David M. Rowe

Risk Advisory

Why Risk Management Has Lost Credibility and What to Do About It

Presented to
PRMIA Chapter Seminar
Toronto, Ontario
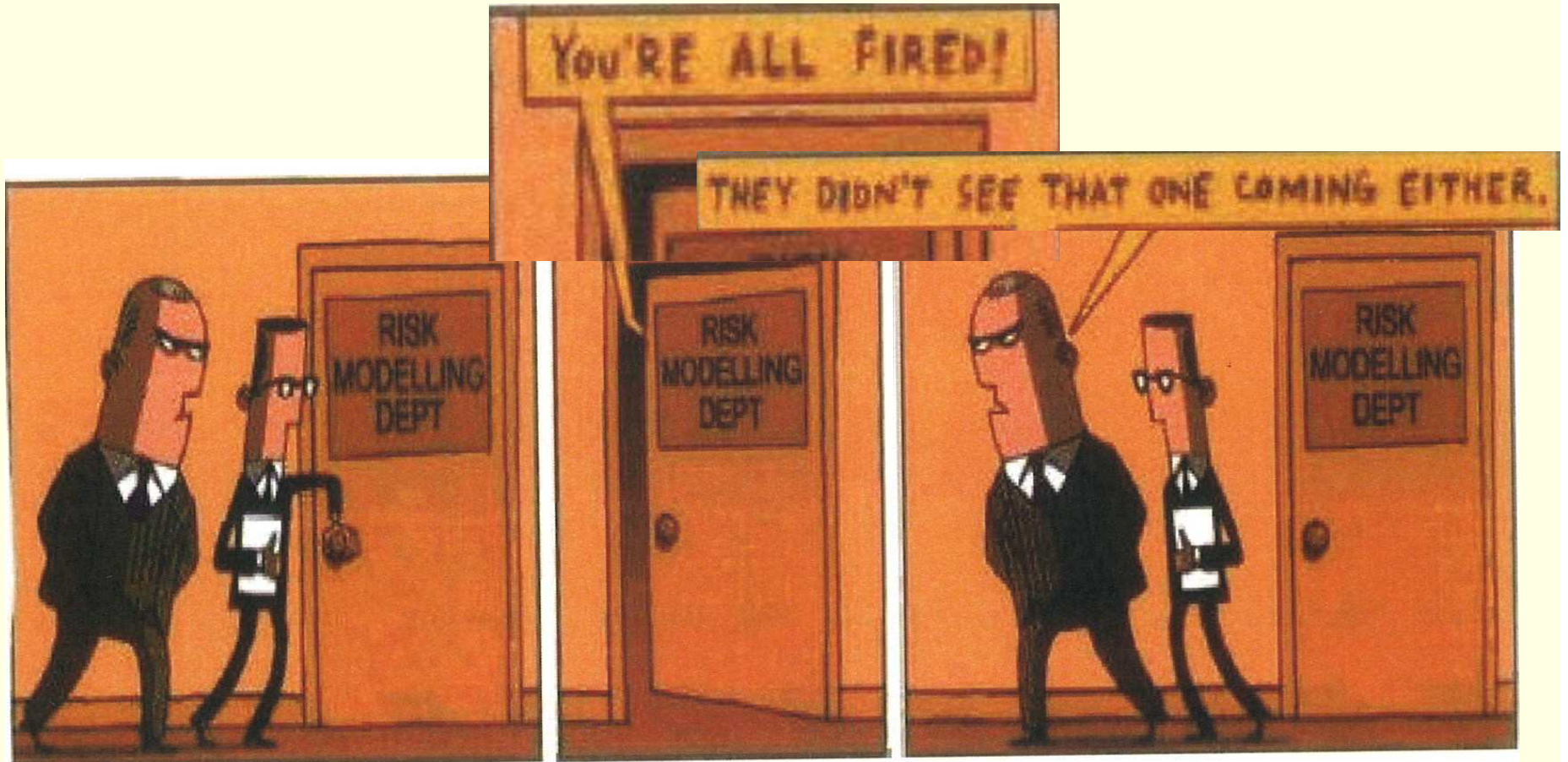**May 18, 2010**

Presented by
David M. Rowe, Ph.D.
President
David M. Rowe *Risk Advisory*

What to Do About It

Things We Ignored at Our Peril

1. Statistical Entropy
2. Structural Imagination
3. Self-Referential Feedback
4. Complexity and Dark Risk
5. Alternate Means of Valuation

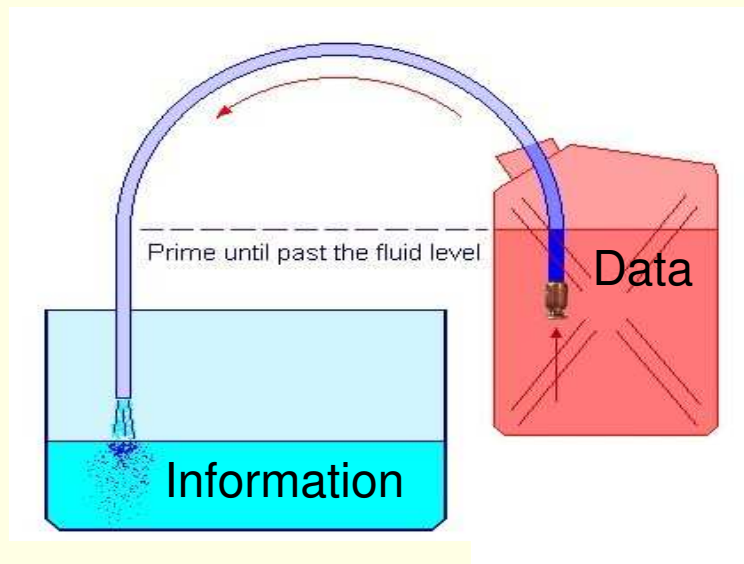## Something to Consider

6. A Framework for Assessing Dark Risk

Statistical analysis can *extract* information from data, it *cannot create* information not already contained in the data.

Stated more casually:
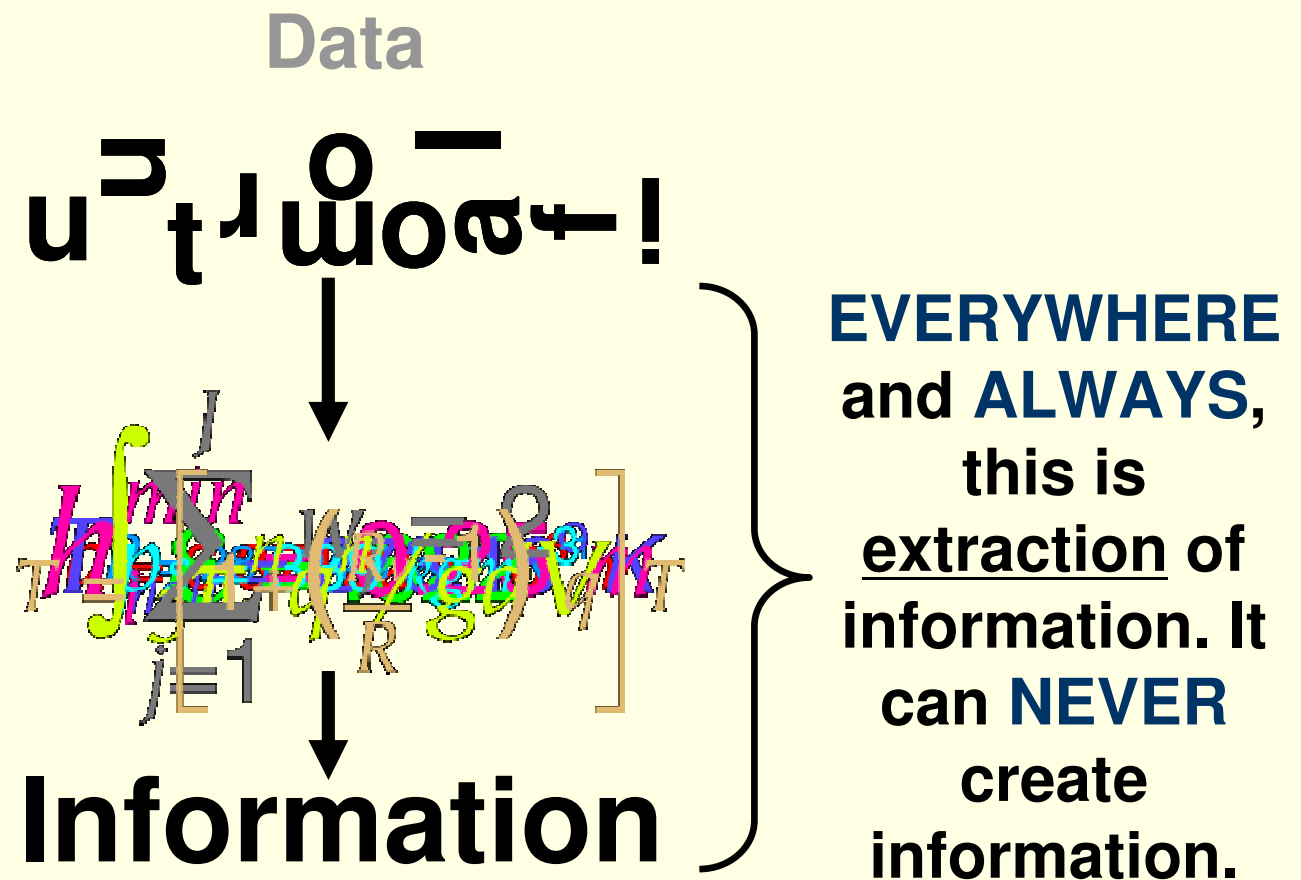
Like water, information cannot rise higher than its source.

Prime until past the fluid level

Data

Information

Data

Information

EVERYWHERE and **ALWAYS**, this is <u>extraction</u> of information. It can **NEVER** create information.

Extreme Confidence Estimates

AAA
AA
A
BBB
BB
B
CCC

- **1 annual default every 10,000 years!**

- **This is twice as long as the written history of Egypt or China!**

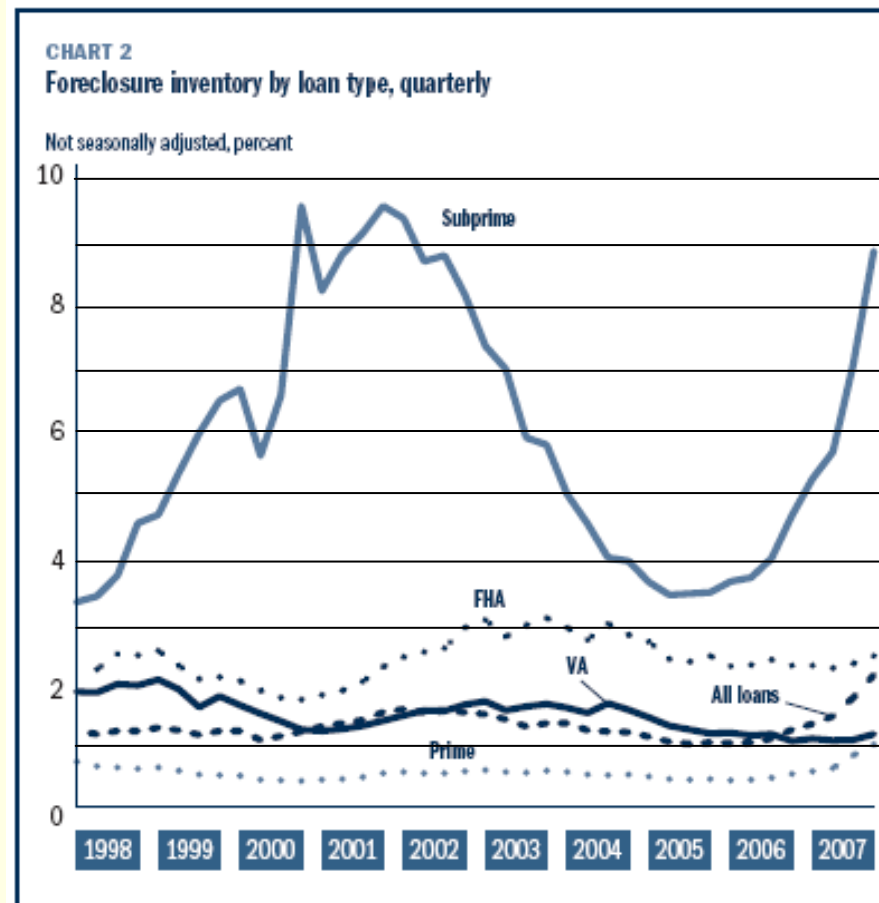- **Super-senior tranches of subprime mortgage-backed securities were rated AAA (or BETTER!!)**

- **What was the empirical basis for these ratings?**
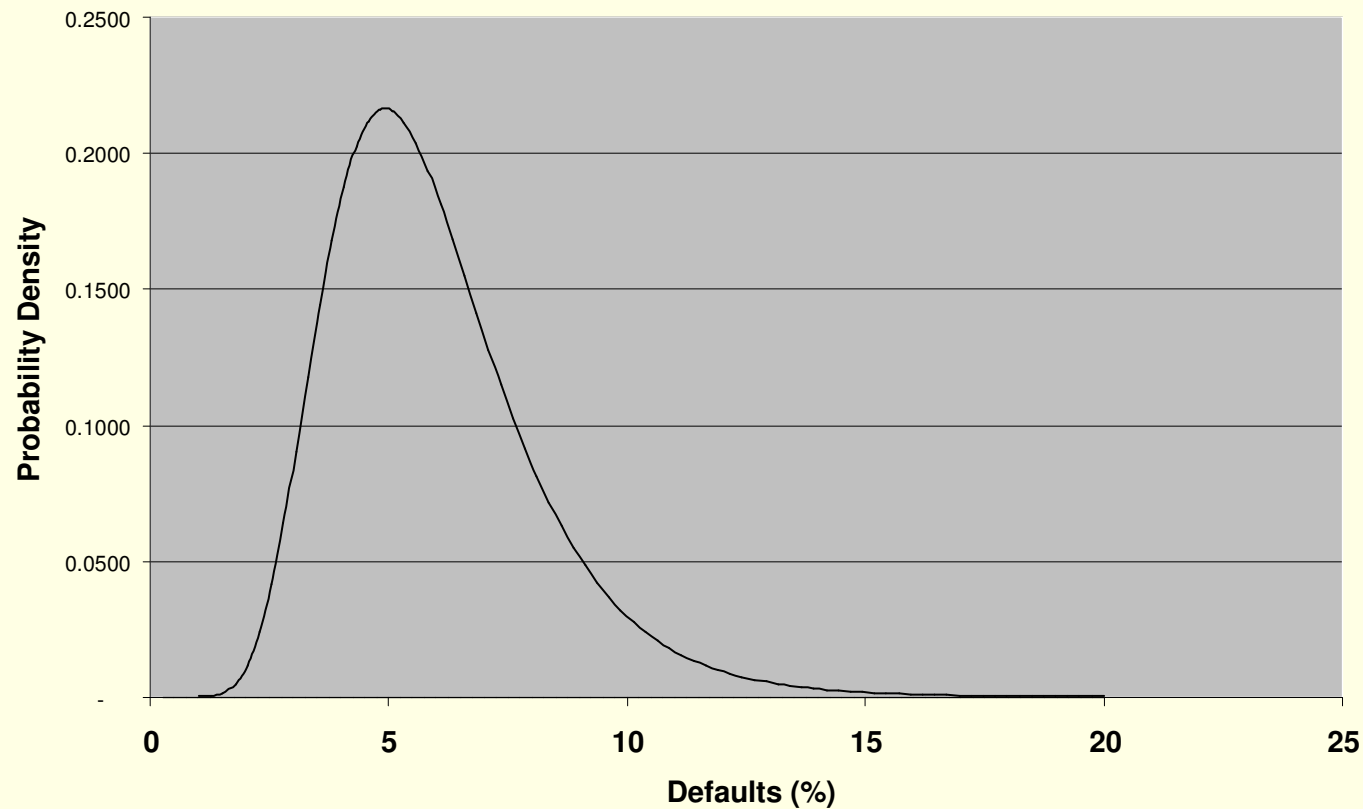
Mortgage Default Experience

CHART 2
Foreclosure inventory by loan type, quarterly

Not seasonally adjusted, percent

Hypothetical Detachment Point
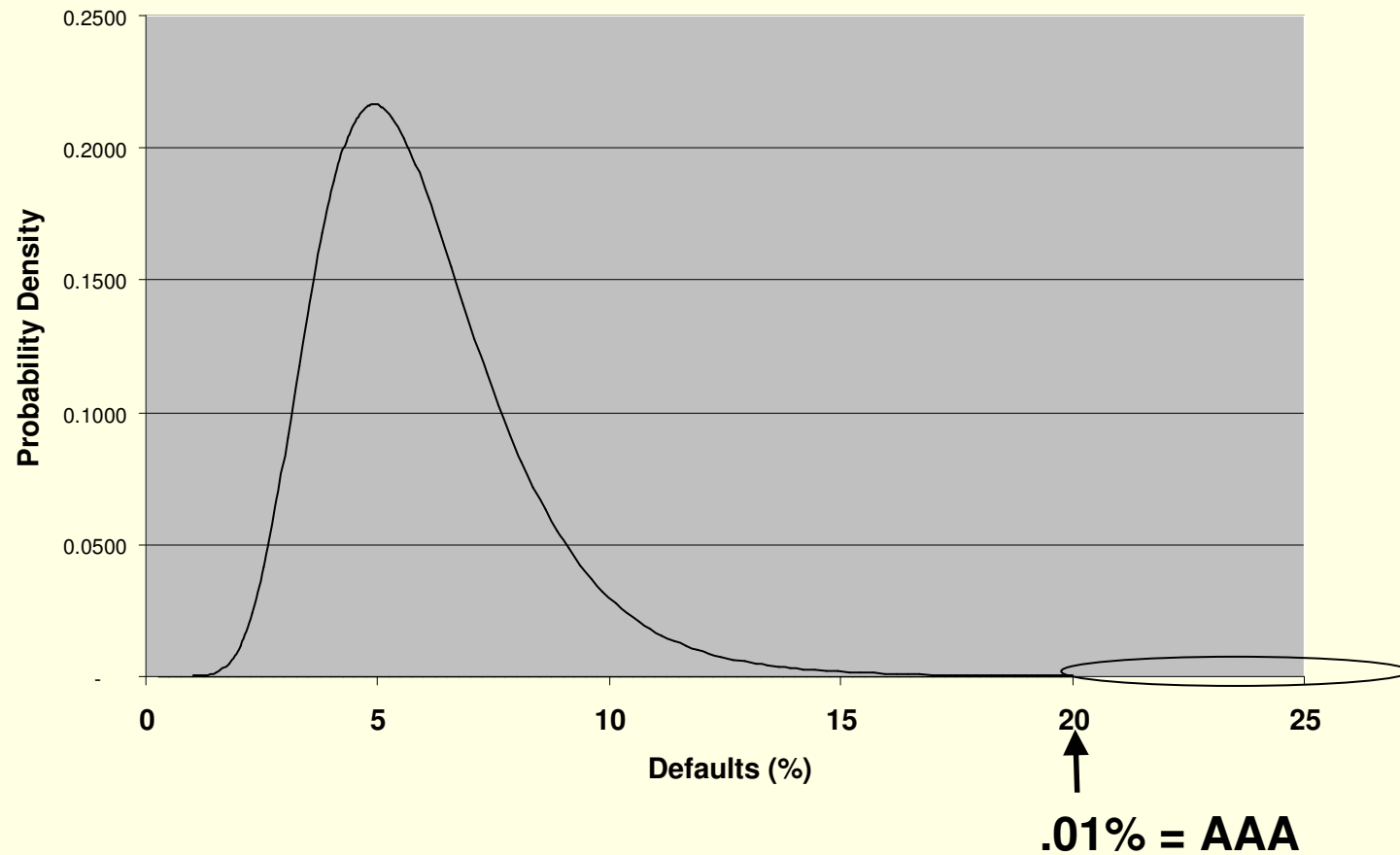
Hypothetical Subprime Default Probability Density
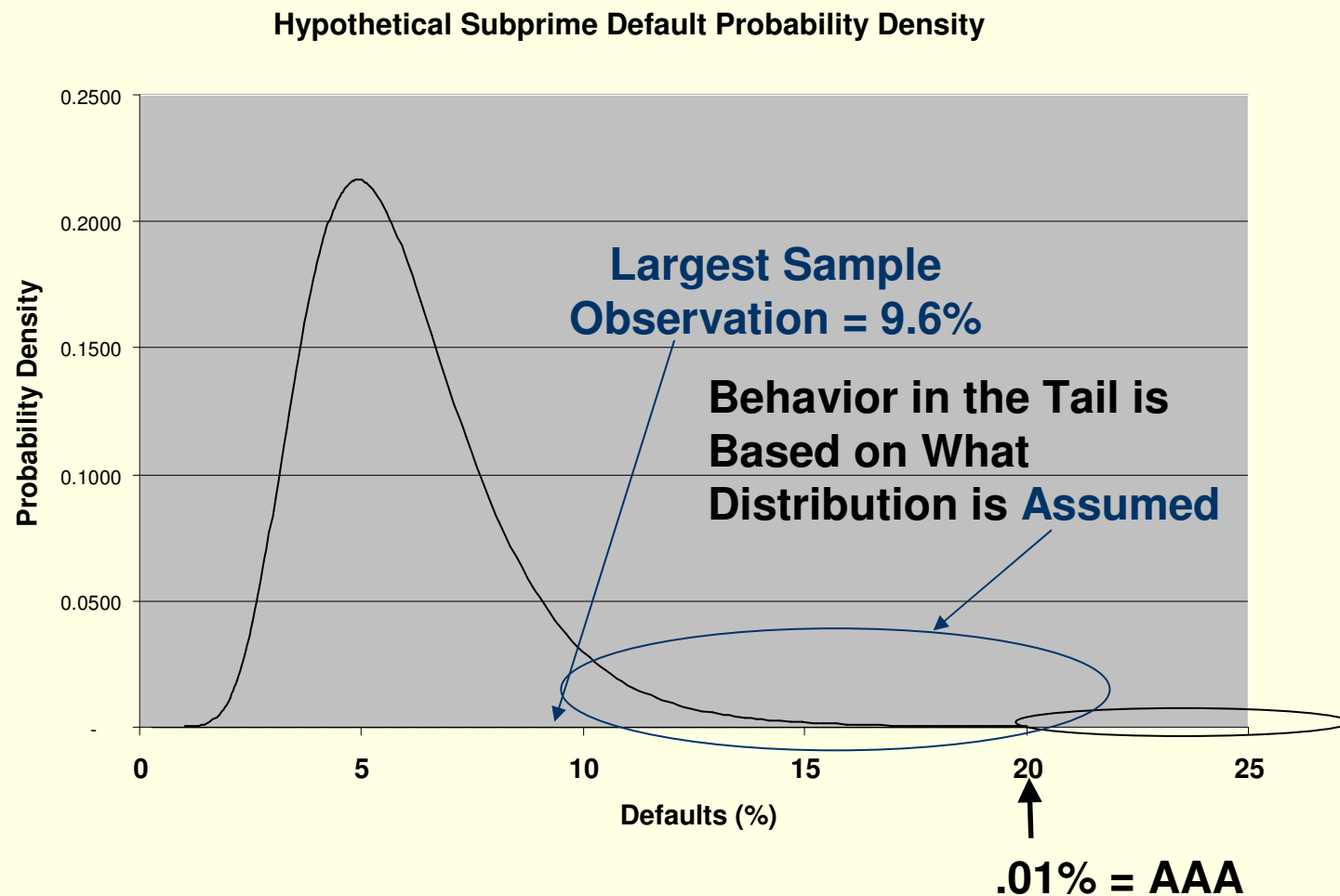

Log-Normal Distribution: Mean = 5.97; StDev = 2.16

Hypothetical Detachment Point

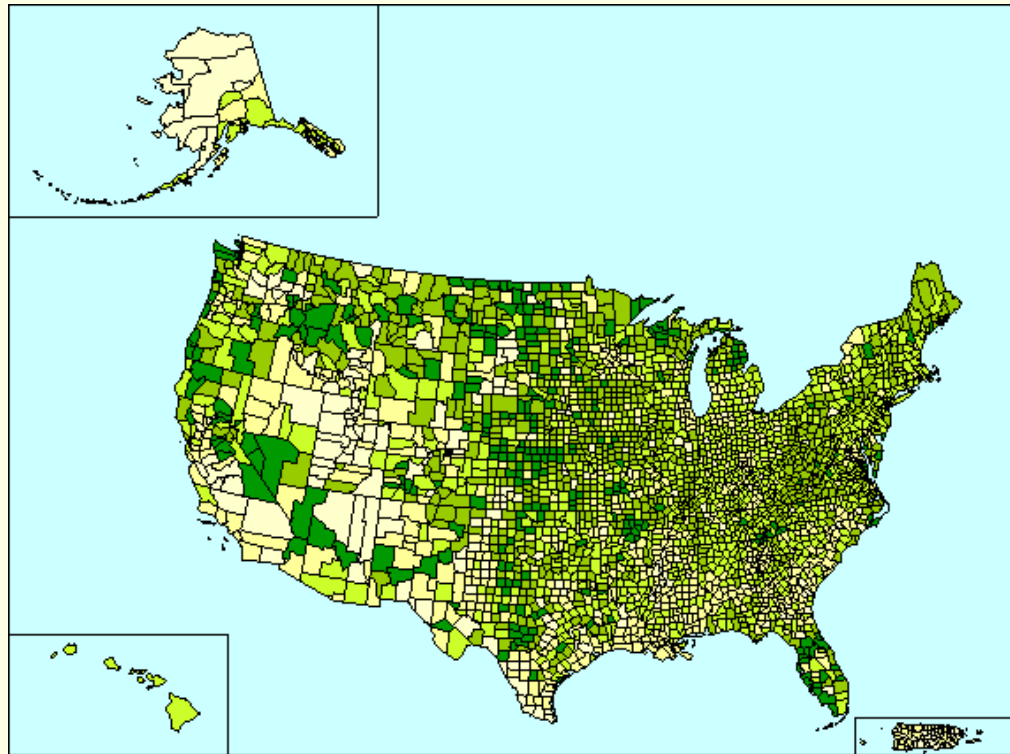**Hypothetical Subprime Default Probability Density**

.01% = AAA

Hypothetical Detachment Point

Hypothetical Subprime Default Probability Density

Largest Sample Observation = 9.6%

Behavior in the Tail is Based on What Distribution is Assumed

.01% = AAA

Probability Density

Defaults (%)

Broad Geographic Distribution

Through mid-2006

Idiosyncratic Causes for Default

What unobserved contingency could upset this pattern?
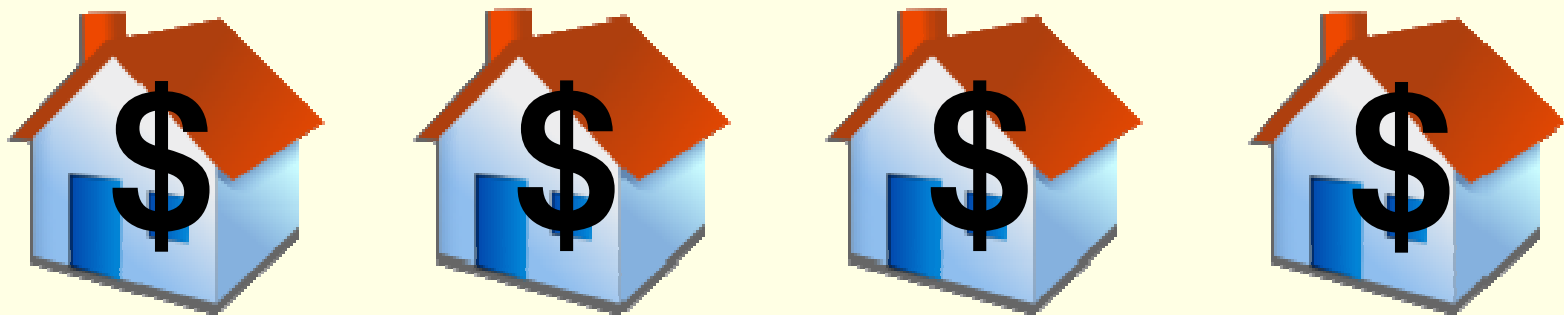
Threats to Diversification

One candidate was fairly obvious.

Falling housing prices would hurt ALL borrowers
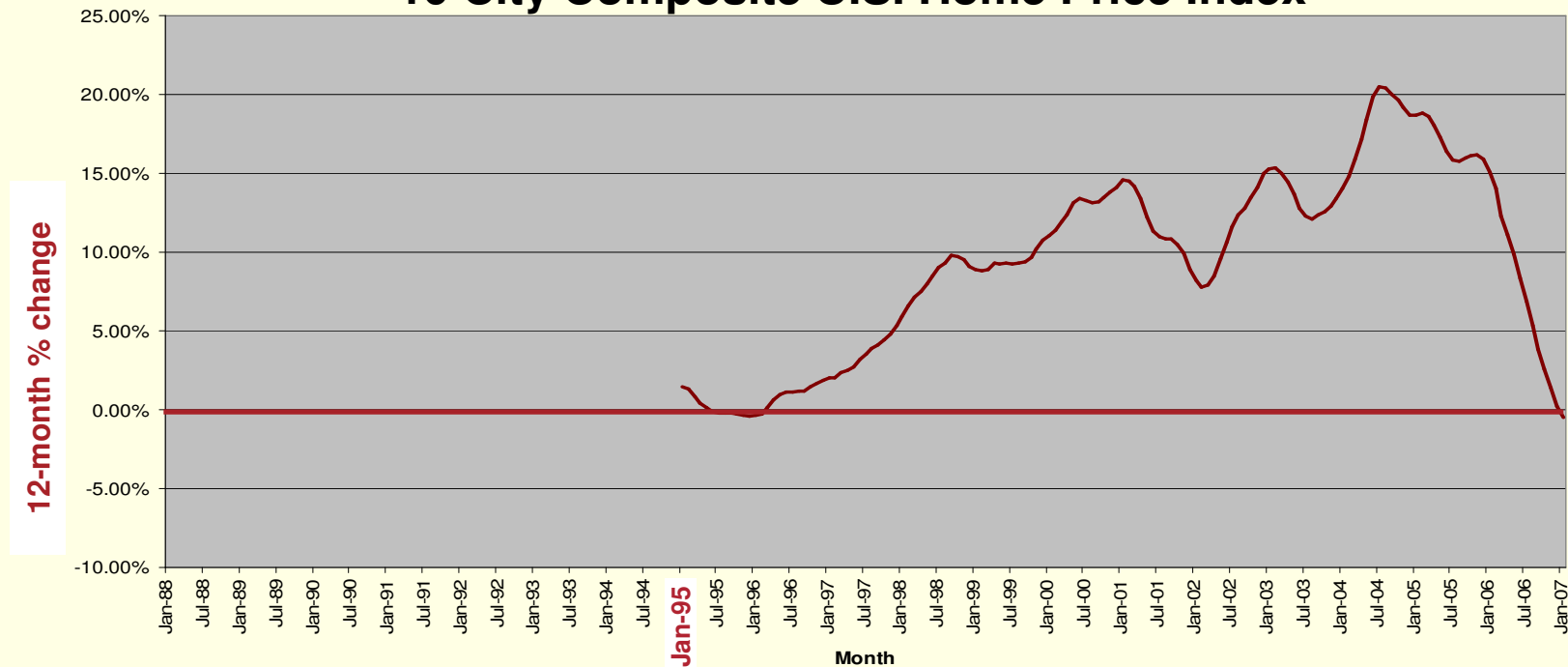
Defaults would no longer be statistically independent

12-month % change

Strongly Positive: 1995-2006

10 City Composite U.S. Home Price Index
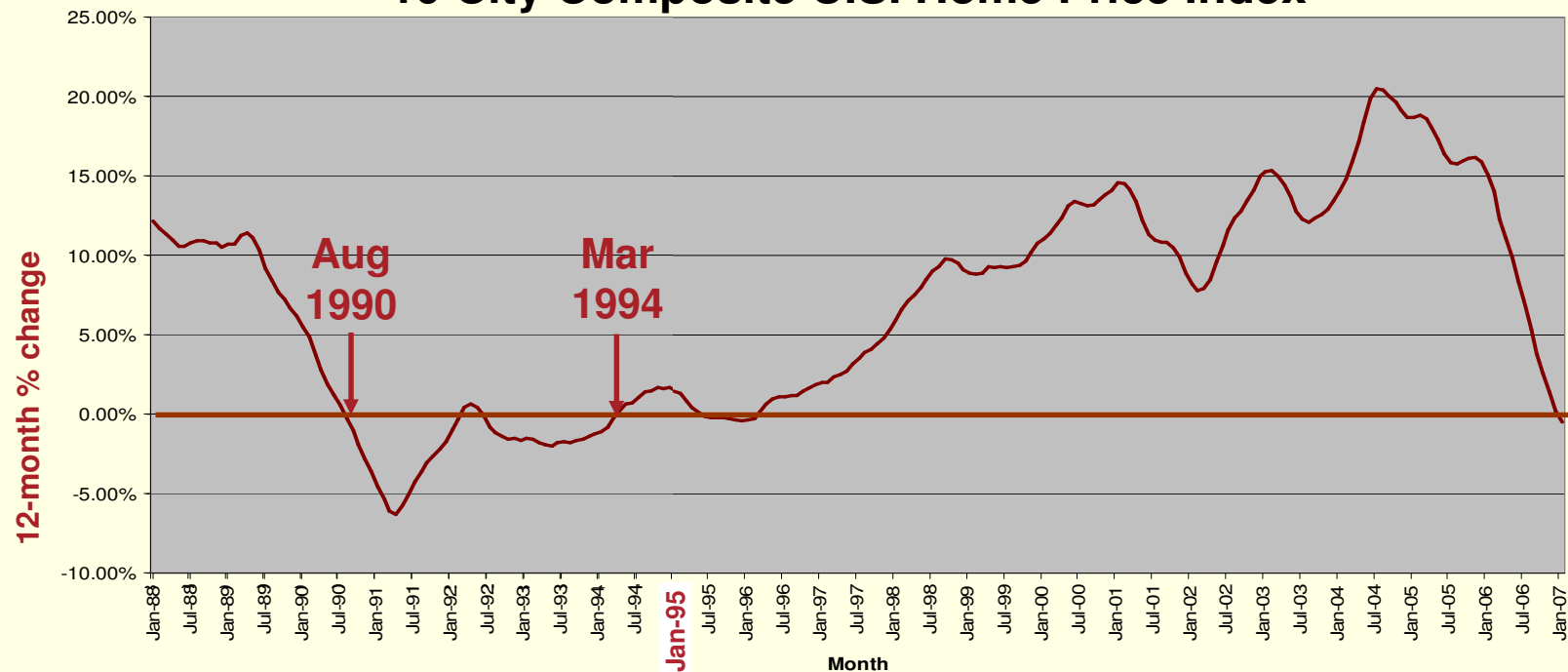
2. Structural Imagination

12-month % change

Negative for 3-1/2 years in early 1990s

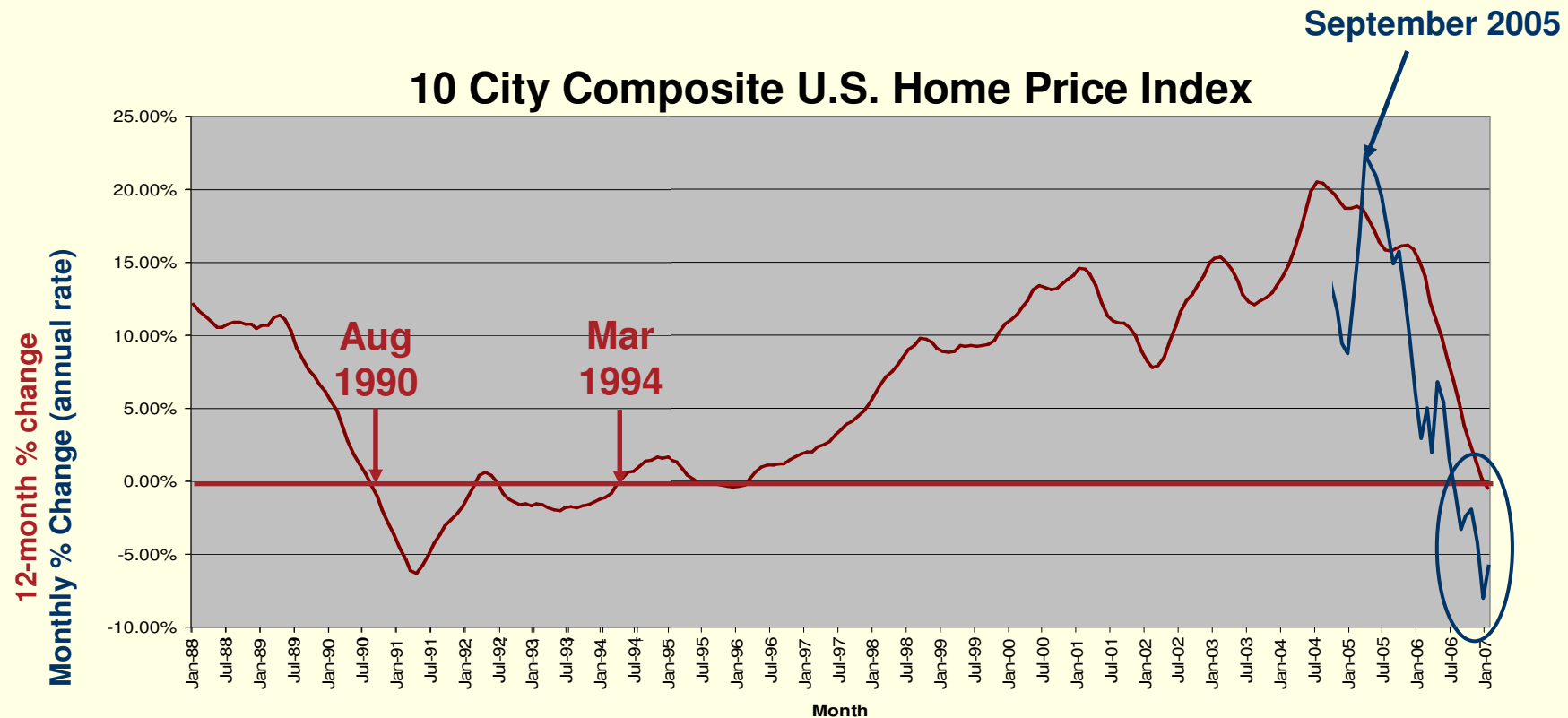### 10 City Composite U.S. Home Price Index

S&P/Case-Shiller Home Price Indices

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Month-to-Month % Change
Peaked in September 2005 : Turned Negative in mid-2006

September 2005

10 City Composite U.S. Home Price Index

12-month % change
Monthly % Change (annual rate)

Aug 1990

Mar 1994

Month

S&P/Case-Shiller Home Price Indices

The Lesson

1) Look for significant unrepresented variables.

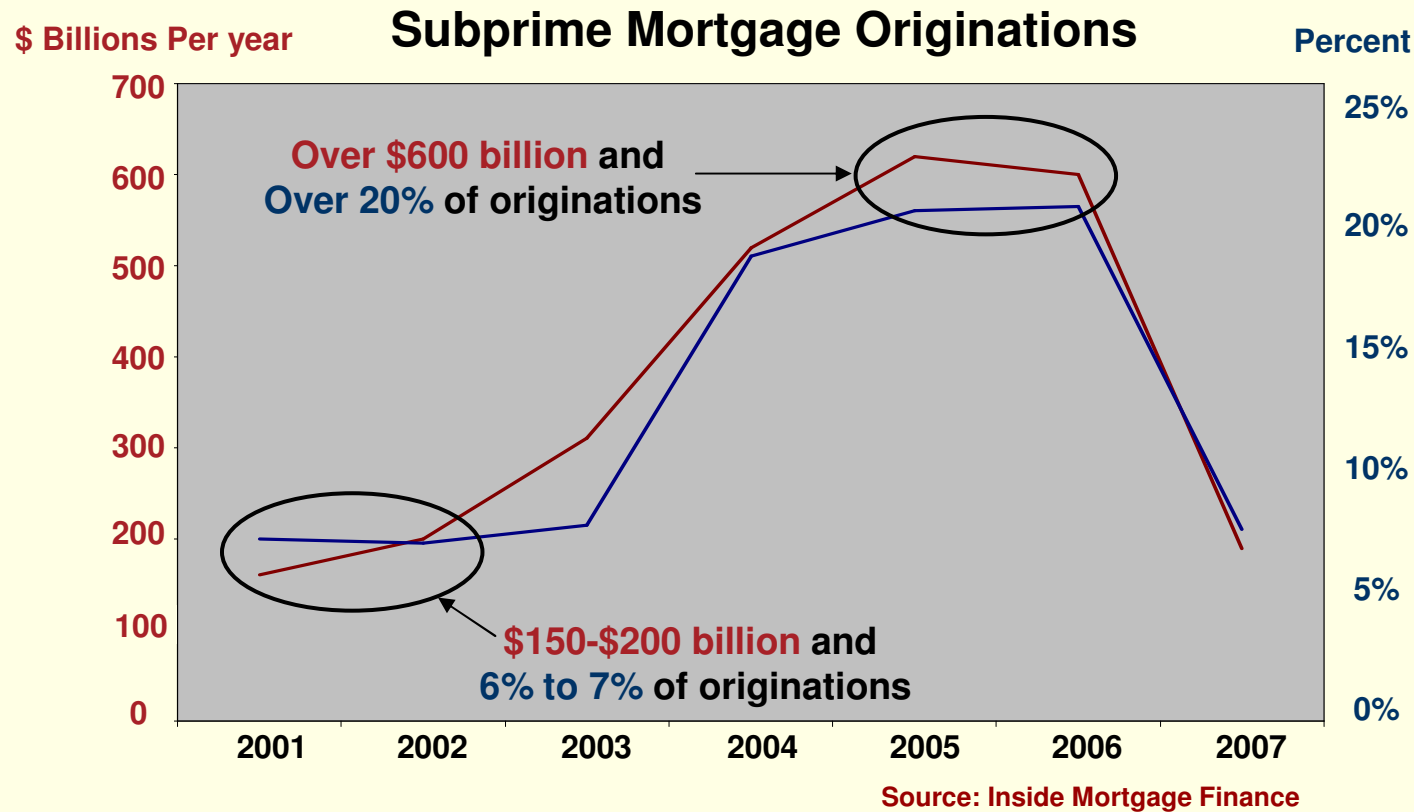2) Track these variables carefully as early warning indicators of emerging problems.

The Seeds of Self-Destruction

The huge expansion of subprime mortgage debt set the stage for a more serious crisis when conditions began to worsen.

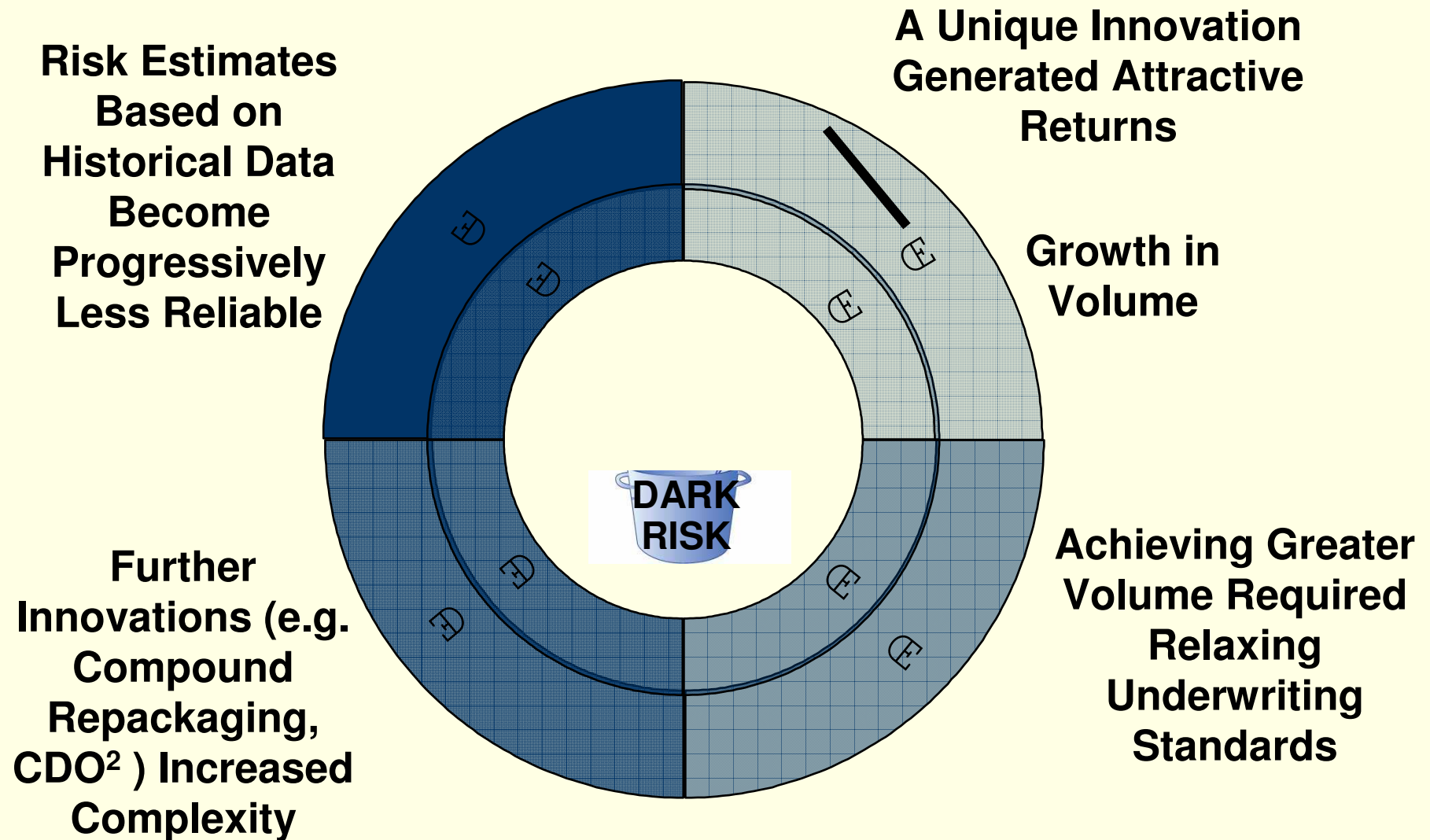# An Explosion in Subprime Mortgage Originations

Subprime Mortgage Originations

Source: Inside Mortgage Finance

By one estimate in late 2007, 14% of all outstanding mortgages were subprime

Risk Estimates Based on Historical Data Become Progressively Less Reliable

A Unique Innovation Generated Attractive Returns

Growth in Volume

DARK RISK

Achieving Greater Volume Required Relaxing Underwriting Standards

Further Innovations (e.g. Compound Repackaging, CDO^2) Increased Complexity

An Initial
Economic Shock

Home Price
Declines

Defaults are
Magnified by
the Inflated
Volume of
Poorly
Collateralized
Mortgages

Credit Losses
Hurt Bank
Earnings

More Stringent
Credit
Conditions and
Increased
Liquidation
Sales

Compound
Economic
Impact

4. Complexity and Dark Risk

Complexity

Limited Data

+
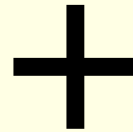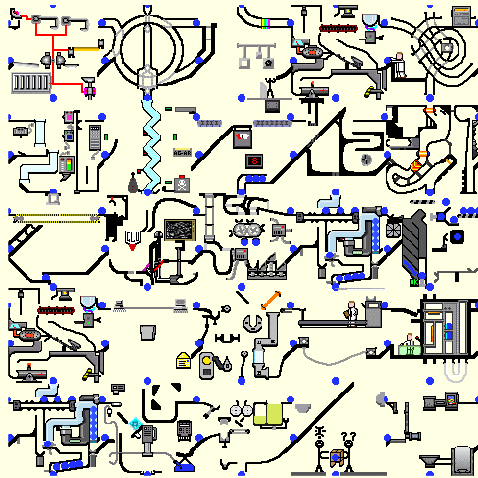
Dark Risk
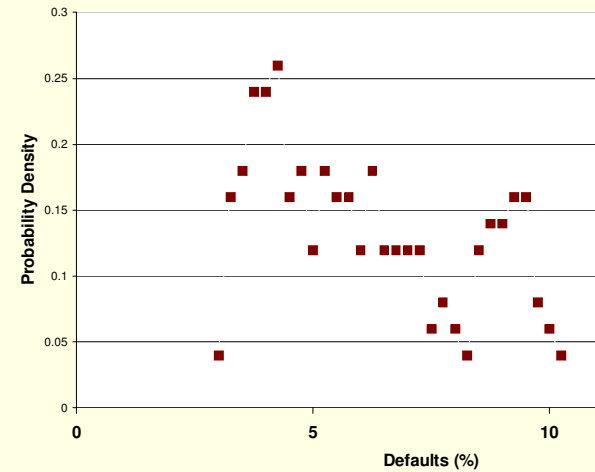
Old Credit Risk Mantra

What is the second means of <u>repayment</u>?

Proposed Capital Markets Mantra

What is the second means of <u>valuation</u>?

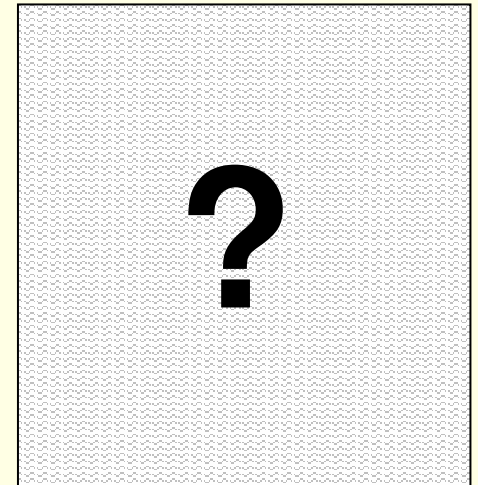**Ease of Current Valuation**
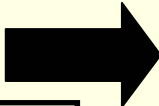
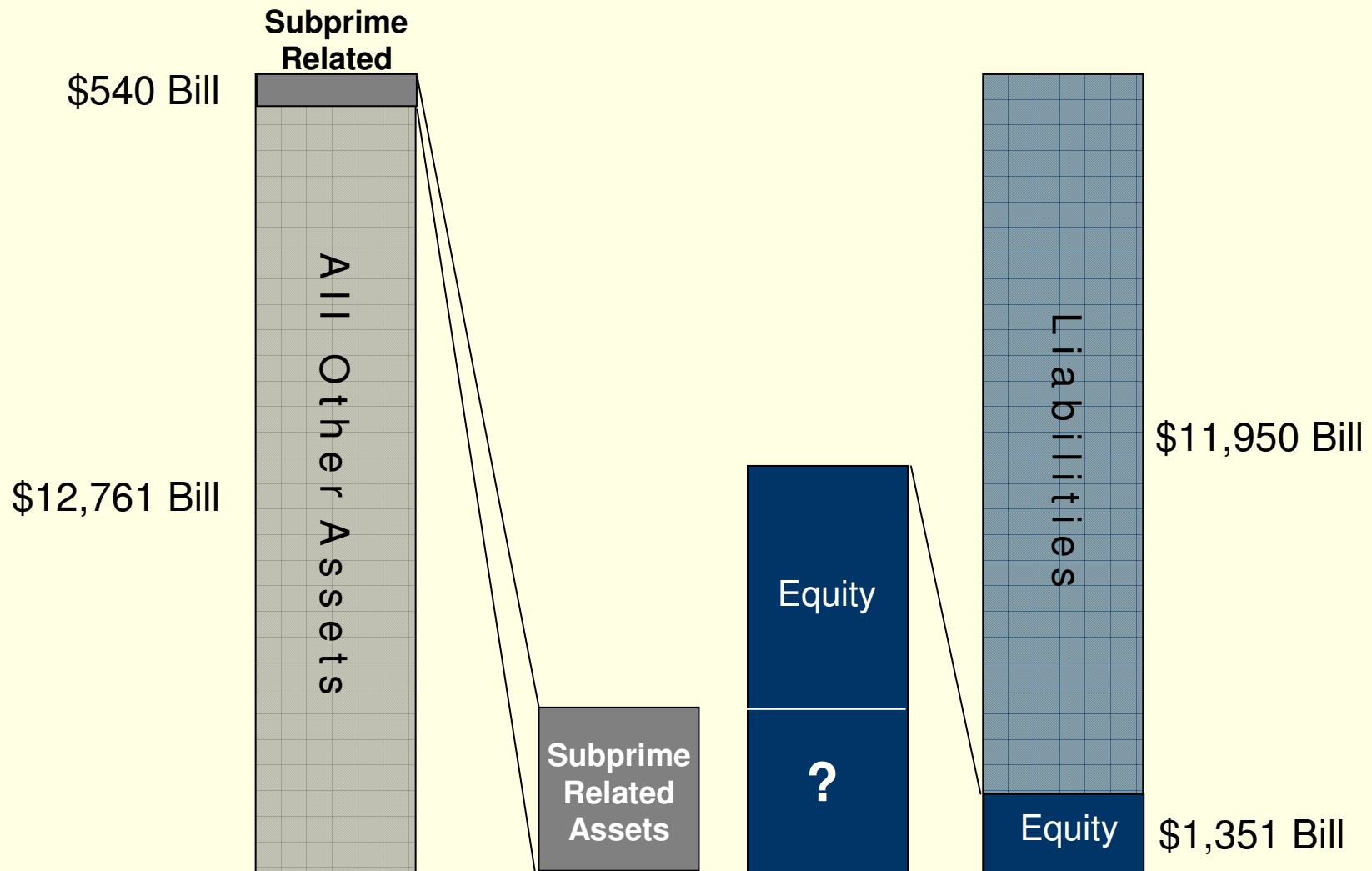| Level 1	IRS CDS Corporate CDOs (2006) Subprime CDOs (2006)	Observable prices in active markets
Level 2		Observable prices in inactive markets or observable inputs to accepted pricing models
Level 3		Few or no observable market prices and models requiring significant unobservable inputs

5. Alternate Means of Valuation

Effectiveness of Alternate Means of Valuation

	Level 2	Level 3	Level ? ➡
Level 1	IRS CDS (2006)	Corporate CDOs (2006)	Subprime CDOs (2006)
Level 2		CDS (2008)	
Level 3			Corporate CDOs (2008)
Level ?			Subprime CDOs (2008)

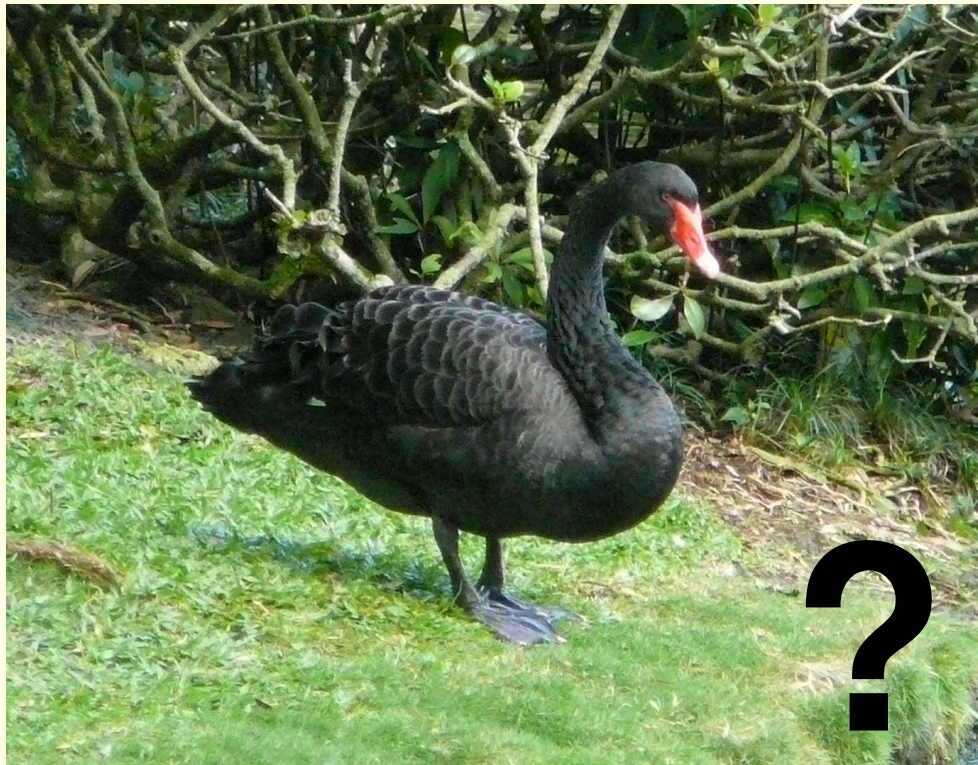**Ease of Current Valuation**

Estimated US Banks Balance Sheet (2008 Q2)

Subprime Related

$540 Bill

All Other Assets

$12,761 Bill

Subprime Related Assets

Equity

?

Liabilities

$11,950 Bill

Equity

$1,351 Bill

Was this crisis a Black Swan?

Elements of the Risk Puzzle (Original: May 2006)

- Technological Change
- Pace of Innovation
- Product Complexity
- Geopolitical Risk
- Liquidity
- Model Risk
- Commodity Prices
- Extreme Events
- Volume Growth
- Emerging Markets
- Operational Risk
- External Linkages
- Regulatory Uncertainty
- Information Security
- Effective Portfolio Mgt.
- Miscellaneous
- ???? Unknown Unknowns ????

Elements of the Risk Puzzle (Rev: October 2008)

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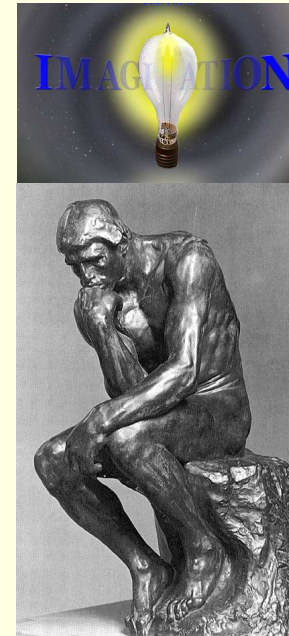
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Summary

1. Statistical Entropy
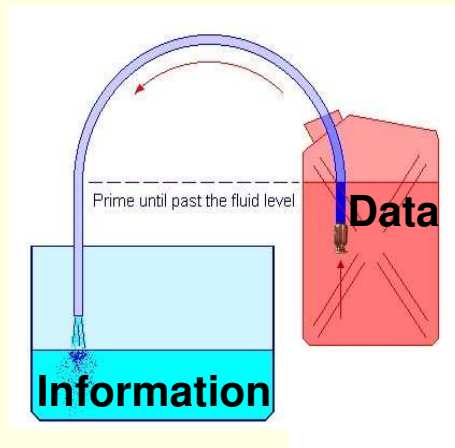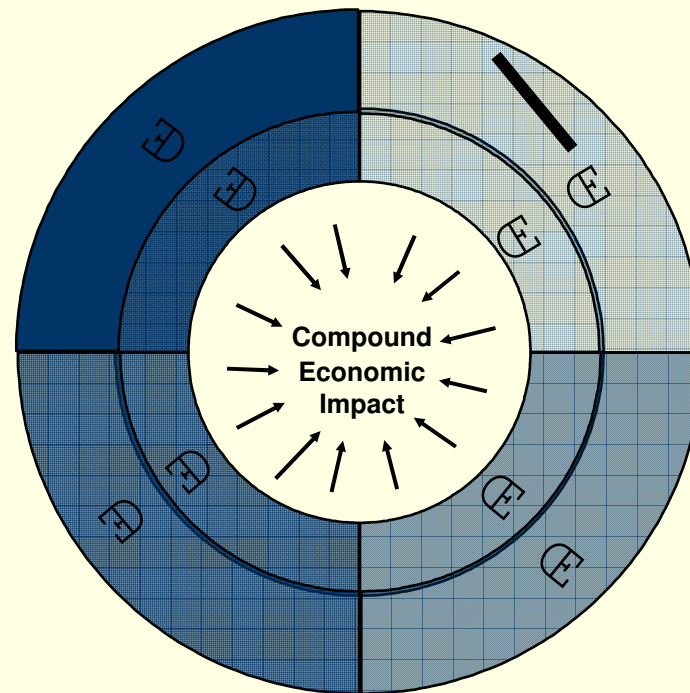

2. Structural Imagination

- **Use structural imagination to define significant unrepresented variables in existing risk analysis**

- **Track these variables as early warning indicators**
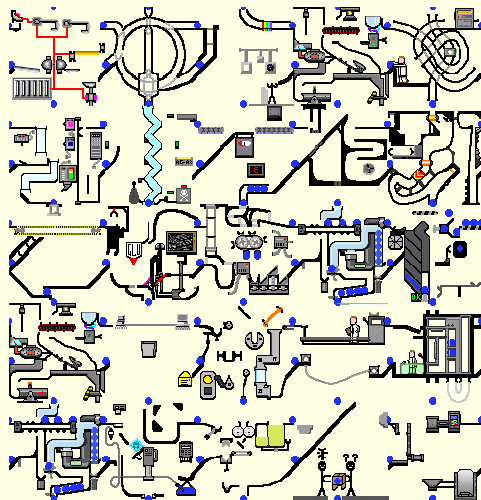
3. Self-Referential Feedback

Recognize that success of an innovation can alter the environment in ways that jeopardize continued success

4. Complexity Ł Dark Risk

Ł

Limited data and untested complexity make risk estimates inherently uncertain

5. Second Means of Valuation

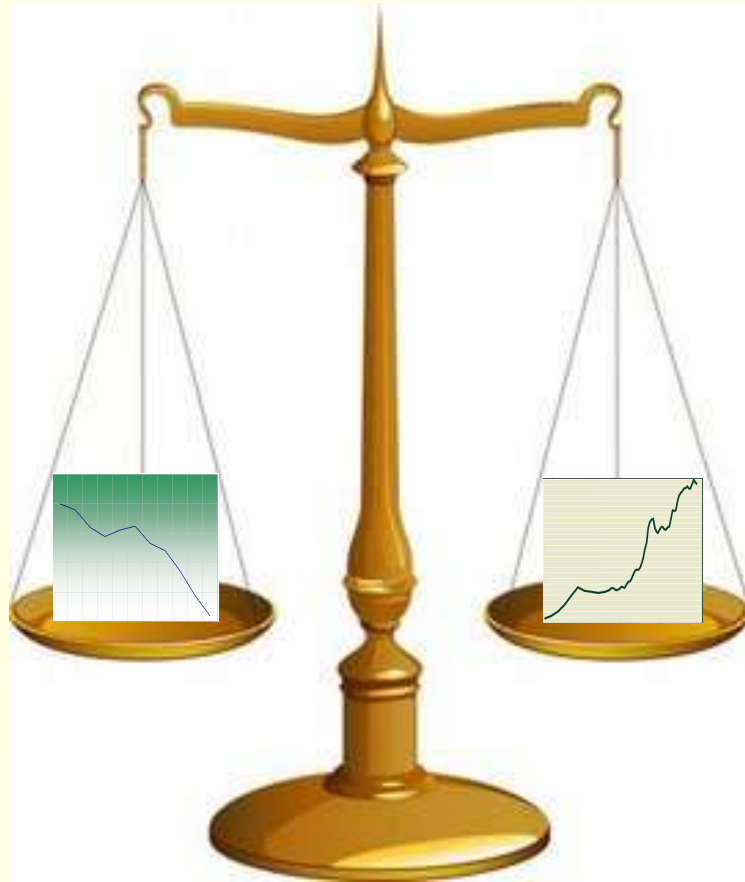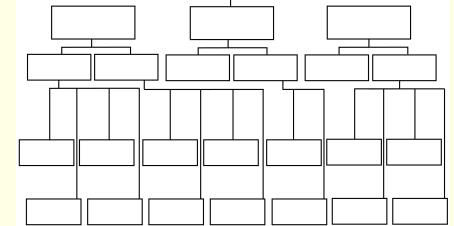**Limit holdings of assets with no reasonably objective second means of valuation _even if they are highly liquid today_**

A Final Thought – Strategic Risk

Where the buck stops → **Board of Directors**

CEO

"*Give me 15% more than last year. Don't give me excuses, give me the numbers.*"

≠ **sound aggressive management**

= **recipe for disaster**