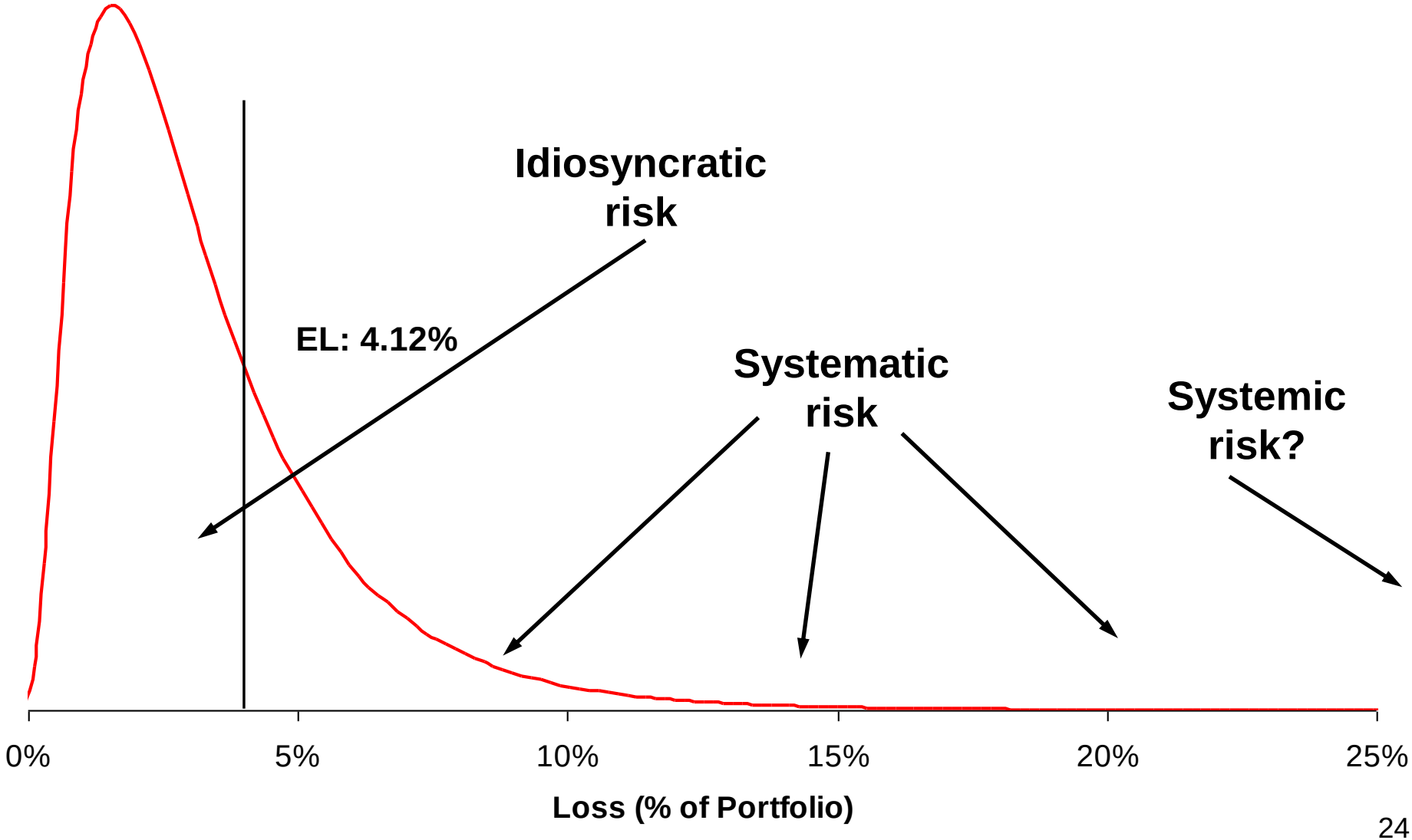
- Still, idiosyncratic risk can bite you
  - See Barings in 1995 and SocGen in 2008 (and Bernie Madoff) ….

Risk taxonomy (in banks)

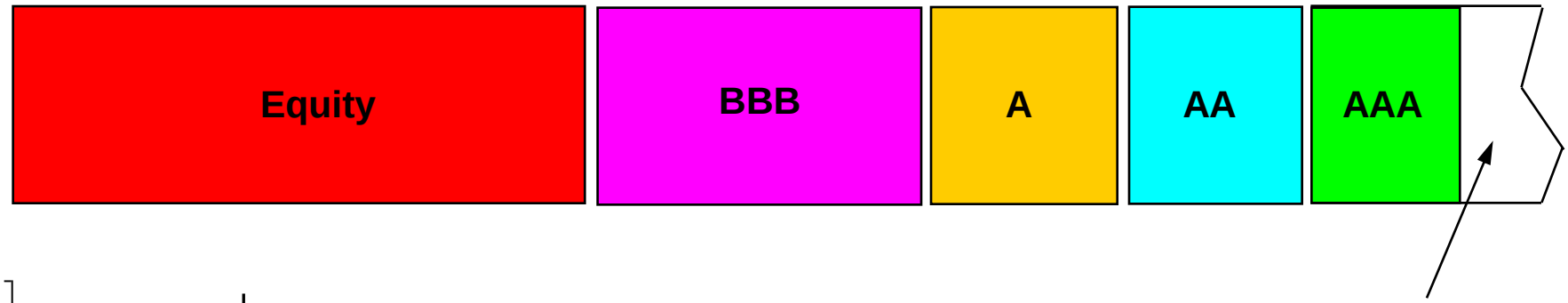


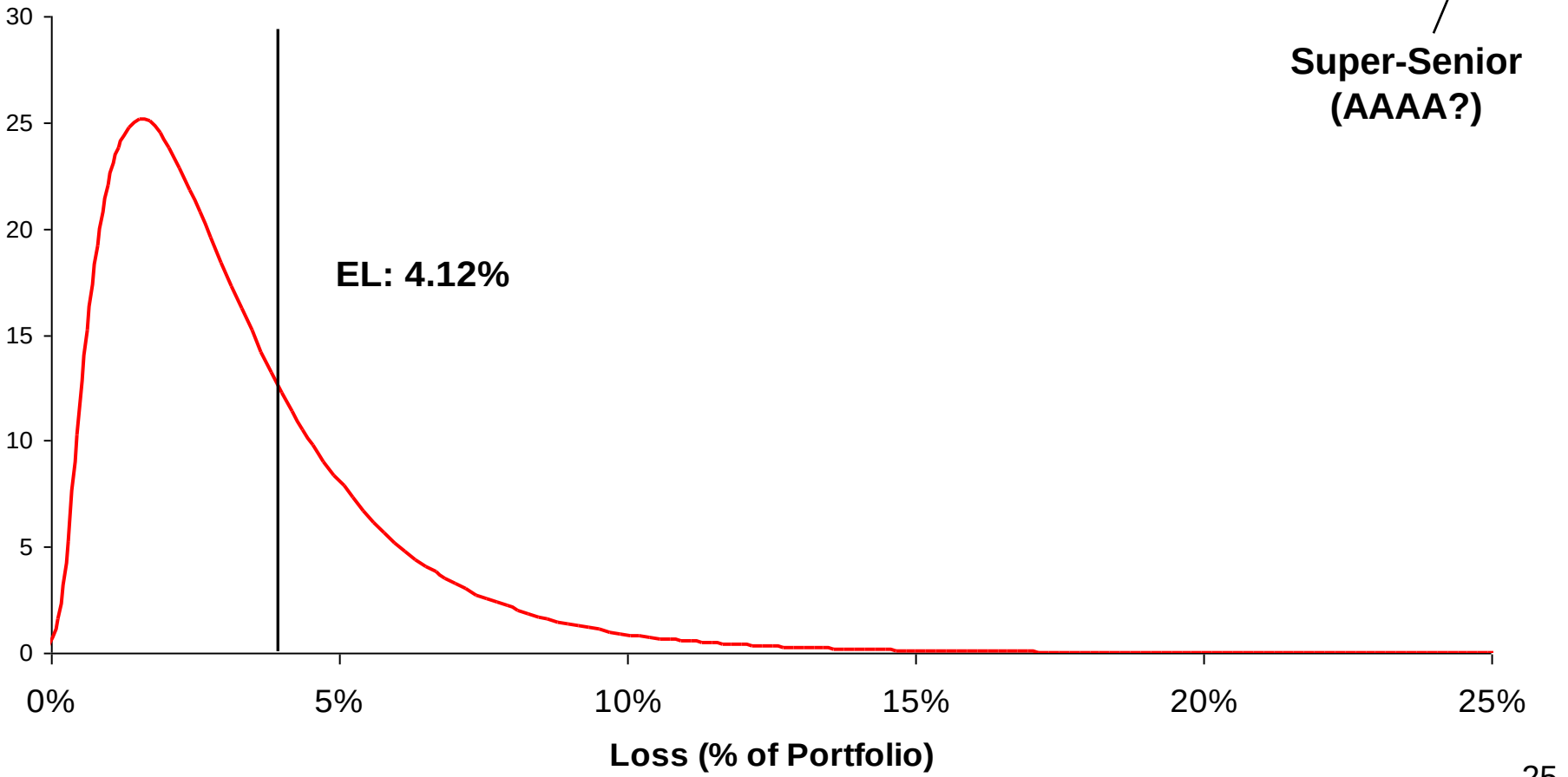
Source: Kuritzkes and Schuermann 2007

Loss distributions: specific and common risks

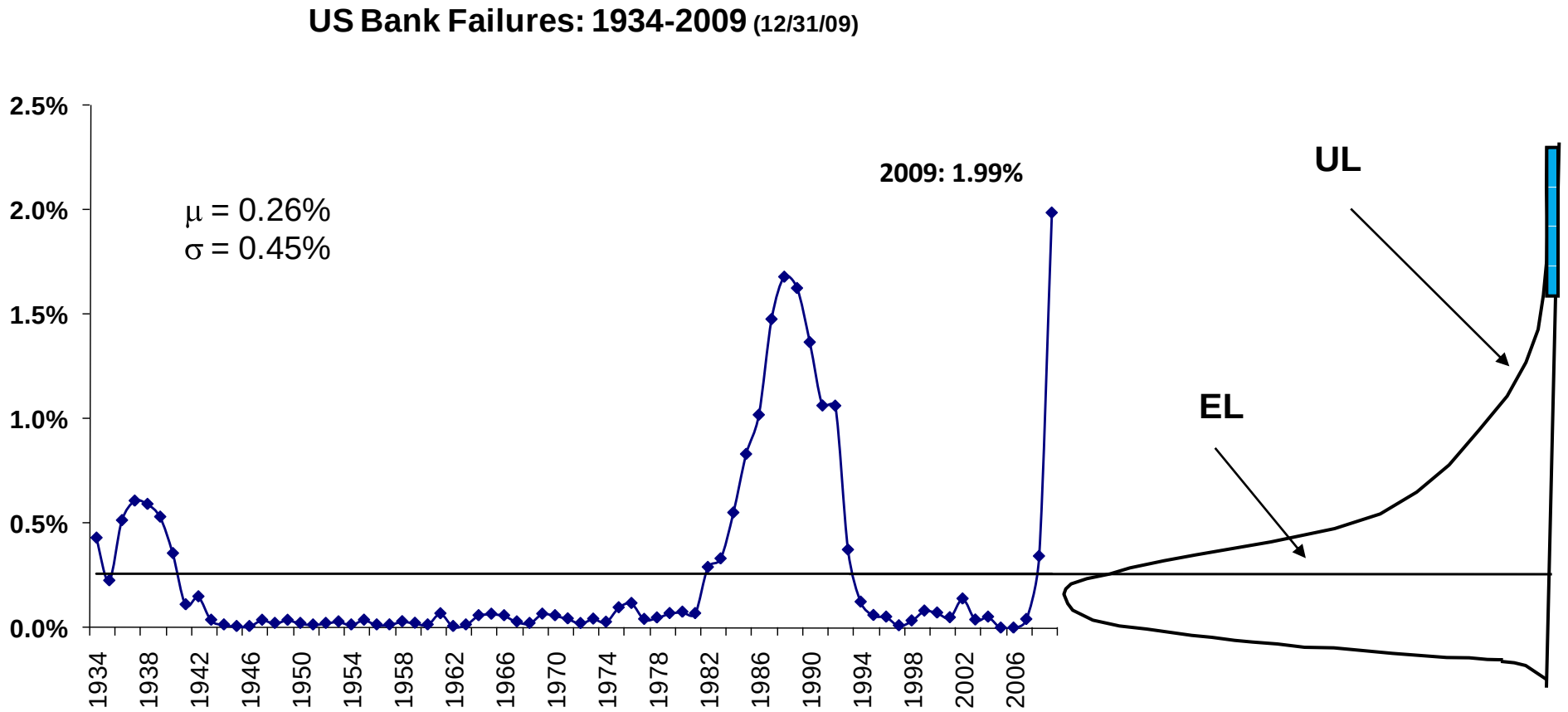


Tranching and systemic risk





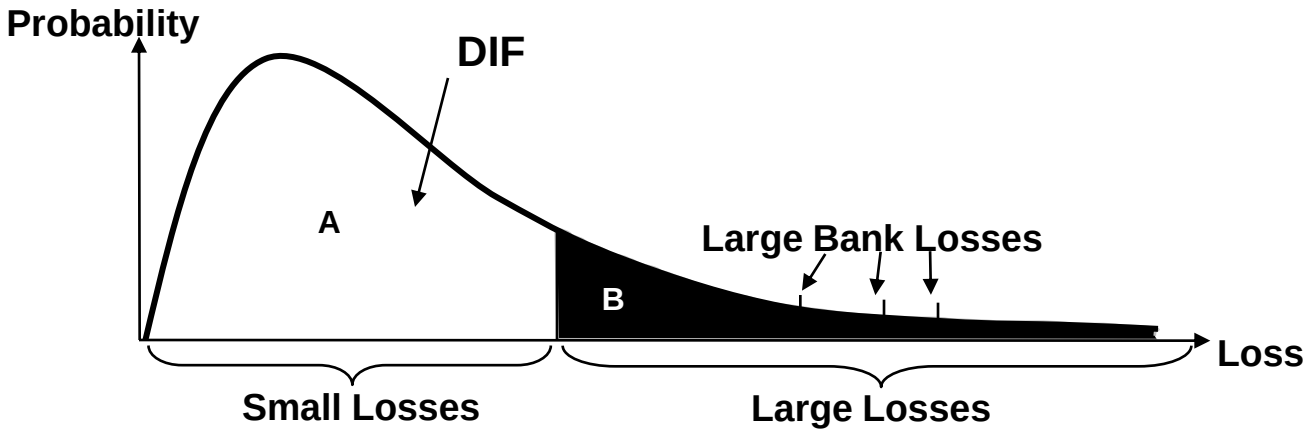
Loss distributions



Regulators face the same problem

FDIC insures deposits

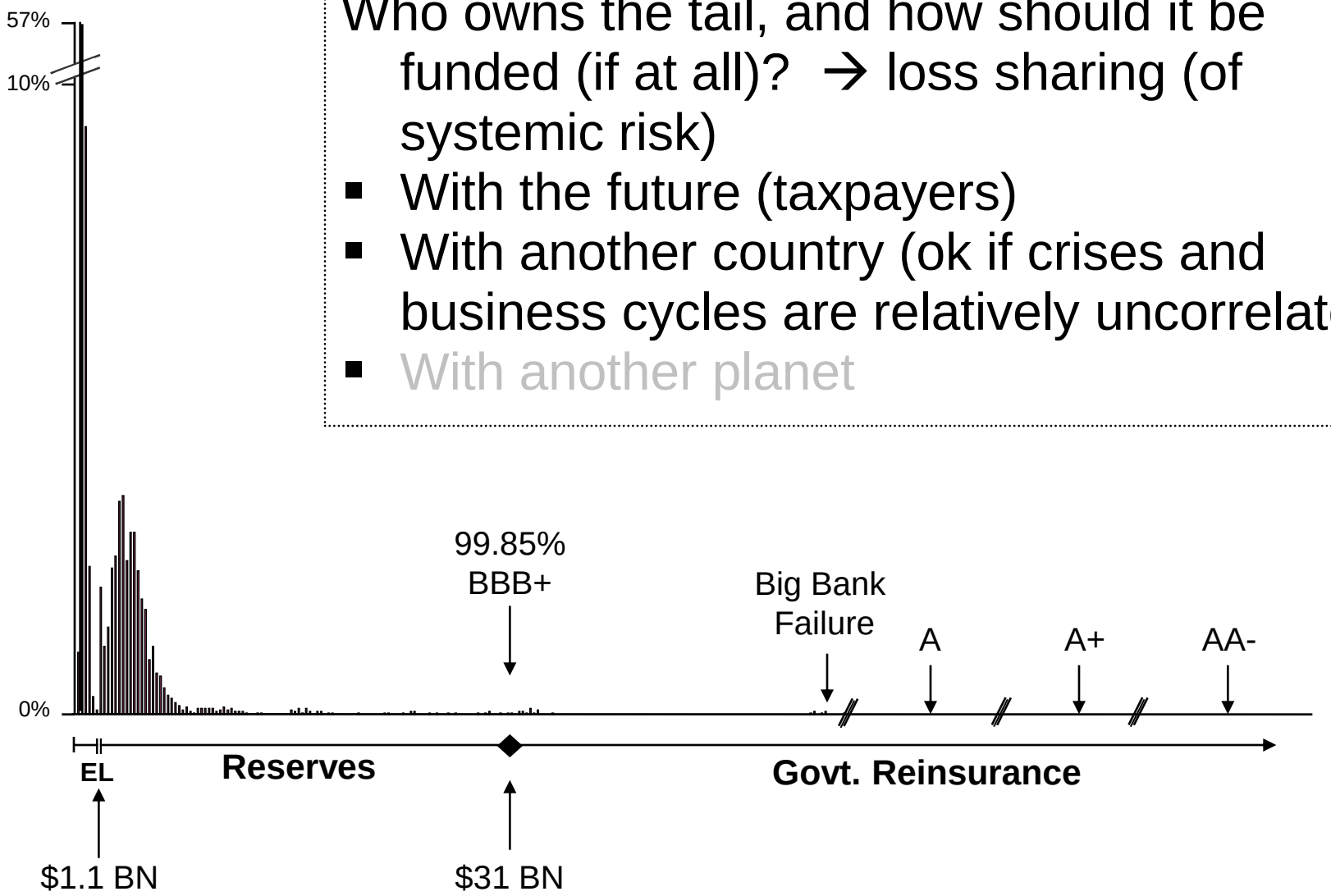
- Manages a portfolio of exposures . . . to US banking system
- Deposit Insurance Fund (DIF) designed to absorb expected and some unexpected losses
  - But how much?
  - Has to be at least 1.15% of insured deposits (and usually there was a slight surplus)
  - Currently (as of 2009Q3) negative



Simulation example for 2000

Who owns the tail, and how should it be funded (if at all)? → loss sharing (of systemic risk)

- With the future (taxpayers)
- With another country (ok if crises and business cycles are relatively uncorrelated)
- With another planet



Source: Kuritzkes, Schuermann, and Weiner 2005

Banks as liquidity providers and maturity transformers

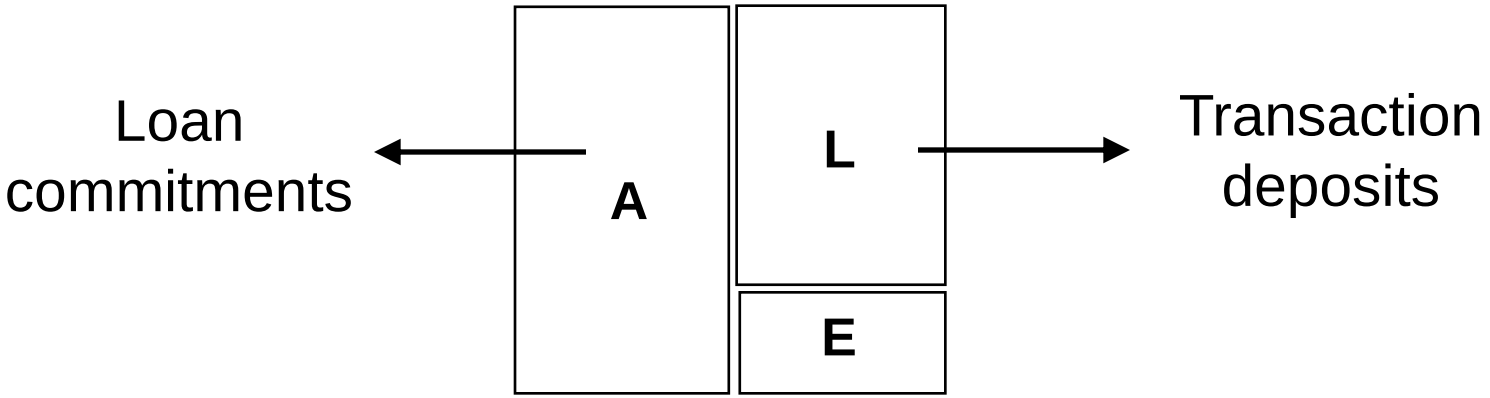
- ALM is a dominant, hard to measure (manage?) risk
  - It is central to what banks do

- Banks (commercial and investment) are naturally longer assets than liabilities
  - In intermediating they conduct maturity transformation for the economy
  - They bear risk – and are compensated
    - And subsidized (through the existence of safety net)

- And banks are liquidity providers of second to last resort

Bank liquidity management

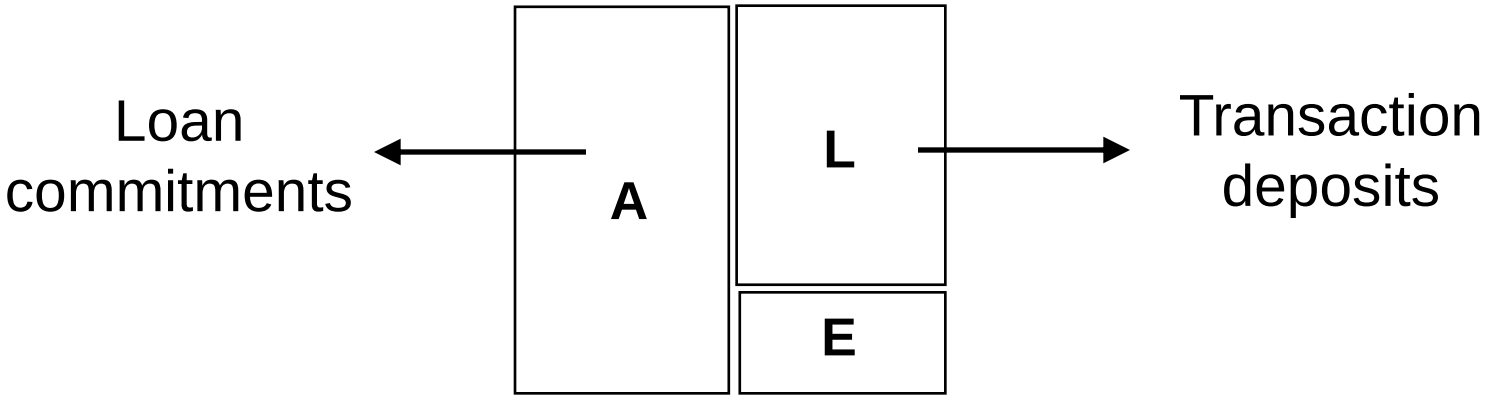
- A bank offers two short-term liquidity contracts



- Seems very unstable
  - What if demand spikes for both at the same time?
  - And what if that happens systematically (affecting *all* banks)
  - Worry about bank runs

Bank liquidity management

- A bank offers two short-term liquidity contracts



- Other sources of bank liquidity
  - Hold cash and liquid assets
  - Access to the inter-bank market
  - Borrow from the central bank

But maybe combining the 2 contracts reduces risk . . .

- Diversification synergy
  - Combining transactions deposits and loan commitments reduces *idiosyncratic* risk (Kashyap, Rajan & Stein, JF 2002)
  - Transaction deposits *hedge* the systematic liquidity risk exposure of loan commitments

- Flight to quality
  - Banks can bear *systematic* shocks to liquidity demand due to funding inflows (Gatev and Strahan, JF 2006)
  - Deposit-lending synergy is *stronger* in a liquidity crisis (e.g. Fall 1998) Gatev, Schuermann & Strahan, NBER 2005, RFS 2009

- Seems related to government safety net
  - Funding flows not related to bank solvency or size
  - Effects absent prior to FDIC (Pennacchi JME 2006)

The shadow and "actual" banking system

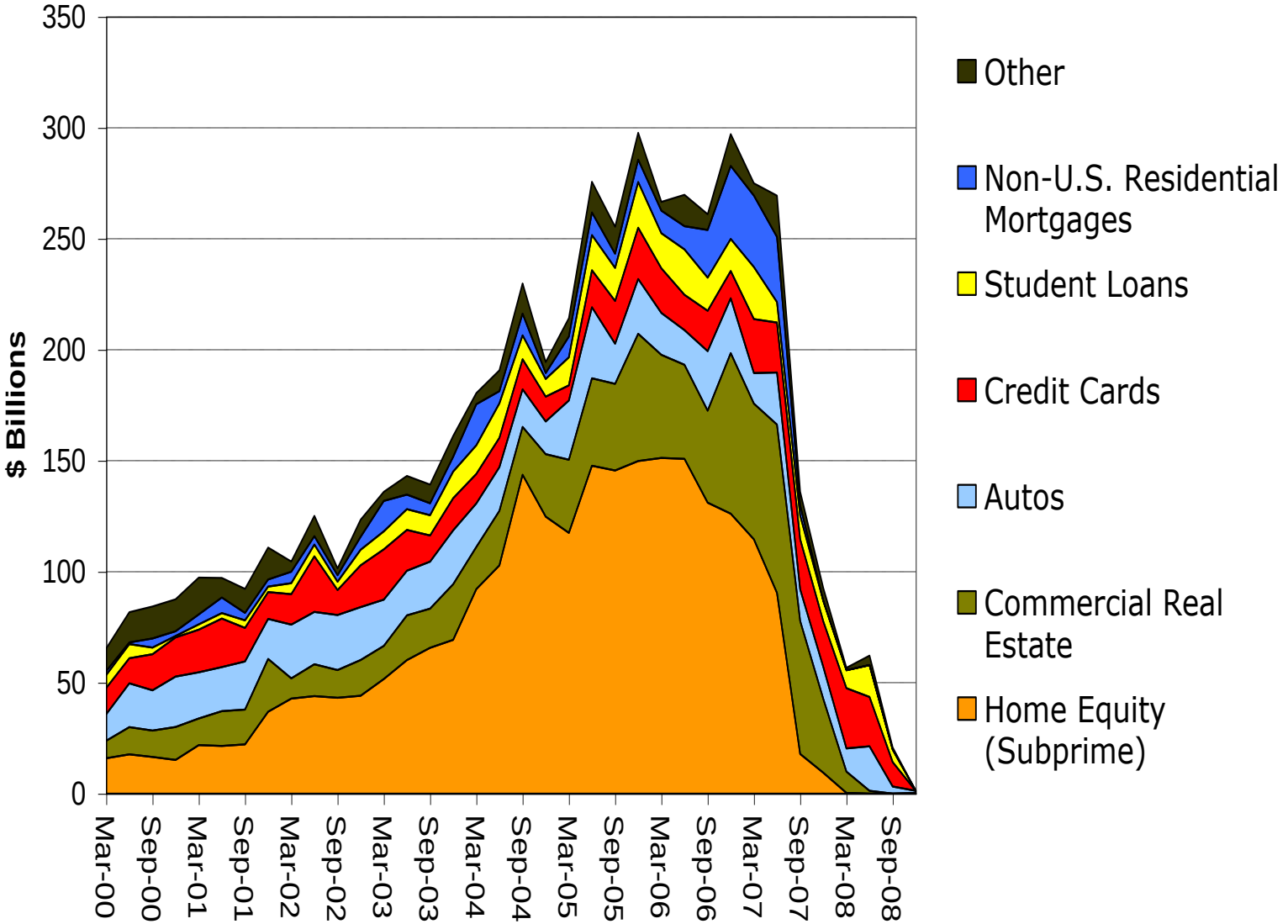
- Early 2007:
  - ABCP + SIV + ARS + TOB + VRDN ≈ $2.2 trn
  - O/N tri-party repo: $2.5 trn
  - Hedge funds AUM: $1.8 trn
  - Assets of 5 i-banks: $4 trn

  - Assets of 5 U.S. BHCs: $6 trn
  - Assets of all U.S. banks: $10 trn

- Typically about 40% of consumer debt is securitized
  - No more; now it has to go back on to banks' BSs

- Meanwhile, sum of write-offs to date (> $1.3 trn) exceeds cost of S&L crisis (~ $250 bn in current $)

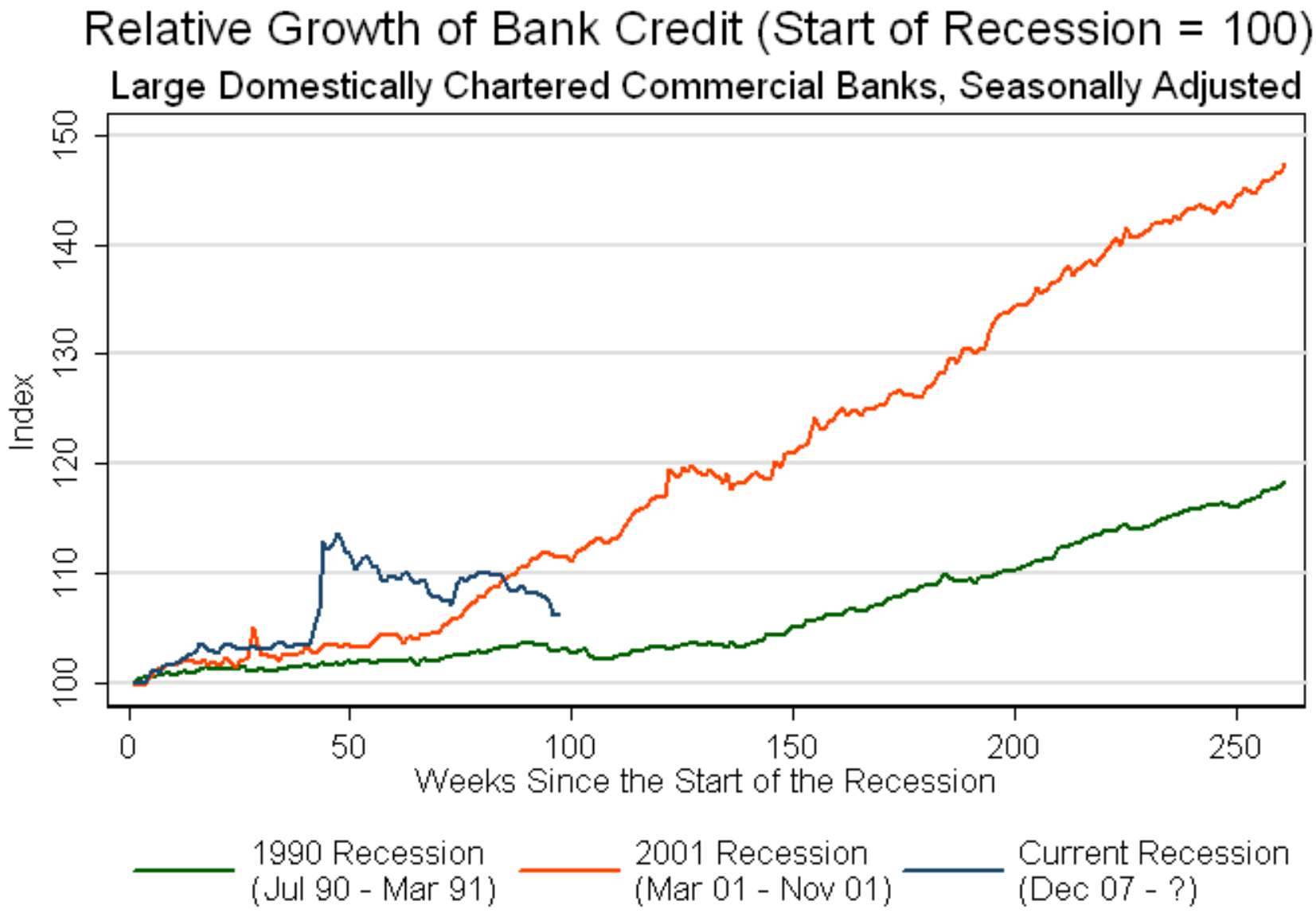
ABS Issuance: growth and collapse



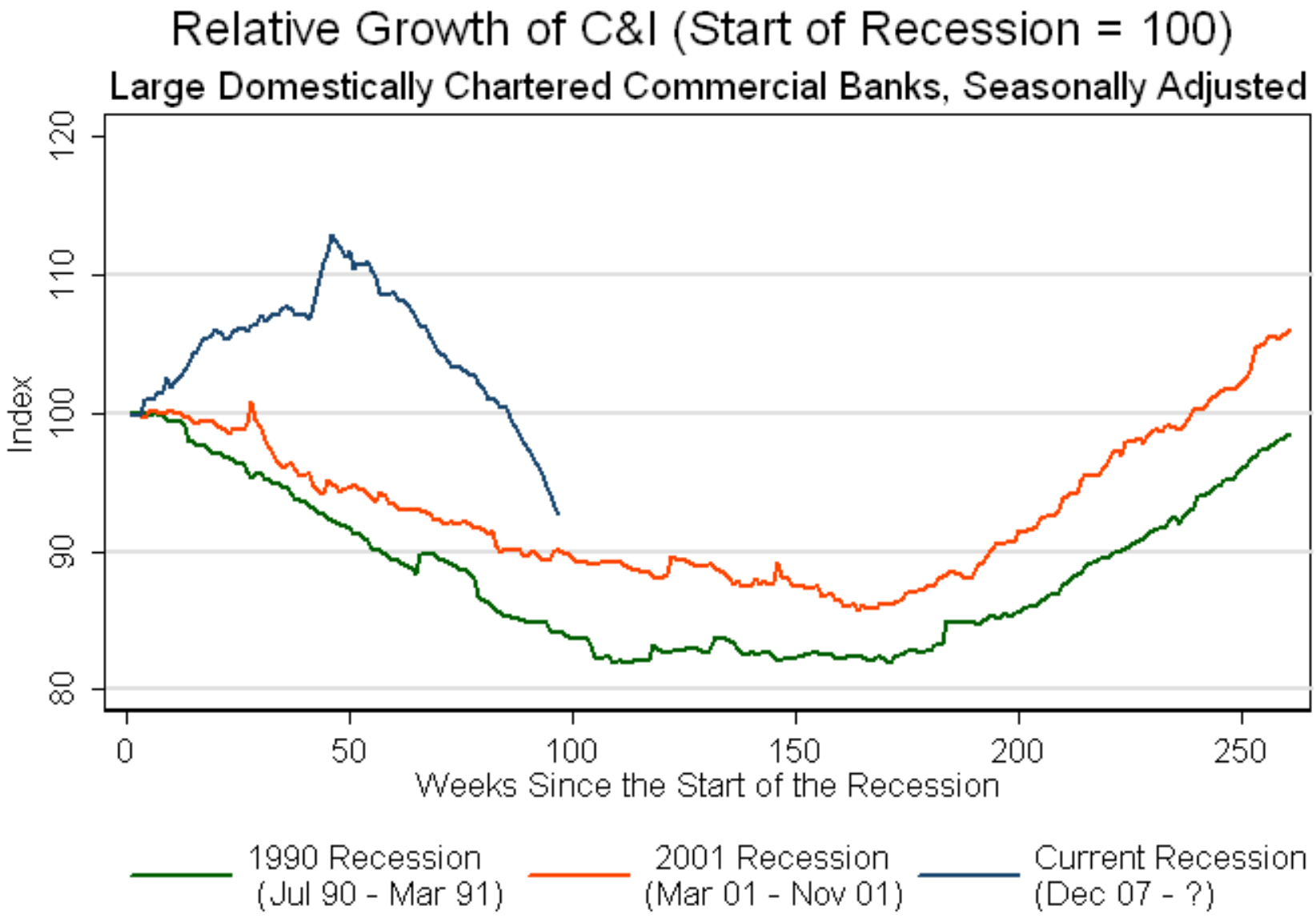
Source: JP Morgan

What was going on in depth of crisis?

- Banks were hoarding liquidity
- Deposit flows
  - Foreign/domestic ….
- Bank balance sheets are growing
  - "Voluntarily"?
  - Banks are clearly re-intermediating as the "shadow banking system" is shrinking
  - But are they extending enough new credit?
- New Fed facilities
  - To help with liquidity (TAF, TSLF, PDCF)
  - To also help with credit provision (CPFF, TALF)



Source: Federal Reserve H.8 data



Source: Federal Reserve H.8 data

Two channels for systemic risk

- DeBandt and Hartmann (2002)
  - Narrow contagion
  - Broad simultaneous shock

- Narrow: may result in downstream defaults ("domino effect")

- Broad: big shock resulting in widespread direct defaults

- Which one matters more?
  - Frequency
  - Severity

Risk management + network analysis

- Elsinger, Lehar & Summer (MS 2006) combine modern risk management tools with network analysis
  - Joint treatment of market & credit risk
  - Address question at the system level (for them, Austria)
  - Bank are connected to each other (network)
  - Network is “open”

- Take advantage of detailed “systemic balance sheet” information
  - Application of Eisenberg & Noe (MS 2001) network model, plus uncertainty

What matters?

- Broad is more important than narrow
  - But, contagion, while rare, can “wipe out major parts of the banking system”
- Bankruptcy costs / failed bank resolution drive contagion effect
  - Effect nonlinear: past some point, contagion spreads rapidly
- Elsinger, Lehar and Summer say it’s cheap to avoid major contagion
  - For 99.9% confidence level, just 0.12% of banking system assets

What it implied for policy

- First-order worry: broad channel, direct effects
  - Promote good risk measurement & management at the bank level
  - Allows for more “decentralized” supervision

- Worry less about the harder-to-spot contagion
  - Detailed knowledge about inter-bank exposures not so important
  - Liquidity injection & efficient failed bank resolution as systemic crisis medicine

Final thoughts

- Network effects are really hard to spot
  - But have turned out to be quite important
- Complex linkages through the instruments
  - Structured credit products (CDO^n) combined broad risk factor exposure (home price index) and interdependence (though layers of structured instruments)
- Remains surprisingly hard for firms, and hence supervisors, to gain complete exposure picture
  - Across all products, instruments, relationships, legal entities,…
- Everything is endogenous . . . for a central banker

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Thank You!

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