BANK OF ENGLAND

Forbearance and Broken Credit Cycles

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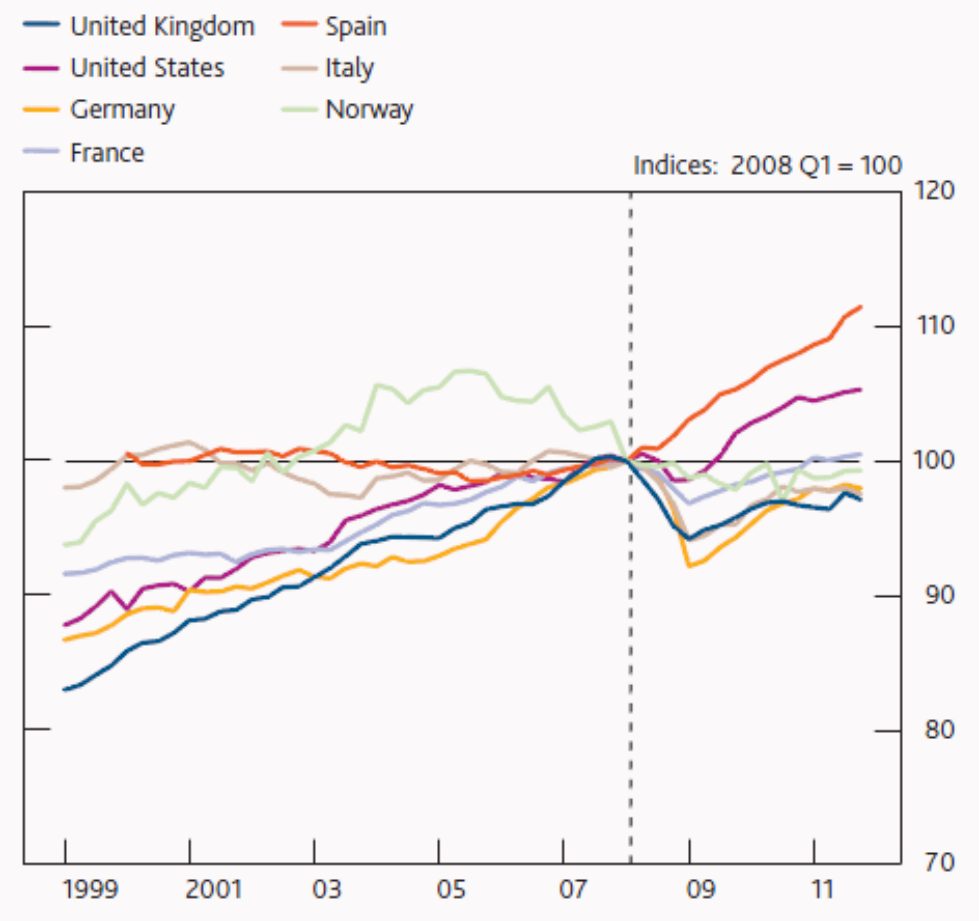
* The views expressed in this presentation are mine and not necessarily those of the Bank of England.

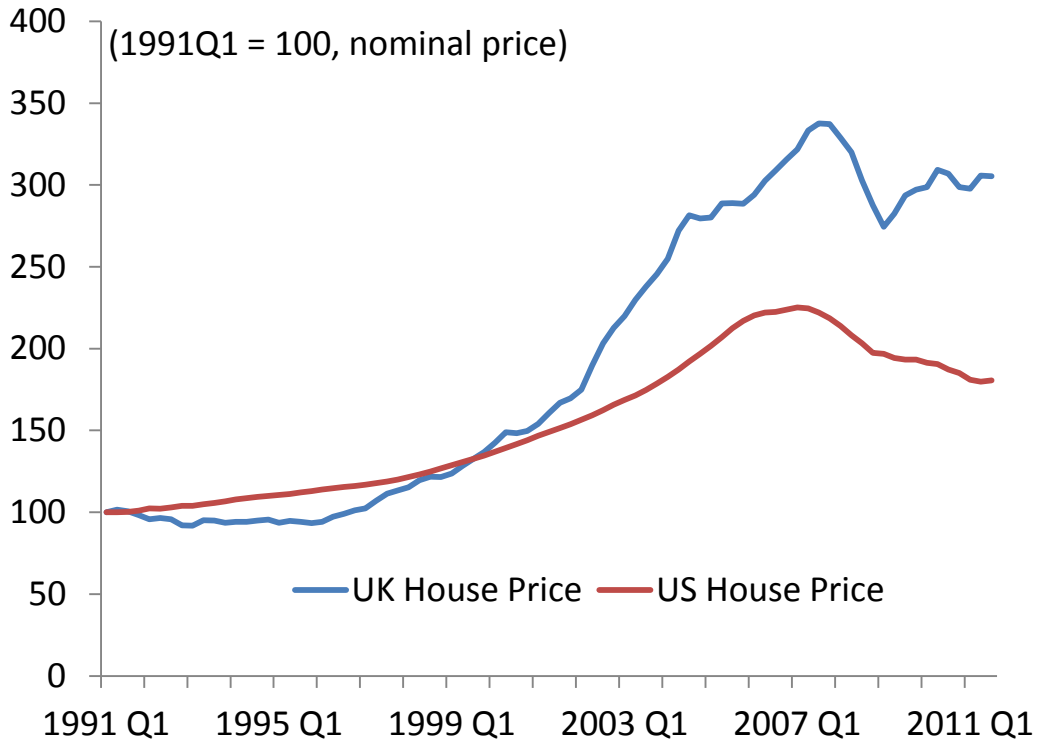
Motivations: from crisis to post-crisis

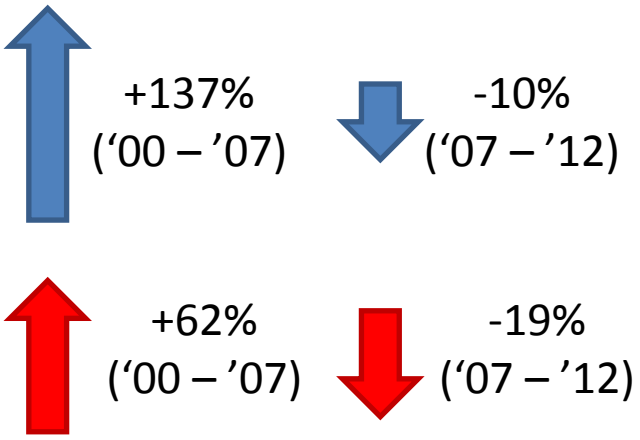
- **Low Productivity** (Hughes and Saleheen, 2012)
  - Unusual fall in the level of productivity after the crisis (except for US)



Motivations: from crisis to post-crisis

- **Property Price Puzzle**
  - Residential property price experienced 250% increase from 2000 till 2007, the price dropped by only 20% after the crisis

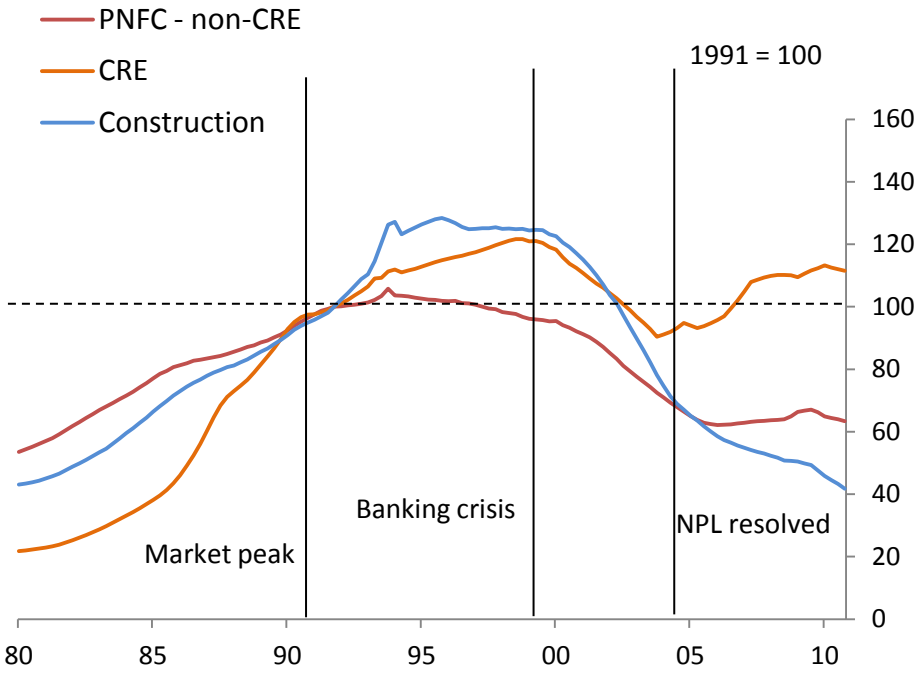




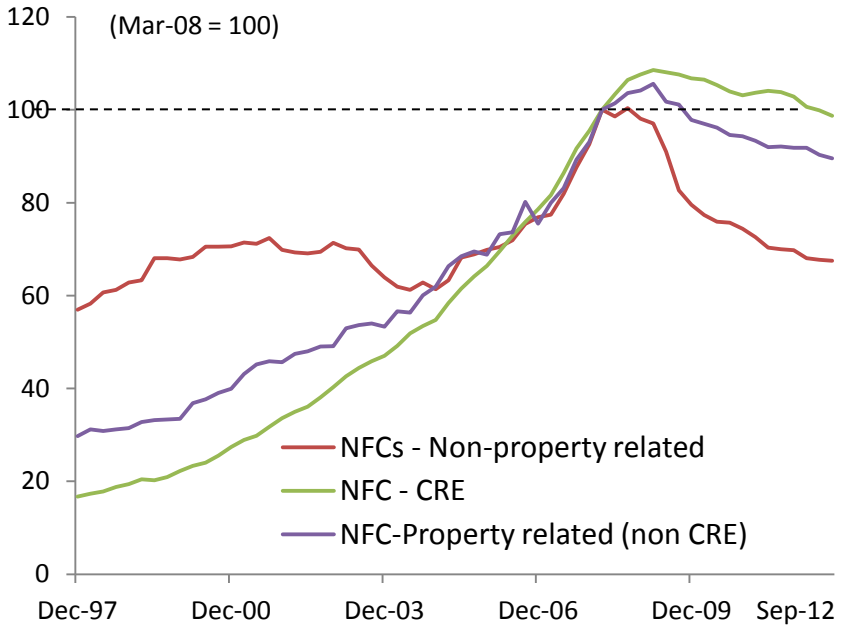
Motivations: from crisis to post-crisis

- **Slow develerage (especially in less performing sectors)**

Japan



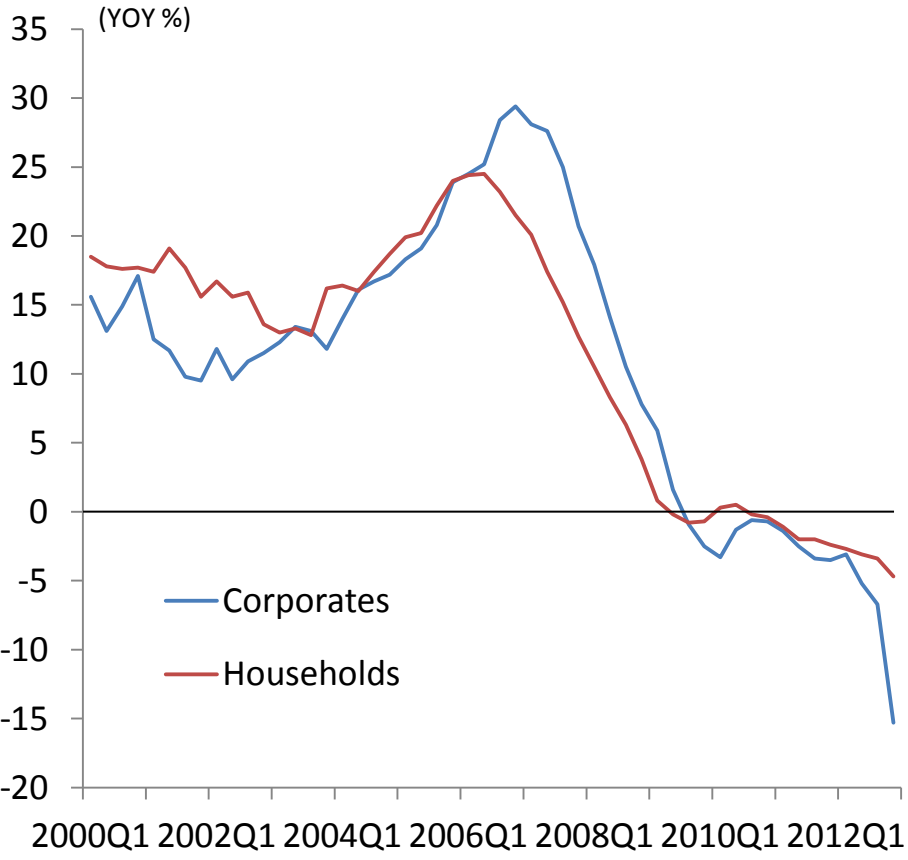
UK



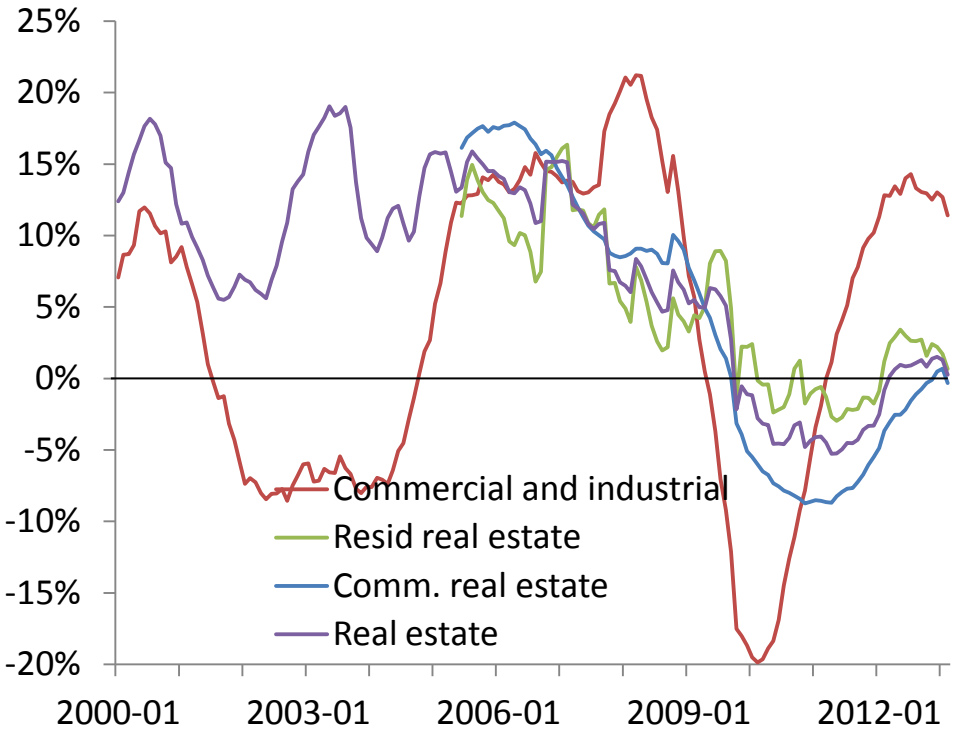
Motivations: from crisis to post-crisis

- **Slow develerage (especially in less performing sectors)**

Spain

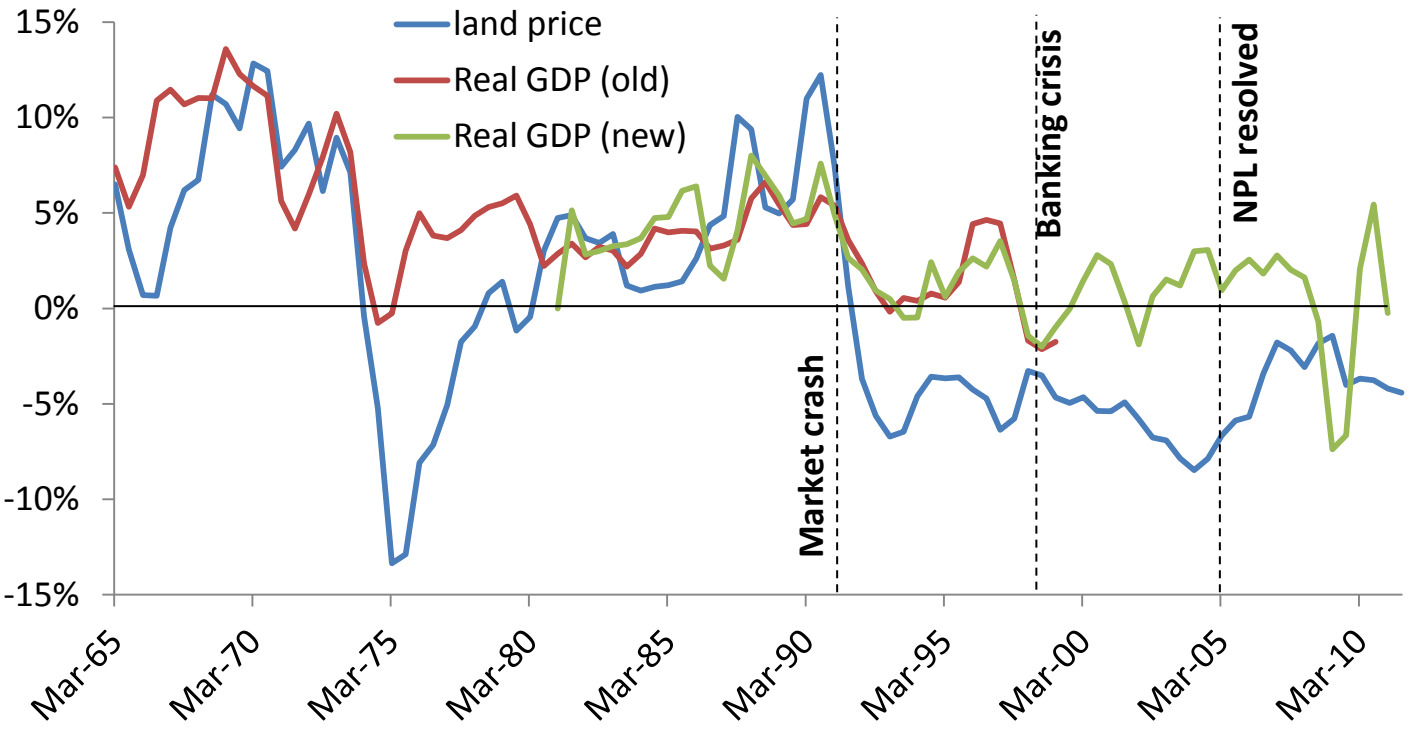


US



Motivations: from crisis to post-crisis

- **Broken credit cycle in Japan**
  - Correlation of land price and GDP (1st order difference) was 0.49 from 1956 till 1991, but -0.15 from 1991 till 2005.
  - Looks like the correlation recovers after 2005



Motivations: Can forbearance be an answer?

- **Forbearance:**
  - Banks do not liquidate less-performing borrowers by revising terms of the contracts
  - Also called: **Zombie lending**, **evergreening loans**

- **Why banks forbear**
  - Liquidating bad borrowers need capital (or bankrupt)
  - Liquidation value could be higher in the future (gamble for resurrection)

- **Is it good or bad?**
  - Rational for stricken banks
  - comes at a macroeconomic cost in the long run
    - Resources are wasted
    - Less new investment, especially to new entrants
  - Could boost outputs in high-leverage sectors

Literature

- **Forbearance (theory)**
  - Kocherlakota and Shim (2007)
  - Caballero Hoshi and Kashyap (2008)
  - Philippon and Schnabl (2013)

- **Forbearance (empirical)**
  - Peek and Rosengren (2005)
  - Saita et. al. (2003)
  - Kwon, Narita and Narita (2009)

- **Relevant theories**
  - Kiyotaki and Moore (1997)
  - Krishnamurthy (2003)
  - Lorenzoni (2008)
  - Korineck and Jeanne (2011)

Overview

1. **Introduction**

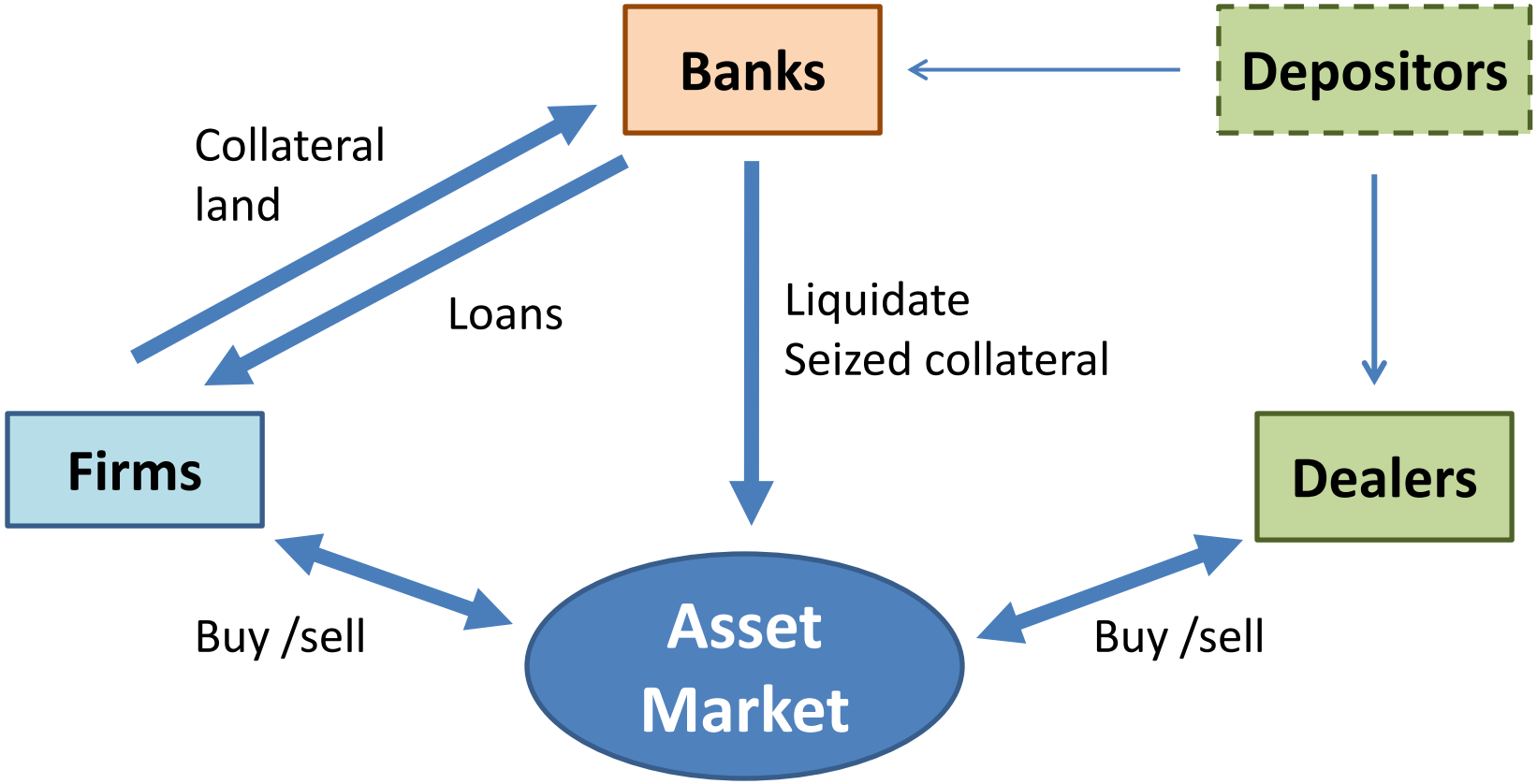
2. **Defining baseline model**
    1. Mechanism of leverage and de-leverage
    2. Financial accelerator and “crisis”

3. **Modelling forbearance**
    1. Impacts of forbearance
    2. Banks’ incentive and coalition

4. **Policy discussions**
    1. Welfare analysis (simplistic)
    2. Implementing efficient outcome

Assumptions

- **3 sets of players:**
  - Firms (atomless): better stochastic production technology $a_t=\{a_H, a_L\}$
  - Banks (many, but finite): collect deposit to lend or invest directly
  - Dealers (atomless): with less profitable non-stochastic technology



Firm's problem

- **Budget constraint** $q_t k_t^f \leq D_t + \omega_t$
- **Collateral constraint** $D_t \leq (1-h) E\left[q_{t+1}\right] k_t^f$
- **Demand function (constrained)** $k_t^f = \frac{\omega_t}{q_t - (1-h) E_t\left[q_{t+1}\right]}$
- **Harvest (at t+1):** firms obtain $a_{t+1}\, k^f_t$
  $a_{t+1} = \{a_H, a_L\}$ with *prob* π and $1-\pi$
- **Bankruptcy:** Firms cannot harvest any with Prob γ
- **Updating wealth ω_{t+1}:**

$$E_t[\omega_{t+1}] = \pi(1-\gamma)\left(a^H_{t+1} k^f_t + q^H_{t+1} k^f_t - R_t\right) + (1-\pi)(1-\gamma)\left(a^L_{t+1} k^f_t + q^L_{t+1} k^f_t - R_t\right)$$

Firms' problem: one more assumption

- **Do firms realise all capital gains from their asset holding?**

$$E_t[\omega_{t+1}] = \pi(1-\gamma)\left(a^H_{t+1}k^f_t + q^H_{t+1}k^f_t - R_t\right) + (1-\pi)(1-\gamma)\left(a^L_{t+1}k^f_t + q^L_{t+1}k^f_t - R_t\right)$$

- Firms realise a fraction ***η*** of the capital gain

$$E_t[\omega_{t+1}] = (1-\gamma)\left(E_t\left[a_{t+1}\right]k^f_t + E_t\left[q_{t+1}\right]k^f_t - R_t\right) + (1-\gamma)\left(E_t\left[\Delta a_{t+1}\right]k^f_t + \eta E_t\left[\Delta q_{t+1}\right]k^f_t\right)$$

- **Firms' demand function and financial accelerator**

$$k^f_t = \frac{\omega_t\left(\eta q_t k^f_{t-1}\right)}{q_t - (1-h)E_t\left[q_{t+1}\right]}$$

Dealers' problem

- **Dealers' payoff function**

$$\Pi_t = f\left(A, k_t^b\right) - rq_t k_t^b$$

- **Dealers' demand function (downward sloping)**

$$k_t^b = \frac{A}{2} - \frac{1}{2} rq_t$$

- **Market Clearing condition**

$$k_t^f + k_t^b = K$$

Banks' problem

- Banks determine loan size D_t and repayment R_t to maximise their next period payoff

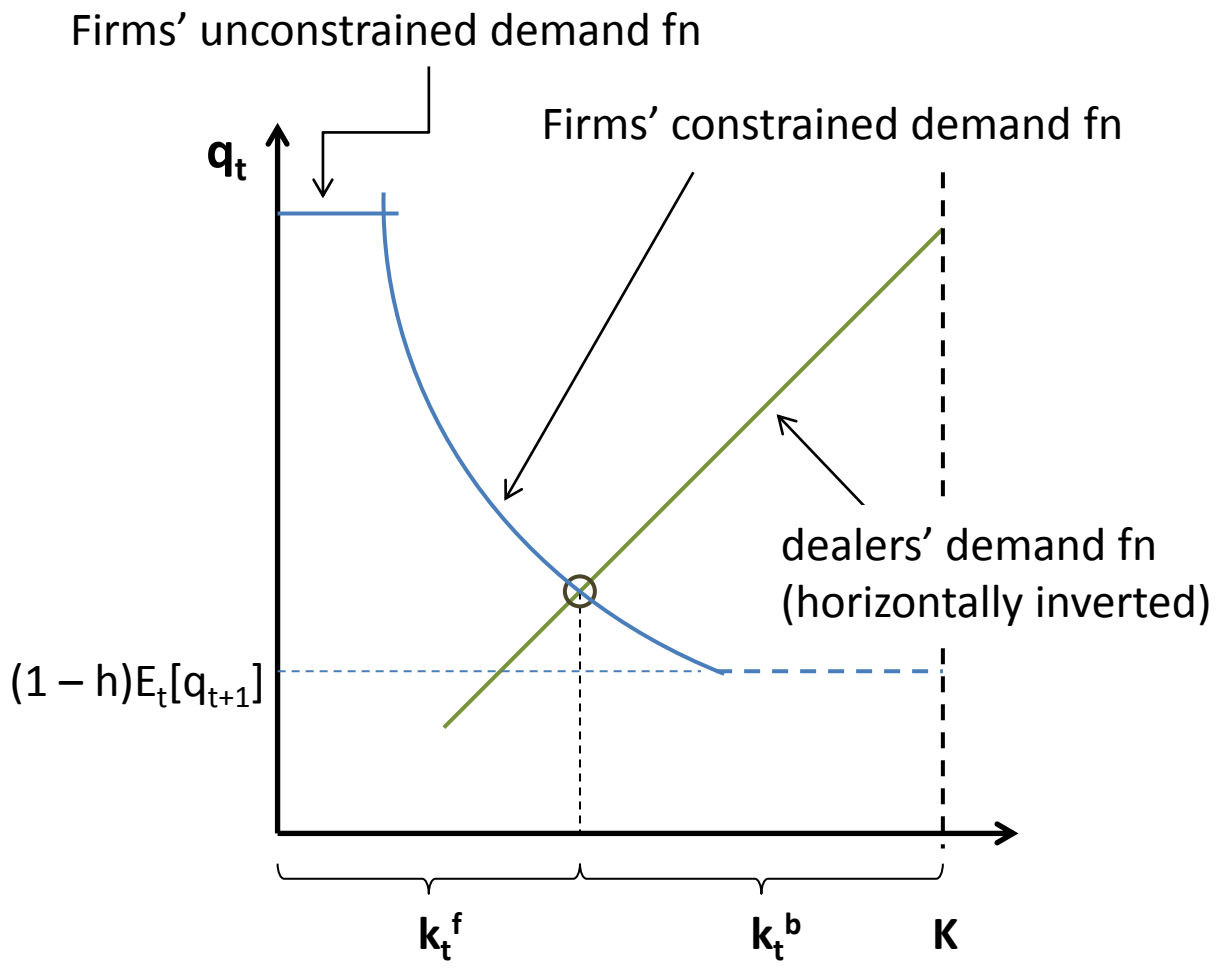
$$E_t\left[W_{t+1}\right] = W_t + E_t\left[\left(1-\gamma\right)R_t + \gamma q_{t+1} k_t^f - \left(1+r_t\right)D_t\right]$$

- Each bank lends to many firms
- Banks make a take-it-or-leave-it offer to firms and take all excess profits

$$\begin{aligned} E_t\left[\omega_{t+1}\right] &= \omega_t \\ E_t\left[W_{t+1}\right] &\geq W_t \end{aligned}$$

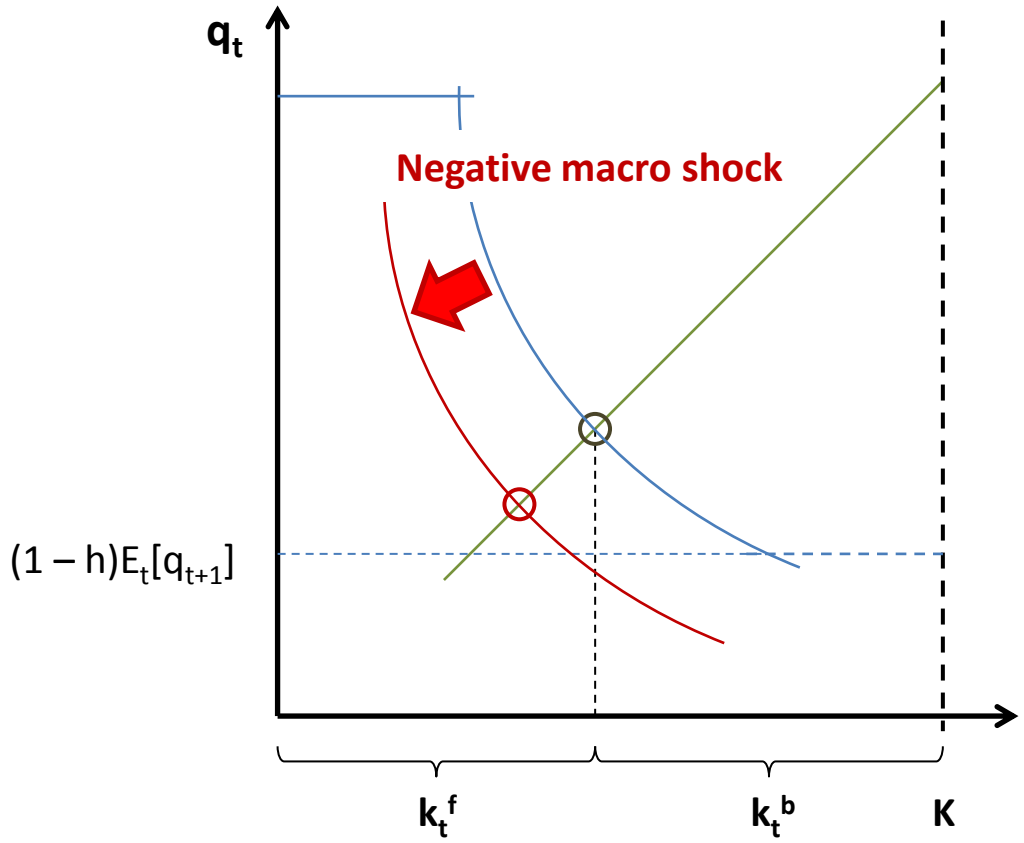
- Borrowing firms' default risks are perfectly correlated:
  - i.e. with probability γ, a bank receives no repayment

Equilibrium (when η is low)

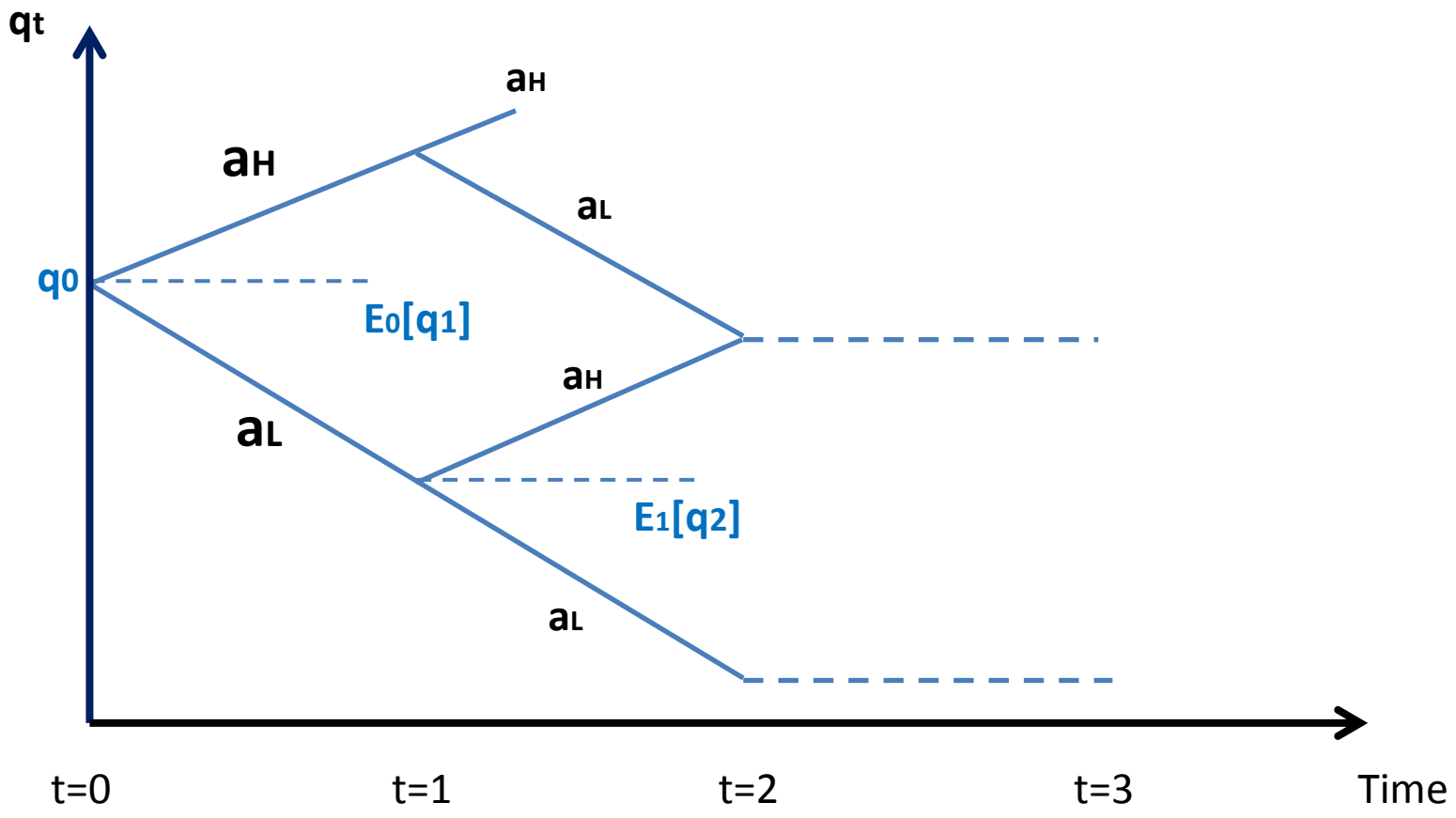


Equilibrium with negative macro shock ($a_{t+1} = a^L$)

- When η is small: **Unique equilibrium**

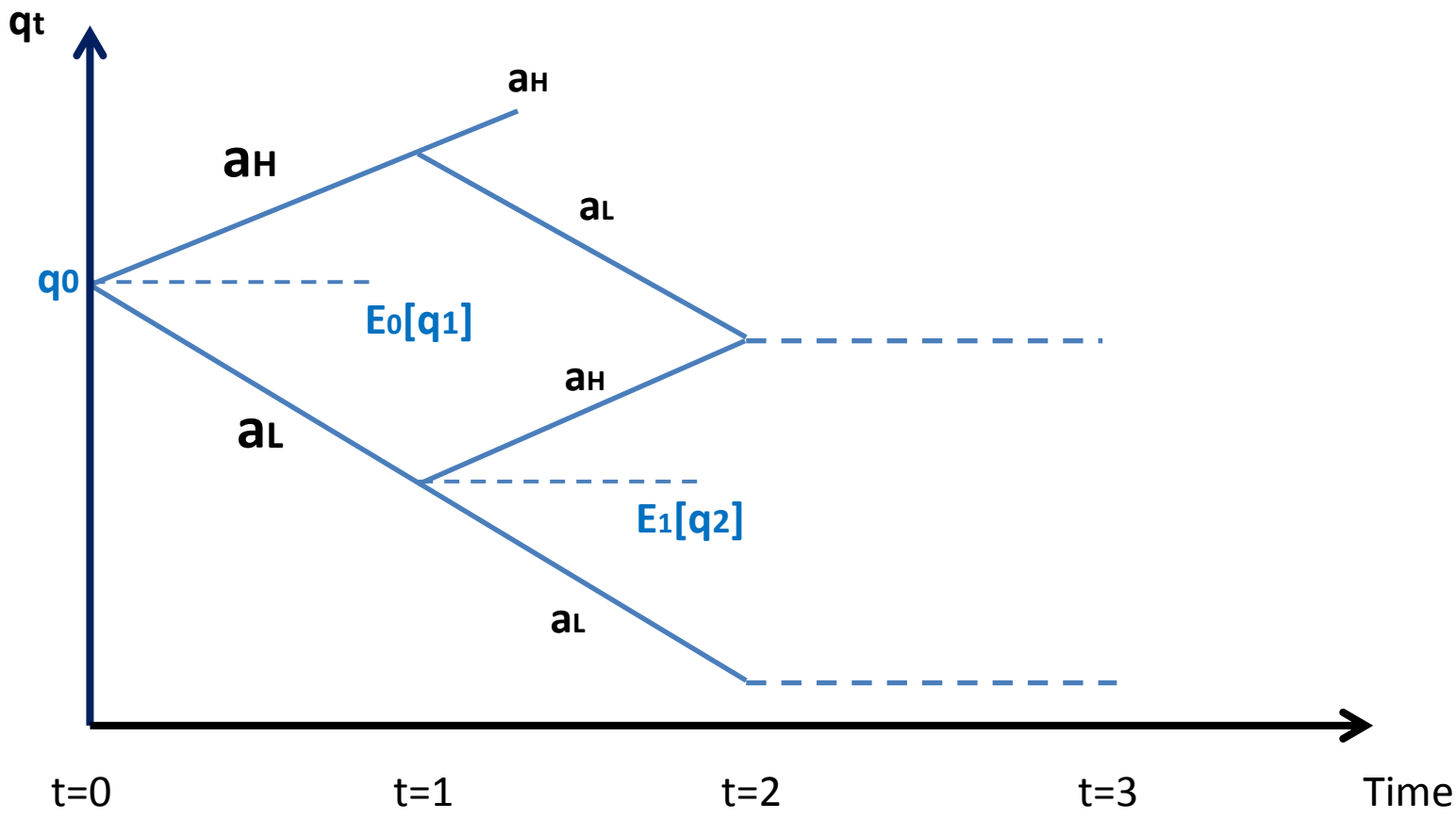


Equilibrium Price (output) Dynamism



Proposition: *In the baseline model, the asset price q_t follows a process with (nearly) zero drift.*

Equilibrium Price (output) Dynamism



- 'Outsider' sells land
- Firms (ω_0) and banks (W_0) are endowed

- 'Outsider' buys land at q_2
- Firms, bank and dealers consume everything and die

What happens to the 'stricken' banks under neg. shock

- **Asset price plunge creates loan loss of the banks**

$$\begin{aligned} & q_t k_{t-1}^f - (1+r) D_{t-1} \\ = \; & q_t k_{t-1}^f - (1+r)(1-h) E_{t-1}[q_t] k_{t-1}^f \\ < \; & 0 \; ? \end{aligned}$$

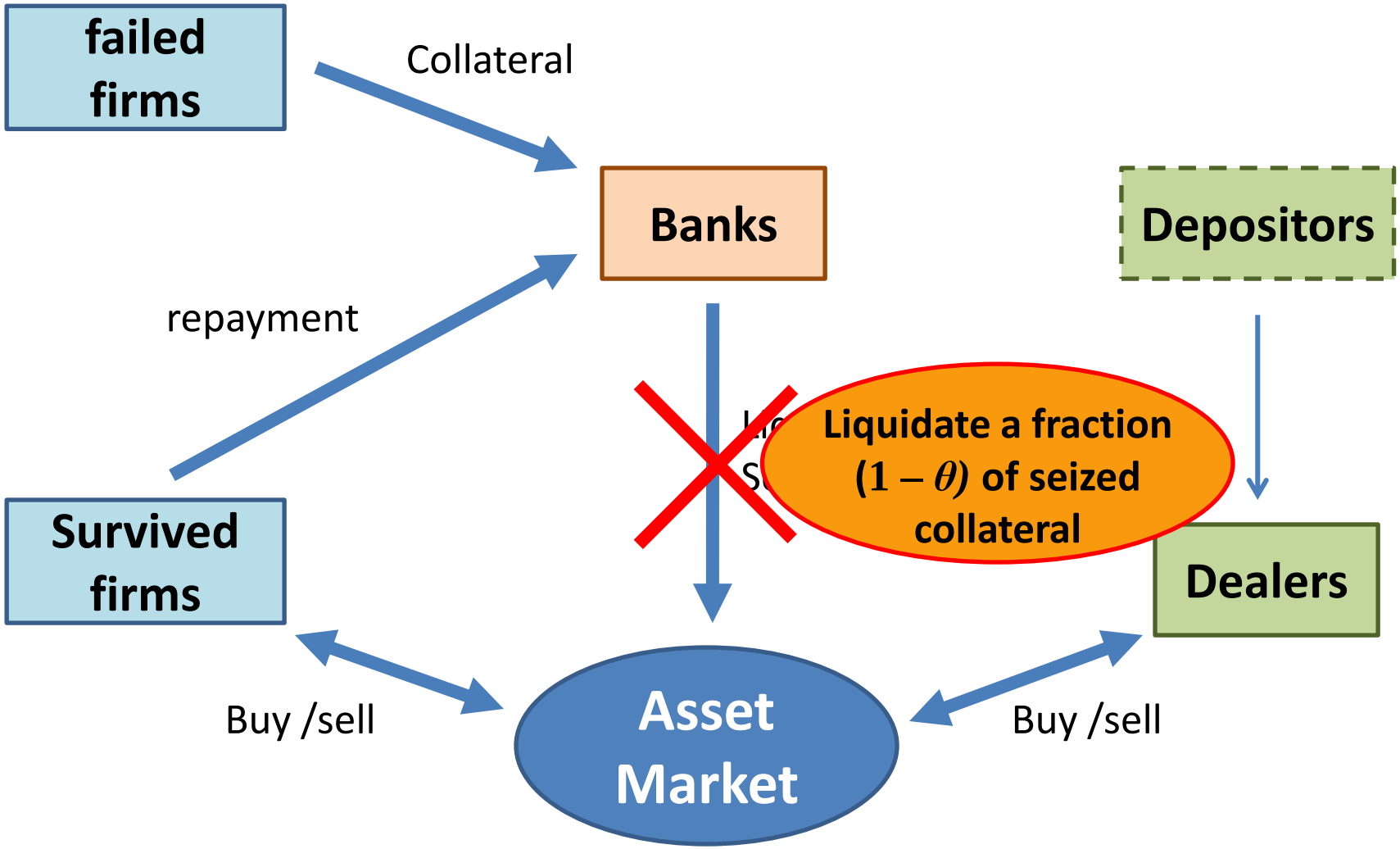
- **Banks with capital W_t below a regulatory threshold are penalised**

$$\begin{aligned} W_{t+1}|_{a_{t+1}=a^L} &= W_t + q_{t+1} k_t^f - (1+r_t) D_t \\ &< \bar{W} \end{aligned}$$

- **Banks can 'make up' their capitals if they can contain the plunge**

- **… but how?**

Forbearance: a basic structure



Forbearance: definitions

- **Renegotiation of terms and conditions of loan contracts**
  - LTV covenant breach
  - Interest / debt service breach
  - Maturity extension
  - Payment holiday

- **Creating new loans to help borrowers service their debts**
  - “snowballing loans” (Japan)

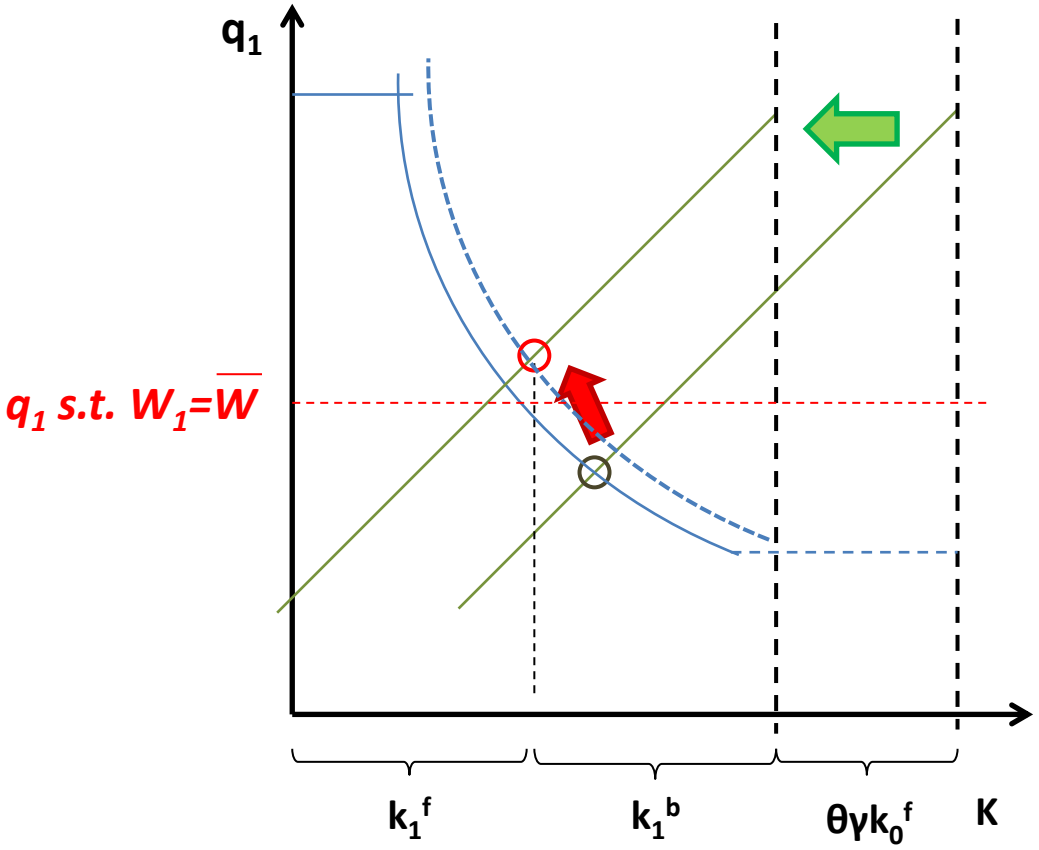
- **Foreclosing borrowers, but not liquidating collateral assets**
  - Spanish banks till 2011

Forbearance: assumptions

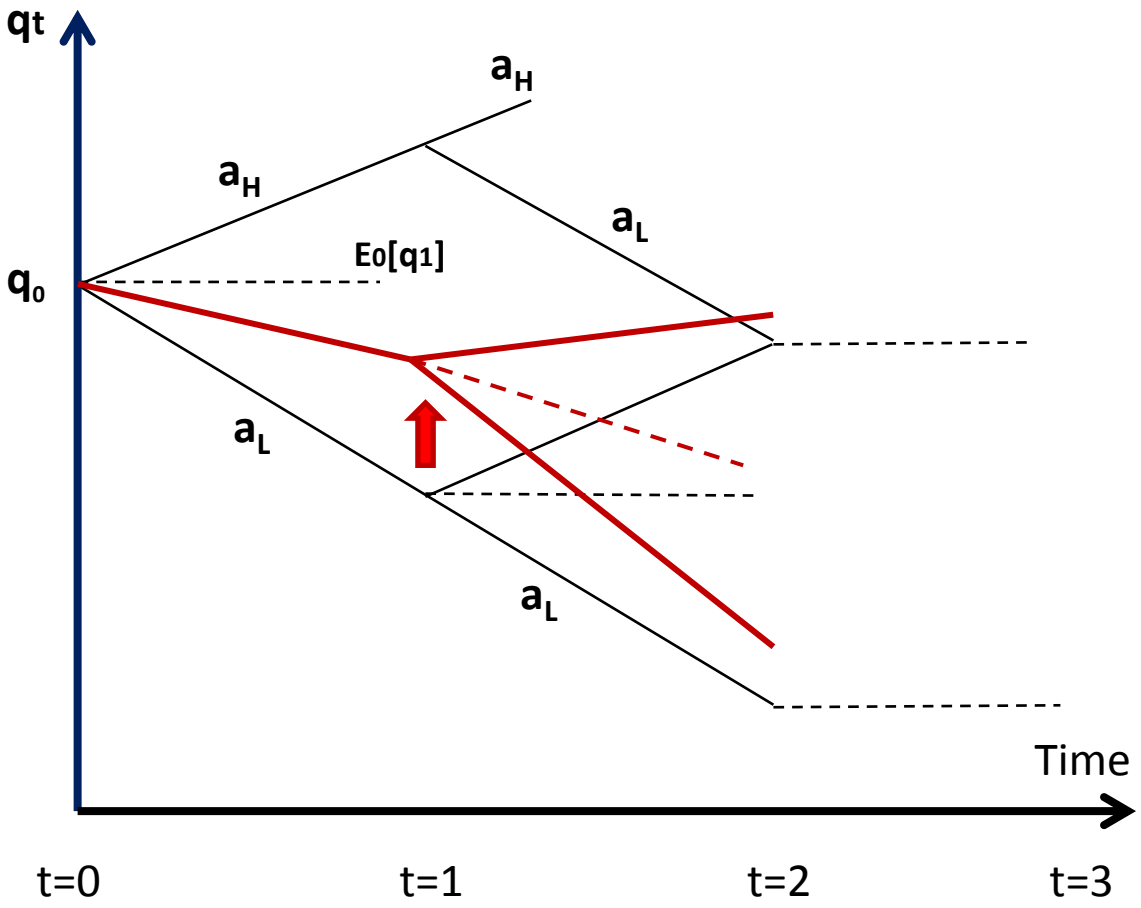
- Bad borrowers (fraction γ)' productivity is fixed at zero throughout the periods
  - Ie they do not recover, nor deteriorate further
- The value of bad borrowers is measured by the value of their collateral (ie banks have to write off all negative equities)
- Banks can forbear only at t=1, and have to unwind at t=2
- Banks can choose the fraction $\theta \leq 1$ of "zombie borrowers" out of their bad borrowers
- Banks have a chance to collude (not to liquidate bad borrowers)

Forbearance: impact on price

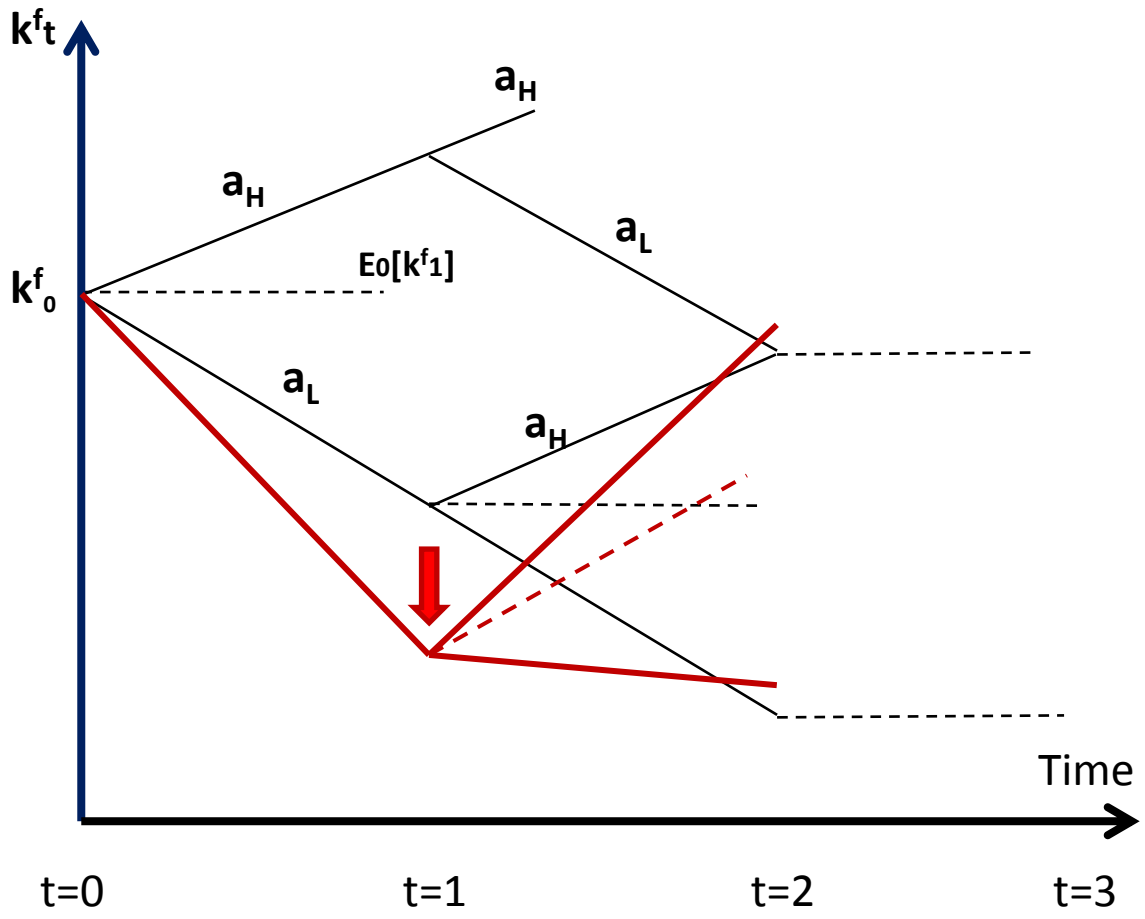
- bad borrowers stay at their land without producing any
  - … and **squeeze total available production capital**
  - Asset price should be pushed up in any equilibrium



Equilibrium Price Dynamism



Equilibrium Investment Dynamism (when η is low)



Forbearance: impact on k_1^f

- **Firms' demand function:**

$$k_t^f = \frac{\omega_t \left(\eta q_t(\theta) k_{t-1}^f\right)}{q_t(\theta) - (1-h) E_t\left[q_{t+1}(\theta)\right]}$$

  - Higher land price lowers firms' purchasing power directly
  - But the collateral value of land does not increase as the unwinding of forbearance is expected
  - i.e. the 'haircut' of collateral land increases by forbearance
  - Higher land price increases firms' wealth

- **Total supply of land decreases to $K - \theta\gamma k^f_0$.**

  - $\theta\gamma k^f_0$ is left unused

Forbearance: impact on k_1^f (new entrants)

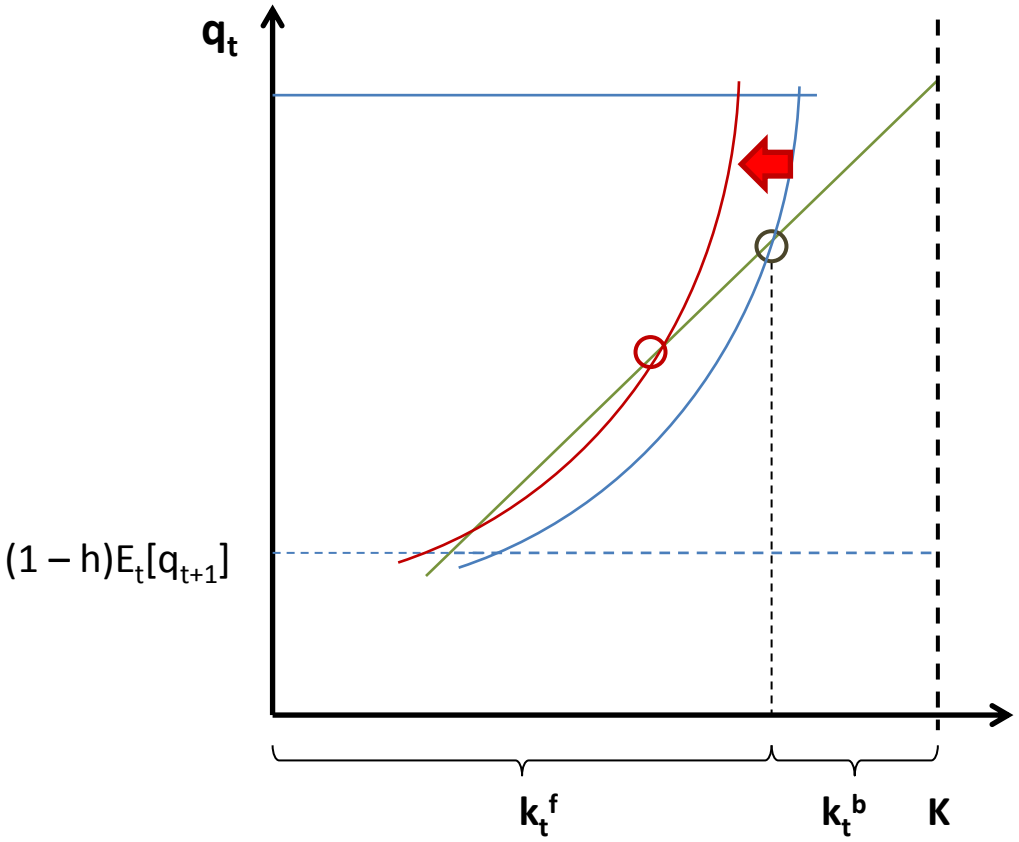
- Firms' demand function:

$$k_t^f = \frac{\bar{\omega}_t}{q_t(\theta) - (1-h)E_t\left[q_{t+1}(\theta)\right]}$$

- Survived (incumbent) firms' purchasing power is supported by the wealth effect to some extent
  - If we introduce new entrants with higher productivity possessing $\boldsymbol{\omega_0}$ at t=1, their land holding decreases further than the incumbents

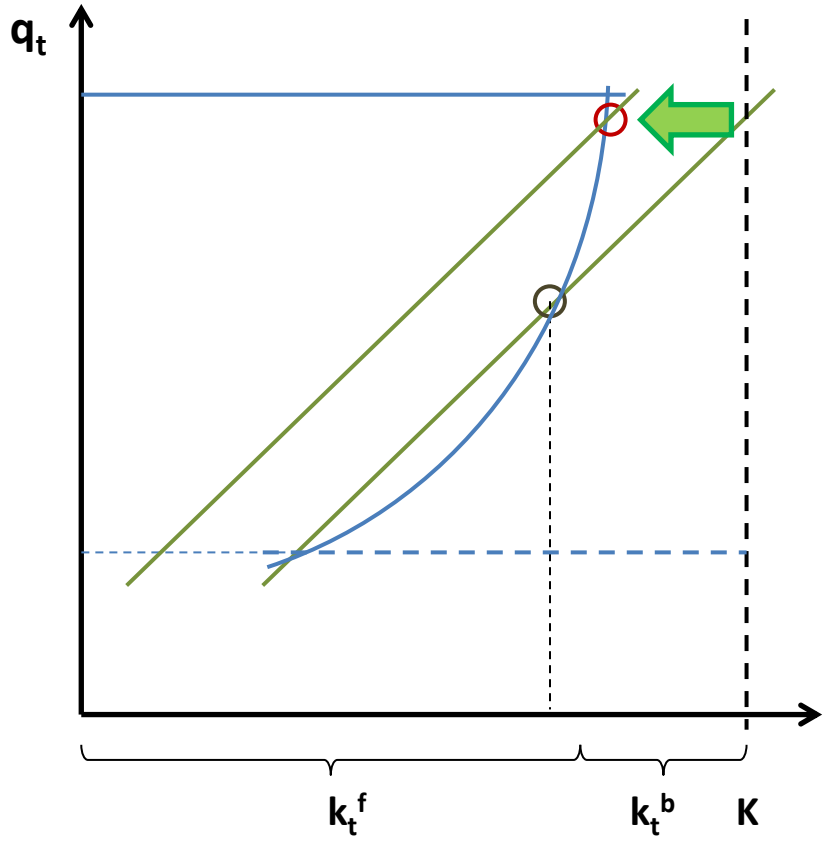
Static Equilibrium (when η is high)

- When η is larger: **Multiple equilibria**
  - Demand curve becomes Z-shape
  - Focus only on the stable equilibrium



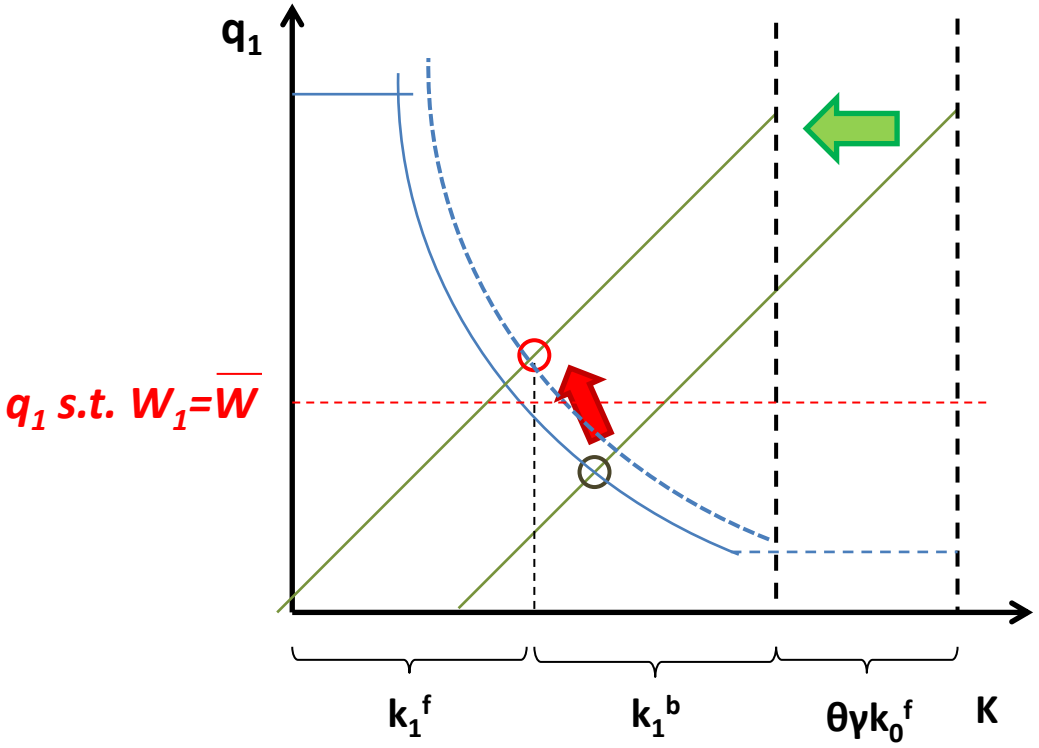
Forbearance (when η is high)

- Forbearance could increase or decrease firms' land holding k_1^f
  - Depend on parameters, particularly higher η
  - Difficult to solve analytically – numerical exercise needed
- Increase of k_1^f is not the sufficient condition of higher output



Incentive of Forbearance

- Authorities monitor banks' W_1 and force banks to close if $W_1 < 0$
- Banks choose the fraction of zombie borrowers θ
  - By tomorrow (t=2) when they are forced to liquidate everything, the banks can earn profit by new lending and can expect higher land price q_2 with prob. π



Is forbearance good or bad?

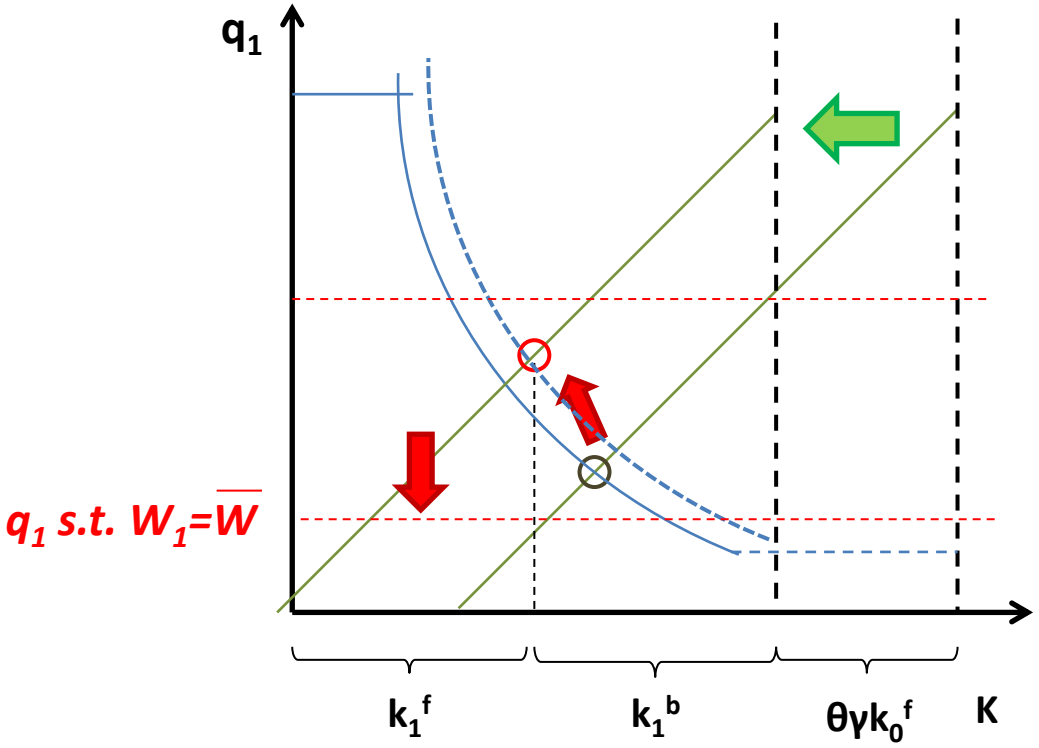
- Forbearance is rational for ‘stricken’ banks

- Forbearance lowers investment (and output)
  - Some production capital is wasted
  - Productive firms reduce investment
  - Healthy banks (and the stricken banks) reduce profit

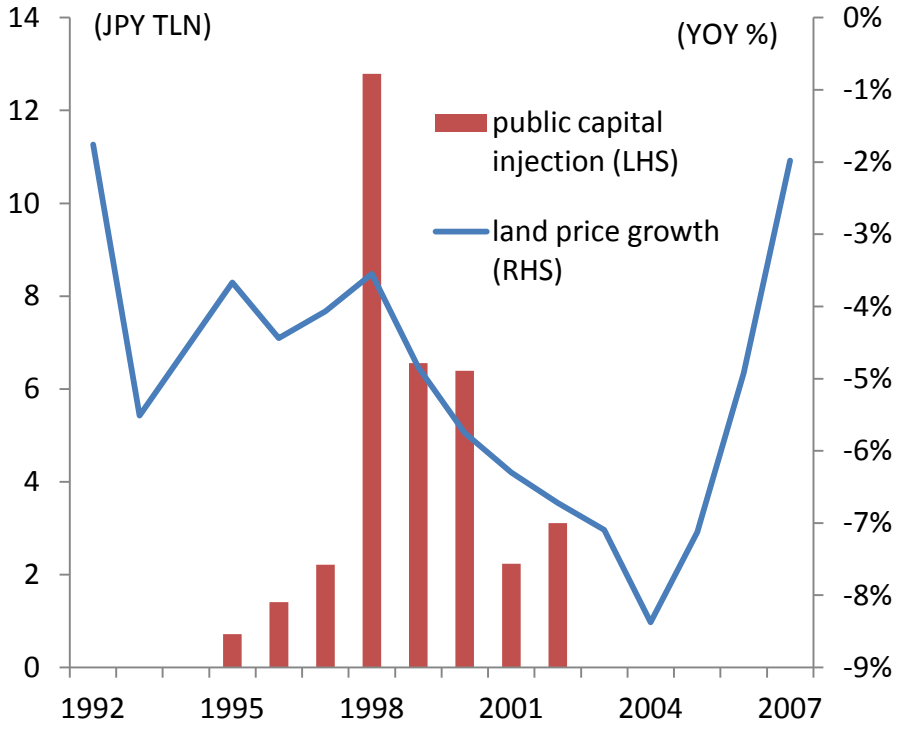
- Forbearance increases investment (and output)
  - If the economy is highly leveraged, the positive ‘wealth effect’ outweighs everything else

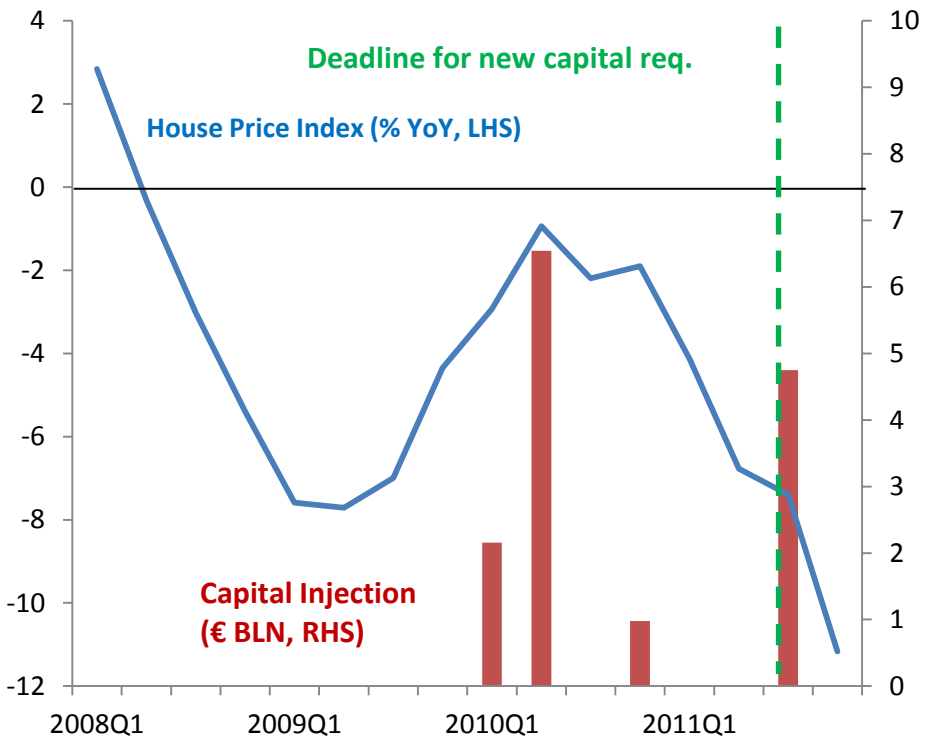
Discouraging forbearance

- If W_1 is increased by the government (capital injection), or the threshold W^{bar} is lowered, banks do not have to forbear
- But if the injection is insufficient it could rather incentivise forbearance



Provisioning and capitalisation: Japan and Spain





Policy implications

- Difficulty in monitoring forbearance
  - Forbearance could ‘hide’ non-performing loans
  - Stress test need to be conservative in asset valuation (asset price would plunge when banks unwind forbearance)
  - Healthy banks’ valuation should be tightened

- Explains the international productivity gap
  - The US: de-leveraging till 2010
  - The UK: less de-leveraging in CRE sectors etc

Directions for further works

- Social planner's optimal θ (regulatory forbearance)
  - Bank failure is currently costless in this model
    - Surviving banks replace loans without friction
  - Stricken banks do not internalise all negative effect on output

- Another incentive of forbearance
  - Expected price recovery in the future can lead to forbearance
  - Externality creates a dynamic inconsistency

- Endogenous interest rate

- DATA!

Summary

- Banks do forbearance to avoid liquidating collateral assets in the middle of the plunge of asset price (= realising a larger loan losses).
- Higher asset price (than it should be) and expected price decline raise haircut of collateral assets and tightens healthy firms' credit constraint (negative externality)
- Forbearance lowers productivity by wasting production capital and by tightening credit constraint of productive firms (esp. new entrants)
  - But if financial accelerator effect is strong, higher price could boost firms' investment
- Healthy banks' profit would be reduced (negative externality)
- Policy responses would be non-monotonic

Appendix: revival of zombies?

- During the "resolving NPL" stage from 2002 to 06, 10 tn Yen loans were downgraded and 10tn Yen were upgraded
- Banks choose the fraction of zombie borrowers θ (collectively)

			cumulative chg FY2002 - FY06 JPY TLN
NPLs based on the FRL (Financial Reconstruction Law)			-31.3
(of which) Special attention Loans (3m arrears or renegotiated loans)			-12.6
	Increase factors	Newly generated loans due to weakened business activities	12.3
		Upgrade from riskier categories	**2.6**
		Improvement of business condition of borrowers	1.4
		Establishment of restructuring plans	1.2
	Decrease factors	**Return to normal claims**	**-12.1**
		Improvement of business condition of borrowers	-9.7
		Establishment of restructuring plans	-2.7
		Downgrade to riskier categories	**-10.3**
		repayments etc	-5.2
(of which) Doubtful and bankrupt/de facto bankrupt			-18.7
	Increase factors	Newly generated loans due to weakened business activities	15.0
		Downgrade from safer categories	**10.3**
	Decrease factor	**Removal from B/S**	**-44.1**

Competitive equilibrium (at t > 0)

- When η is larger: **No equilibrium (crisis)**