Aalto University
School of Business

31E2300
MACROECONOMICS: POLICY

FINANCIAL CRISES: TWO VIEWS

TWO VIEWS

1. ASSET-PRICE BUBBLES, “FINANCIAL ACCELERATORS” AND ”PLAIN VANILLA CRISES”

2. LEVERAGE CYCLES

A BRIEF DETOUR INTO ASSET PRICE BUBBLES

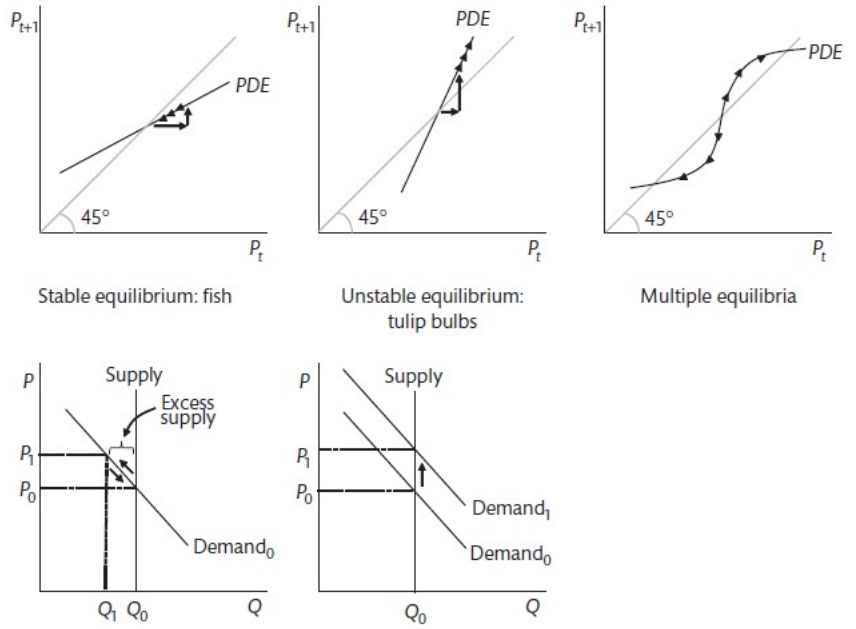
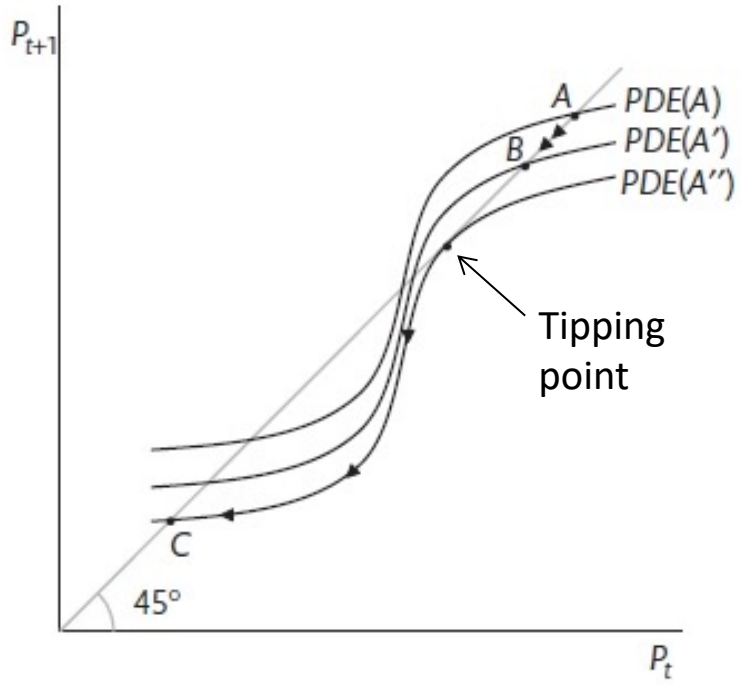


Figure 6.6 Price dynamic processes in different kinds of markets.

S-SHAPED PDE: EXPLANATION OR DESCRIPTION?

- PDE process: $P_{t+1} = f(P_t; A_t)$

- A_t *shifts the PDE: for example, the proportion of population with a given belief about* P_{t+1} *(where beliefs depends on* P_t*)*



Initially: High price equilibrium (A)

Shock: A small prop. of agents expect lower P_{t+1} →

PDE shifts down to PDE (A'), New equilibrium is at B →

Next period, more people adopt the belief of falling P_{t+1} →

PDE shifts down until the tipping point (tangency point to 45º line) *on PDE (A") →*

Next period, the high equilibrium disappears and the economy is pulled to the low price equiliburium C.

For example: The housing market with self-fulfilling expectations: A housing boom (bust) involves moving to the upper (lower) equilibrium.

1. THE FINANCIAL ACCELERATOR (SPILLOVER)

1. Credit-constrained households can borrow based on the value of their collateral, i.e. house value (= *market price*). Recall that this is a critical component of our initial model.

    1. Why are house (asset) prices sometimes unstable or "bubble-y"? See experimental economics (Palan 2014) for some explanations.

2. House prices ↑ → can borrow more because credit constraints relaxed.

3. Household borrowing ↑ (if households are borrowed up to the limit set by credit constraints)

4. Borrowing is used for consumption and new housing→ IS curve shifts rightwards

5. Increased demand for housing pushes up prices further; the financial accelerator process begins again at step 1.

1. FINANCIAL ACCELERATOR (CONTINUED)

- Financial accelerator in the presence of credit constraints: positive feedback process where P ↑ → Credit constraints ↓ → Demand ↑ → P ↑ → …

- KEY: Without credit constraints: House P ↑ → Temporary shock to permanent income → Small effect on demand → no positive feedback process

- The financial accelerator does not have to rest on bubble effects: It is driven by credit constraints and collateral effects.

  - It is also does not need to be limited to houses: for households in the top half of the income and wealth distribution, bond and stock wealth also matters.

- Both mechanisms can interact with each other, however: bubble bursts → financial accelerator amplifies and propagates the shock.

1. “PLAIN VANILLA” FINANCIAL CRISES

- *These are financial crises – often the result of house price-based booms - that do not involve novel financial instruments*

Summary:

1. *Property bubble bursts, house P ↓ → Household net worth ↓ → Households find it difficult to service mortgages, and some are unable to do so.*
2. *Houses are repossessed by bank but sold at a loss (at a price below remaining mortgage value)*
3. *Losses on mortgage loans → Net worth of banks ↓->Reduce /ration loans (?)*
4. *Sufficient exposure to falling prices → Bank asset value (mortgages) shrinks and wipes out its capital cushion → Banks become insolvent.*

1. WHERE IS THE CENTRAL BANK DURING THIS?

- IS curve shifts rightwards from a boost in demand due to relaxed borrowing conditions
- Inflation increases and the CB tightens monetary policy
- The only link to the CB is due to changing inflation coming from the rise in loans and AD.
- No link between CB stabilization and house price feedback process: CB's response does not necessarily dampen the upswing of the financial cycle
- Higher int. rates for reducing inflation will dampen demand for mortgages but not necessarily cut off an asset price bubble and the financial accelerator mechanism:

  → See Fig 6.4 in slide 11: Continuous upswing in US house prices between 1970s to mid-2000s.

2. LEVERAGE (WHAT IS IT? AND SOME SUGGESTIVE PICTURES)

(One) Definition: Assets/Net Worth, or Equity.
UK BANK LEVERAGE

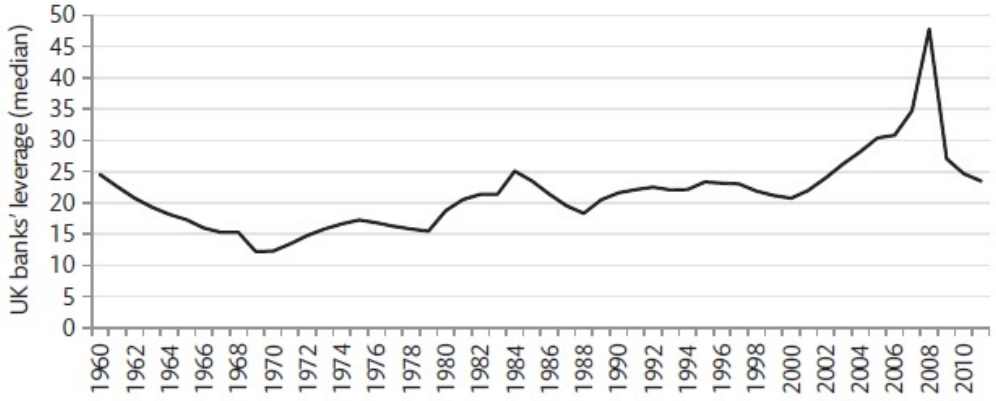


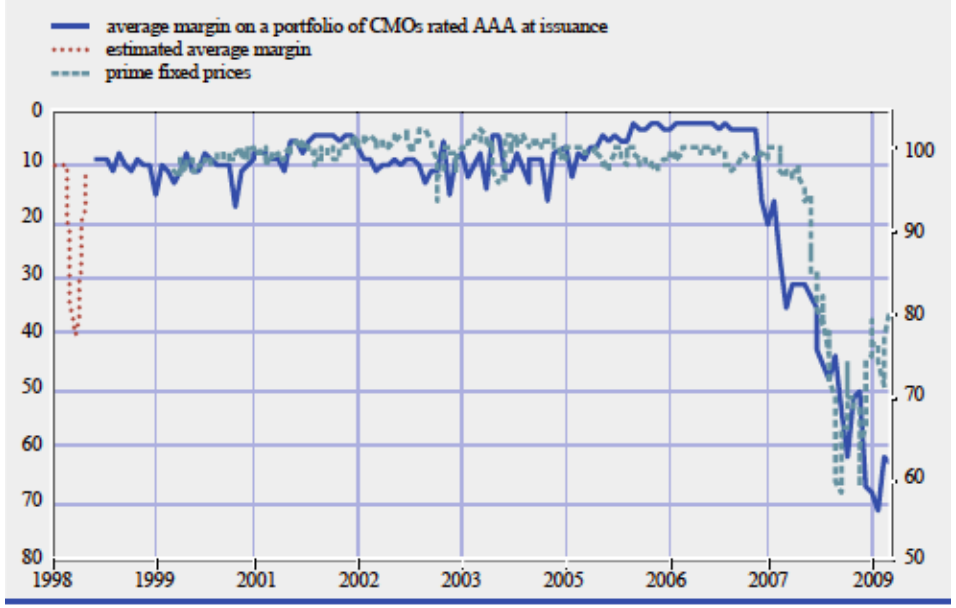
Figure 6.10 UK banks' leverage: 1960–2011.

Source: Bank of England Financial Stability Report, June 2012.

GEANAKOPLOS (2011) (MARGINS)

Chart 4 Securities leverage cycle margins offered and AAA securities prices

(margin percentage (downpayment required to purchase securities) – reversed scale; prices)



Notes: The chart represents the average margin required by dealers on a hypothetical portfolio of bonds subject to certain adjustments noted below. Observe that the margin % axis has been reversed, since lower margins are correlated with higher prices.

The portfolio evolved over time and changes in average margin reflect changes in composition as well as changes in margins of particular securities. In the period following August 2008, a substantial part of the increase in margins is due to bonds that could no longer be used as collateral after being downgraded, or for other reasons, and hence count as 100% margin.

OUTLINE OF THE MECHANISM

Investment bank behaviour and leverage:

1. Risk neutral investment banks (IBs) and risk averse saving households both invest in risky securities:

   - Upswing: Perceived risks ↓ → Demand for securities ↑ → Price ↑
   - Risk averse savers cut demand but IBs do not → Financial assets are transferred from savers to IBs.
   - IBs are willing to hold risky assets up to the amount that can be borrowed from savers.
   - Savers are willing to lend so long as loans to IBs are risk free
   - ∴ Fall in risk → IB leverage ↑

2. Second upswing: Asset price ↑ → IB capital gain → Larger capital cushion → Savers willing to lend more to IBs → IB leverage ↑

3. IBs now hold large volume of risky assets: If perceived risks ↑ → Asset price ↓ → Large capital loss → IB Solvency risk ↑

THE UPSWING AND THE 3-EQUATION MODEL

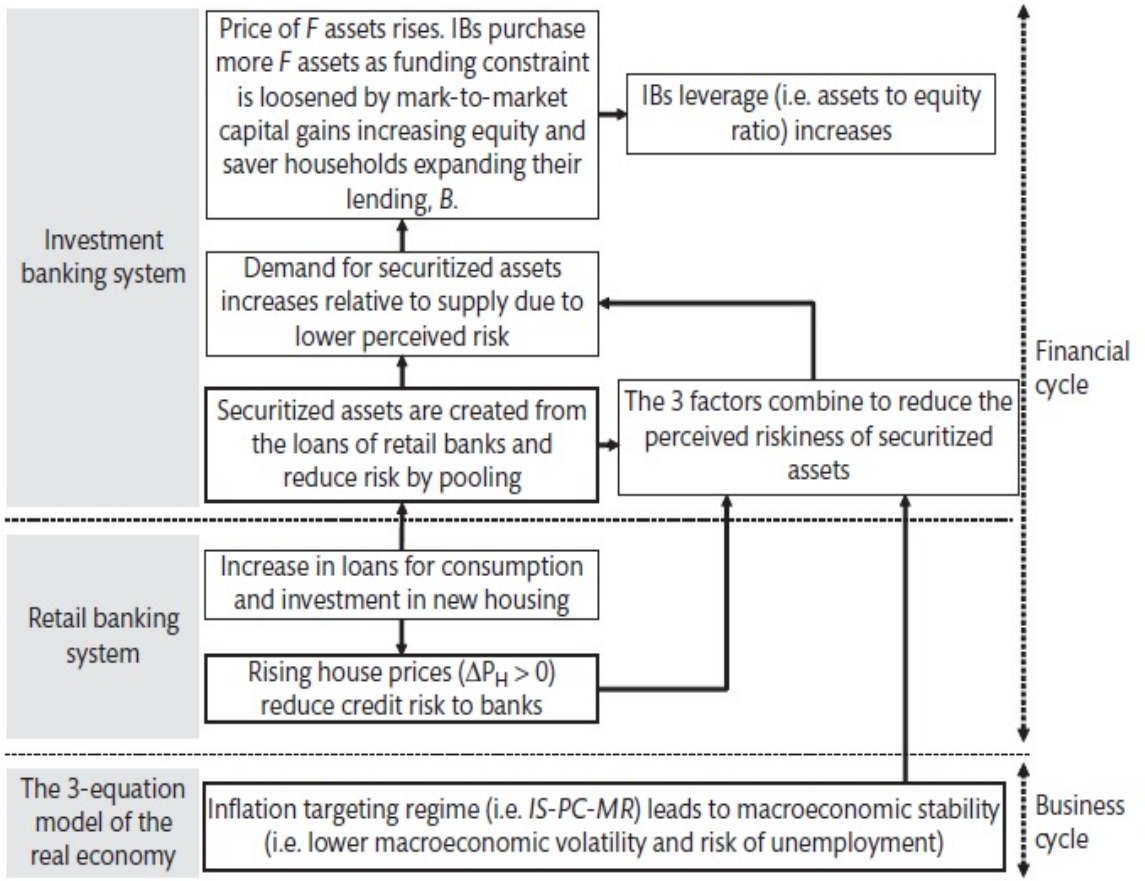


Figure 6.12 The 3-equation model of the macro-economy and the financial cycle: the bank-centred positive feedback process.

<u>Starting from the bottom:</u>

(I) 3 factors reduce risk:

i. Macro stabilization

ii. Rising house prices

iii. Financial innovation (tranching; pooling risk)

(IIa) Lower risk → savers willing to lend more

(IIb) Lower risk → asset demand ↑ → price ↑ → IB's asset and equity value ↑

(IIa) + (IIb): IB can borrow more to buy more assets → IB leverage ↑

THE DOWNSWING AND THE 3-EQUATION MODEL

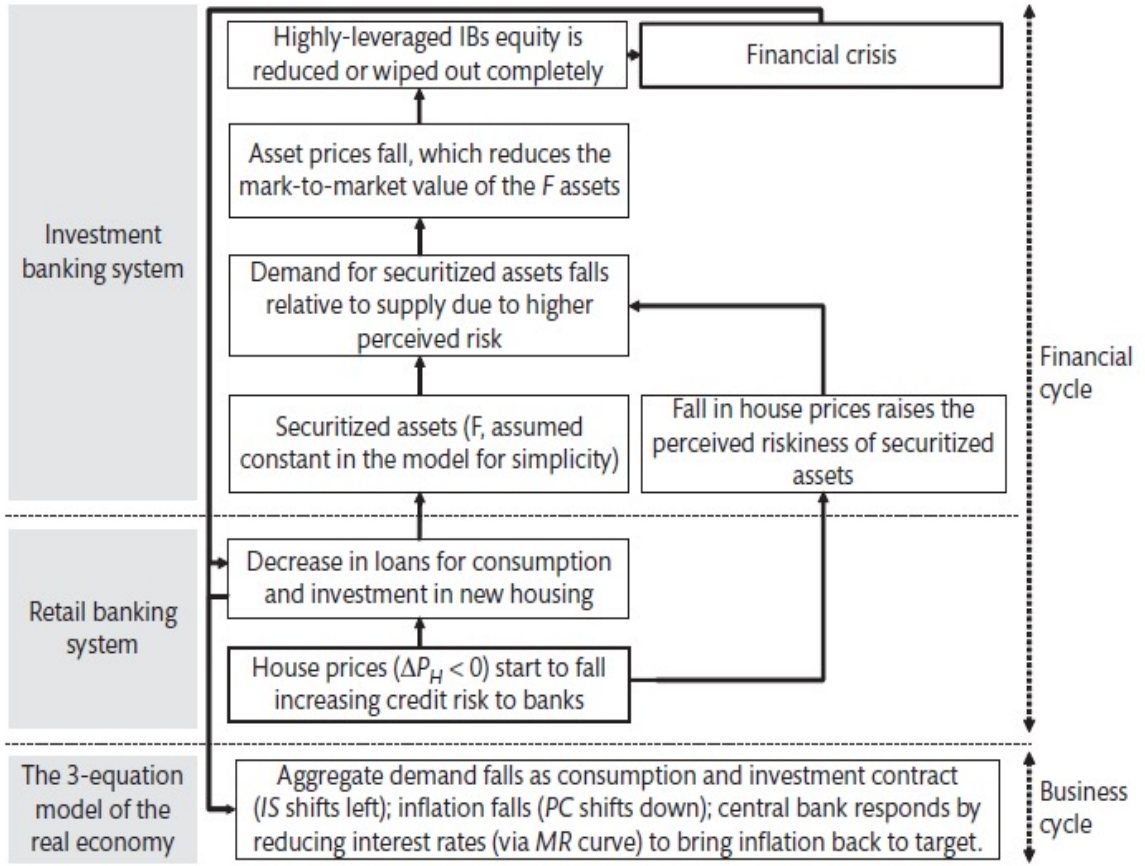


Figure 6.13 The 3-equation model of the macro-economy and the financial cycle: a fall in house prices leading to increased perceptions of risk and a financial crisis.

<u>Starting from the mid panel:</u>

(I) House prices start falling

(II) The feedback process is now in reverse.

(III) Retail banks, IBs, households deleverage (reduce debts) → AD ↓

<u>The paradox of credibility:</u>
Benign period in the economy sows the seeds for the subsequent crisis. SEE MINSKY!

Here, lower macro risk from inflation targeting etc. sets in place the conditions for the financial crisis.

BALANCE SHEET RECESSIONS AND FINANCIAL ACCELERATOR

- Pre-crash: 2 household types: Savers (consume following PIH), Borrowers (credit-constrained); Output is at y_e.
- Crash: House and securitized asset prices fall, then:
  1. Retail banks reduce LTV ratio → AD ↓
  2. Value of housing collateral falls → Consumption loans ↓ → AD ↓
  3. Balance sheet effect:

     " Banks call in loans → Borrowers repay loans by cutting C → savers' wealth rises from repayment → PIH: savers' C increases by small amt."

     ∴ AD ↓ as fall in borrowers' C > rise in savers' C.

  4. Rebuilding target wealth after fall in house & asset prices:

     Households save to rebuild wealth → AD ↓ (slows down recovery)

EXTRA MATERIAL FROM CHAPTER 7

A SIMPLE MODEL

Some simplifying assumptions:

1. The real economy is held as constant during the two upswing periods of the financial cycle (upswings do not depend on spillovers to the real economy)
2. IBs are not deposit-taking (unable to fund asset purchases using deposits)
3. Asset risk is known to all agents.

Value at Risk (VaR) behaviour of the IB:

Notation: F : asset quantity

P : asset price

r : asset rate of return

r^P : saver's lending rate to IB (money market rate)

VaR MODEL:

- VaR behavior: The IB buys *as many F assets as it can* so long as the expected return is higher than the price: $1 + r > P$
- The maximum expenditure is equal to total equity plus available borrowing from savers: $PF = e + B$
- Savers are willing to lend at r^P so long as there is no risk.
- Savers assume the maximum loss per asset is $\bar{z}$, so the worst case return is $(1 + r - \bar{z})F$
- Savers are willing to lend amt. B so long the IB can still pay them back in the worst case: $(1 + r^P)B = (1 + r - \bar{z})F$
- Assuming $r^P = 0$ for simplicity, the maximum borrowing by the IB is: $\max B = (1 + r - \bar{z})F$.

VaR MODEL (CONTINUED)

- Therefore, so long $1 + \mathrm{r} > \mathrm{P}$, the IB's expenditure on the assets is: $PF = max\ B + e = (1 + r - \bar{z})F + e$
- Rearranging this, we get the IB's asset demand:

$$F = \frac{e}{\bar{z} - (1 + r - P)}$$

risk *return*

- Recalling the definition of leverage,

$$leverage = \lambda = \frac{assets}{equity} = \frac{F_0}{e} = \frac{1}{risk - return\ to\ the\ IB}$$

- Leverage depends on the gap between risk and return.
- Risk ↓ → IB Leverage ↑
- *Note: The IB is risk neutral so risk only influences savers in their willingness to lend.*

AN EXAMPLE

	PERIOD 0	PERIOD 1 (BEFORE CHANGE IN BANK CAPITAL)	PERIOD 2	PERIOD 3
POLICY RATE (rP)	0	0	0	0
ASSET RETURN (r)	0.07	0.07	0.07	0.07
EQUITY (e)	10	10	20	WIPED OUT
RISK LEVEL (zBAR) RETURN	0.12 0.07	**0.04** **0.02**	0.04 0.02	0.12
PRICE OF ASSETS (P)	1	**1.05**	1.05	1
DEMAND (F)	200	200	500	
LEVERAGE	20	20	50	

BUBBLES IN THE LAB! (PALAN, JoES 2013)

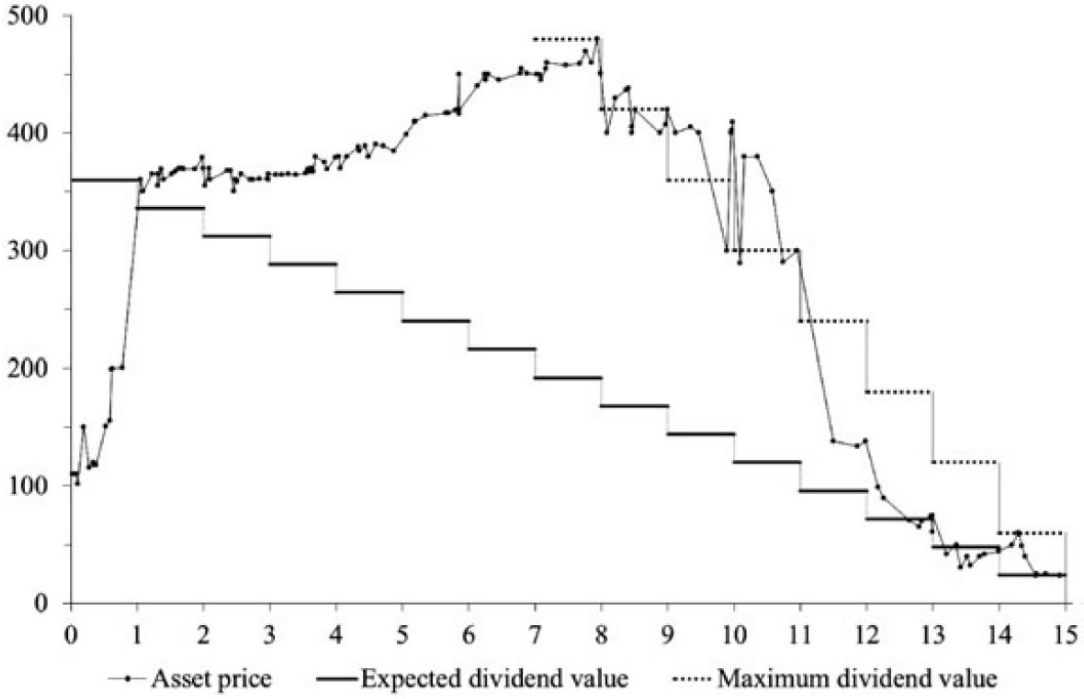


Figure 1. Typical Price Pattern in Baseline Markets with Inexperienced Subjects.
The lower (upper) step-wise decreasing function shows the expected (maximum) dividend return from holding one unit of the asset from the respective period until the end of the experiment.
Source: (Palan, 2010), Exp. 2, Round 1.

In dozens if not hundreds of experiments, traders (re)produce bubbles in excess of fundamental value that is, or should be, known to all participants in advance, an environment that is much simpler than our "uncertain" world.

WHY? SOME OF PALAN'S (2013) TWO DOZEN REGULARITIES …

- BUSINESSPERSONS, CORPORATE EXECUTIBES AND STOCK MARKET DEALERS DO NOT PRODUCE FEWER OR SMALLER BUBBLES (SMITH ET AL, ECONOMETRICA, 1988, REPLICATED SEVERAL TIMES) BUT …
- "EXPERIENCE" AND REPEATED TREATMENT DO.
- PERSONALITY, EMOTION AND GENDER ALL MATTER
- TEAMS CREATE FEWER AND SMALLER BUBBLES
- TOURNAMENT-BASED INCENTIVES PRODUCE MORE AND LARGER BUBBLES