



# ZUR EFFIZIENZ DER FINANZMÄRKTE: DIE SICHT DER WISSENSCHAFT

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# Overview

1. Traditional view of EMH
2. Current view of EMH
3. Theoretical explanations
4. Implications for CFOs
  - Hurdle rate
  - Raising equity

# Traditional view

$$p_t^j = E\left[\sum_{\tau=0}^{\infty} \frac{1}{(1+r_t+\pi^j)^\tau} CF^j_{t+\tau} \mid \mathcal{I}_t\right]$$

- Risk premium  $\pi^j$  depends on covariance ( $\beta^j$ ) with
  - Market CAPM
  - Aggregate consumption CCAPM

# Traditional view

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■ What news does the price reflect?

Strong form	all public and private info	<b>Logically inconsistent</b> Grossman-Stiglitz (1980)
Semi-strong form	all public info	
Weak form	all past price info	

# Empirical evidence

- Event studies
  - Dismiss strong-form
  - ...
- Momentum
  - Long-run: Reversals (DeBondt & Thaler)
  - Short-run: Momentum (Carhart)
  - High frequency: Reversals (market microstructure)

# Current view

$$p_t^j = E \left[ \sum_{\tau=0}^{\infty} \underbrace{\frac{1}{(1+r_t+\pi_{t,t+\tau}^j)^\tau}}_{SDF_t} CF^j_{t+\tau} \mid \mathcal{J}_t \right]$$

- Stochastic discount factor, i.e. risk premium  $\pi_{t,t+\tau}^j$  is **time varying**
- The “dark matter of finance”

Price change =(objective) cash flow news + *change in risk premium*

- “SDF news” is much more important than “CF news”!
- Cochrane 2011: *“all price-dividend ratio volatility corresponds to variation in expected returns. None corresponds to variation in expected dividend growth, ...”*

# || Predictability across asset classes

from Cochrane's AFA Presidential Address 2011

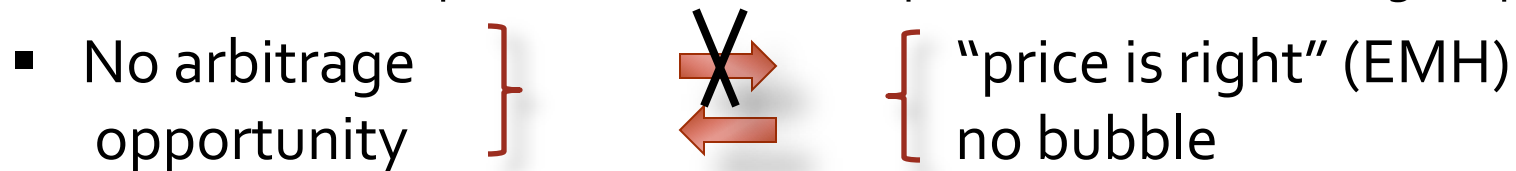
- *Stocks.* Dividend yields forecast returns, not dividend growth. (Campbell-Shiller regressions)
- *Treasuries.* Rising yield curve signals better 1-year returns for long-term bonds, not higher future interest rates. Fed fund futures signal returns, not changes in the funds rate. (Fama-Bliss 87, Campbell-Shiller 91)
- *C-Bonds.* Variation in credit spreads over time and across firms or categories signals returns, not default probabilities. (Duffie-Berndt 11)
- *FX.* International interest rate spreads signal returns, not exchange rate depreciation. (Hansen-Hodrick 80)
- *Sovereign debt.* High levels of sovereign or foreign debt signal low returns, not higher government or trade surpluses  
*Greek debt in 2006 vs. now --- resolving the Euro crisis with ESBIES*
- *Houses.* High price/rent ratios signal low returns, not rising rents or prices that rise forever. (Fama-French 89)

# Why? Theories for time-varying $\pi_t$

- Excessive run-ups
  - Bubbles and limits to arbitrage
- Amplification and persistence in downturns
  - Constrained financial experts
  - Liquidity spirals
    - Level
    - Volatility

# Theory – speculative bubbles

- Price distortion + speculation  
(hold an overpriced asset in the hope to sell at an even higher price)



## ■ Arbitrage is limited/risky, since

- irrational trades might push price further away "noise trader risk"
- difficult to predict when other traders "lean" against bubble "synchronization risk"
- 1. Lean against bubble, but not enough DSSW (JPE '90)
- 2. Ride the bubble Abreu-Brunnermeier '03  
"dance as long as the music plays"
- *Isaac Newton*
  - 04/20/1720 sold shares at £7,000 profiting £3,500
  - re-entered the market later - ended up losing £20,000
  - "I can calculate the motions of the heavenly bodies, but not the madness of people"

# || Bubbles – backwards induction

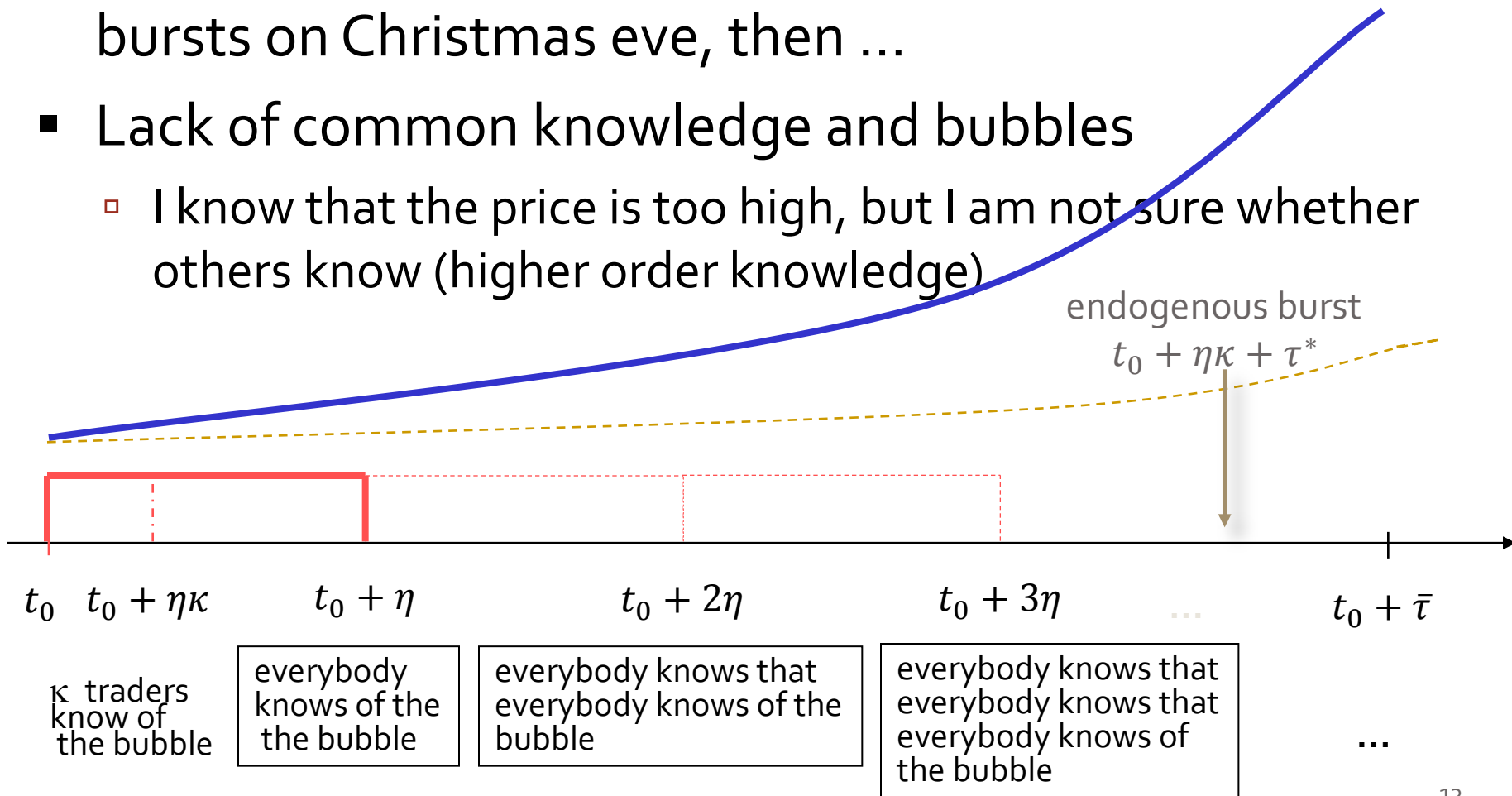
- EMH:
  - “If there are many sophisticated traders in the market, they may cause these “bubbles” to burst before they really get under way.” (Fama)
- Problem are not speculative attacks
- Problem is that they occur too late

# || Bubbles – backwards induction

- EMH: if it is commonly known that the bubble bursts on Christmas eve, then ...
- Lack of common knowledge and bubbles
  - I know that the price is too high, but I am not sure whether others know (higher order knowledge)

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|| Riding bubble → bubble persists



- Wile E. Coyote Effect – Minsky moment

# Riding the technology bubble – Evidence

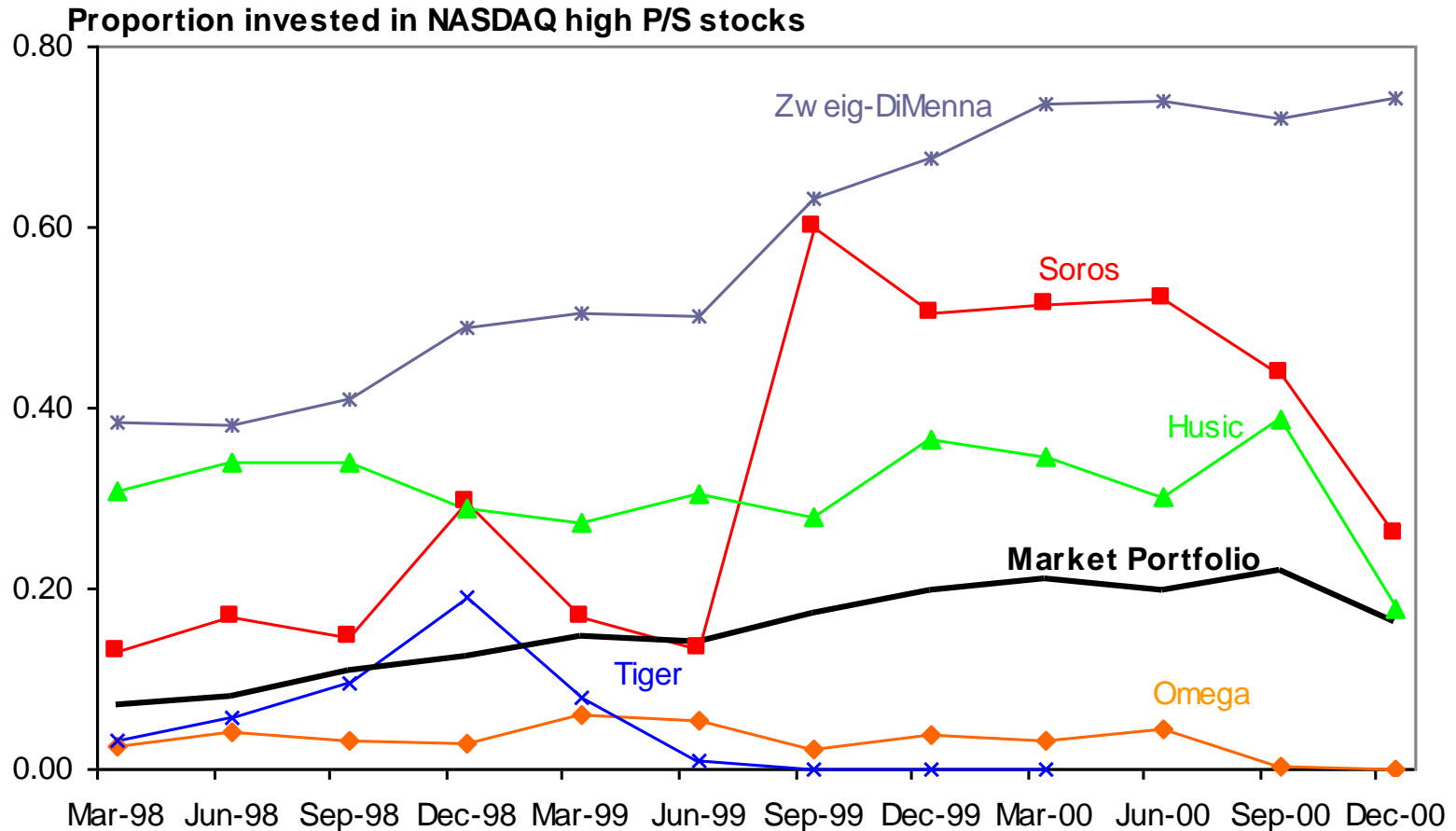


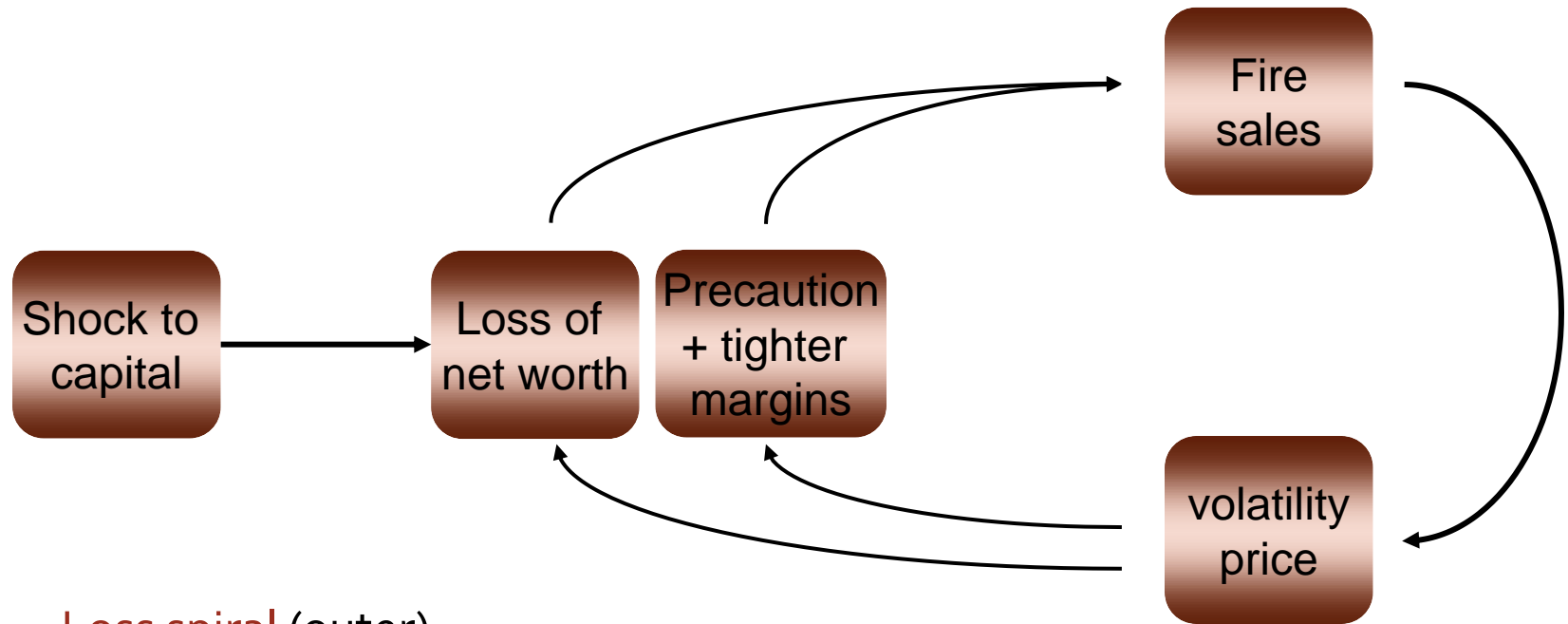
Fig. 4a: Weight of technology stocks in hedge fund portfolios versus weight in market portfolio

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- **Amplification and persistence** in downturns
  - Constrained financial experts
  - Liquidity spirals
    - Level effects                      loss spiral
    - Volatility effects                leverage/margin spiral

## 2. Liquidity spirals

### 1. Unstable dynamics due to (nonlinear) liquidity spirals



**Loss spiral** (outer)

very pronounced in mark-to-market accounting regime

**Margin/haircut/precaution spiral** (inner)

more pronounced in mark-to-model accounting regime

# Liquidity Mismatch Index (LMI)

A

L

## Market liquidity

- Can only sell assets at **fire-sale prices**

Ease with which one can raise money by **selling** the asset

## Funding liquidity

- Can't **roll over** short term debt
- **Margin**-funding is recalled

Ease with which one can raise money by **borrowing** using the asset as collateral

Maturity mismatch

# Liquidity Mismatch Index (LMI)

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*Liquidity Mismatch Index* = liquidity of assets minus liquidity promised through liabilities

# Other Theories of time-varying $\pi_t$

- So far, “frictional finance”
- “Preference theories”
  - Representative agent with habit formation
    - Risk aversion spikes as representative agent is closer to his habit

$$E \sum_{\tau=0}^{\infty} \delta^{\tau} \frac{(C_{\tau} - X_{\tau})^{1-\gamma}}{1-\gamma}$$

- Relative risk aversion,  $u''C/u'$ , is

$$\gamma \frac{C}{C - X}$$

# Implications for CFOs

- Traditional view:
  - Focus on project selection – hurdle rate depends on  $\beta$
- Current view:
  - Market timing is important
    - Timing of cash flow structure matters  
(especially if cash flow is negative at some point in time)
      - Life-span of equipment (depreciation)
      - Specificity of equipment (market liquidity)
    - Funding structure (equity vs. debt, maturity of debt) matters
    - Cash holding as precautionary measure
    - When to raise equity?

# Equity issuance

- Equity issuance is expensive due
  - Stigma effect – it signals that firm is weak
- Forced equity issuance across industry is not expensive
  - Main lesson of SCAP – US stress test that forced banks in spring 2009 to raise more equity

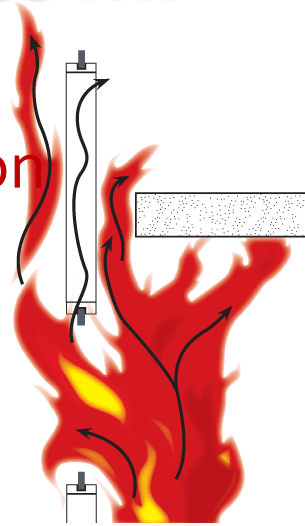
# Conclusion

	Traditional view	Current view
Price changes reflect	Cash flow news	Discount rate news
Investment hurdle rate	Varies across projects	Varies across time
	Project selection	Market timing is important

- Liquidity mismatch matters for firm's investment
  - How easily can I resell my machines/factories?
  - How much will be the price discount in crisis?
    - Depends on specificity of physical capital
  - Determines amount of cash holdings
- **Forced recapitalization is cheaper** than voluntary recapitalization (due to signaling)

# 5. Regulatory Implications - Challenges ....

1. Focus on **externalities – systemic risk contribution**
    - Internalize externalities (... just like pollution)
    - Fire-code analogy: fire-protection wall
    - $\text{CoVaR}^i = \text{VaR}^{\text{system}}|i$  in distress
  2. **Countercyclical regulation**
    - Regulate based on characteristics that give rise to *future* systemic risk contributions
  3. Incorporate **funding structure**
    - asset-liability interaction, debt maturity, liquidity risk
  4. **Objective** regulatory criteria across financial institutions
    - Banks, broker-dealers, insurance companies, hedge funds,...
- .... Bankruptcy procedure, living will, .... (see Geneva Report)



# 5. Regulatory Implications

- Who should be regulated?
  - Micro-prudential
  - Macro-prudential
  - ➔ Objective risk contribution measure – like CoVaR
- How much?
  - Based on contribution to systemic risk (externalities)
  - ➔ CoVaR<sup>contri</sup>
- Countercyclicality
  - Predict future CoVaR with high frequency variables
  - Laddered response
- How?
  - Caps: capital ratio requirements
  - Pigouvian tax
  - Private insurance scheme

# How to regulate?

- **Size limits:**

- **Problem 1:** “too big to fail”  $\neq$  “too systemic to fail”
  - split “individually systemic” institution into 10 clones
    - (clones perfectly comove with each other)
- “systemic as part of a herd”



Lessons:

- Regulation should provide incentive to be heterogeneous
  - Spillover risk measure should satisfy “clone property”
- **Problem 2:**  
one-dimensional threshold  
“bunching” below threshold



Lesson: Smooth transition -- “have to pay” in leverage ...

- **Mix of size, leverage, maturity mismatch, connectedness, risk pockets, crowded trades, business model, ...**  
.... but what weights?

# CoVaR method

1. Find **optimal mix**/trade-offs between size, leverage, .....,  
across institutions **objective weights**
2. **Countercyclical** implementation **forward-looking weights**

## Method:

- *Predict*  $\Delta\text{CoVaR}$  using frequently observed characteristics
  - Size, maturity mismatch, leverage,
  - .... special data only bank supervisors have  
(e.g. crowdedness , interconnectedness measures)
- Step-procedure:
  1. Form portfolios
  2. Time-varying CoVaR (linked to lagged macro variables:  
VIX, Repo spread, term spread, credit spread, market return, housing)
  3. Predict future CoVaR using size, leverage ,...

# Conclusion

1. Rational Expectations, EMH
2. Bubble hypothesis view
  - Bubbles burst too late – risk builds up too long and only materializes late
  - Communication policy to help investors to attack bubbles earlier
  - Countercyclical regulation
  - Focus on externalities
3. Systemic risk measures, like CoVaR, that focus on spillover risks