

Comments by Rafael Repullo on

# **Contagious Illiquidity**

by

John Moore

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# Disclaimer

- Not easy discussion
  - No paper yet
  - Many arguments are not fully spelled out

# Introduction

- Structure of presentation
  - Static Akerlof model (6 slides)
  - Dynamic Akerlof model (10 slides)
  - Model of contagious illiquidity (18 slides)
  - Contagious illiquidity and financial fragility (5 slides)

# Introduction

- Overview of discussion
  - Static Akerlof model (7 slides)
  - Dynamic Akerlof model (9 slides)
  - Model of contagious illiquidity (11 slides)
  - Contagious illiquidity and financial fragility (0 slides)

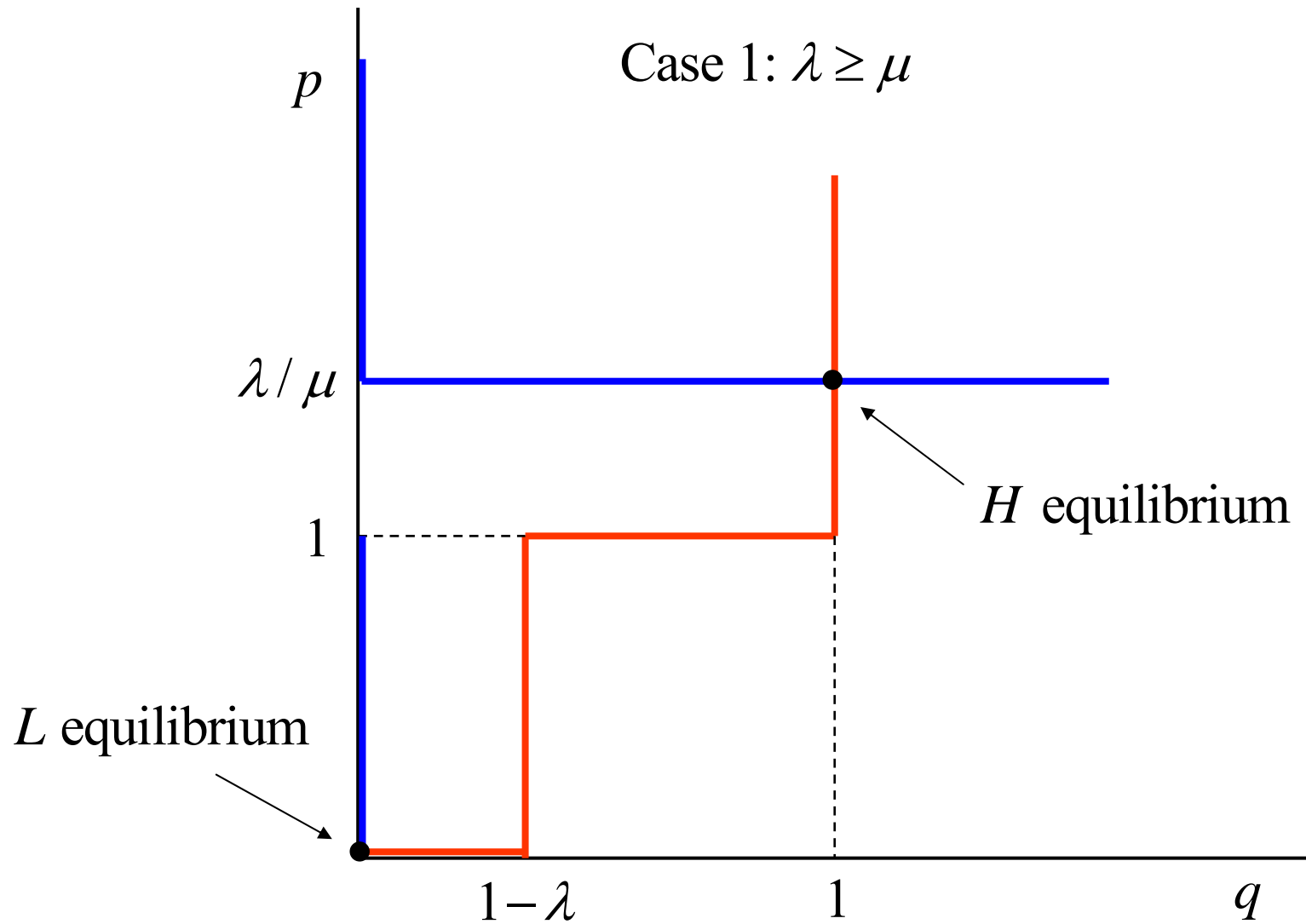
# Static Akerlof model

- Agents
  - Sellers with marginal utility of income  $\mu^s = 1$
  - Buyers with marginal utility of income  $\mu^b = \mu < 1$
- Goods
  - Two types which give utility  $H = 1$  or  $L = 0$
  - Asymmetric information: only sellers know type
  - Let  $\lambda$  denote the proportion of type  $H$

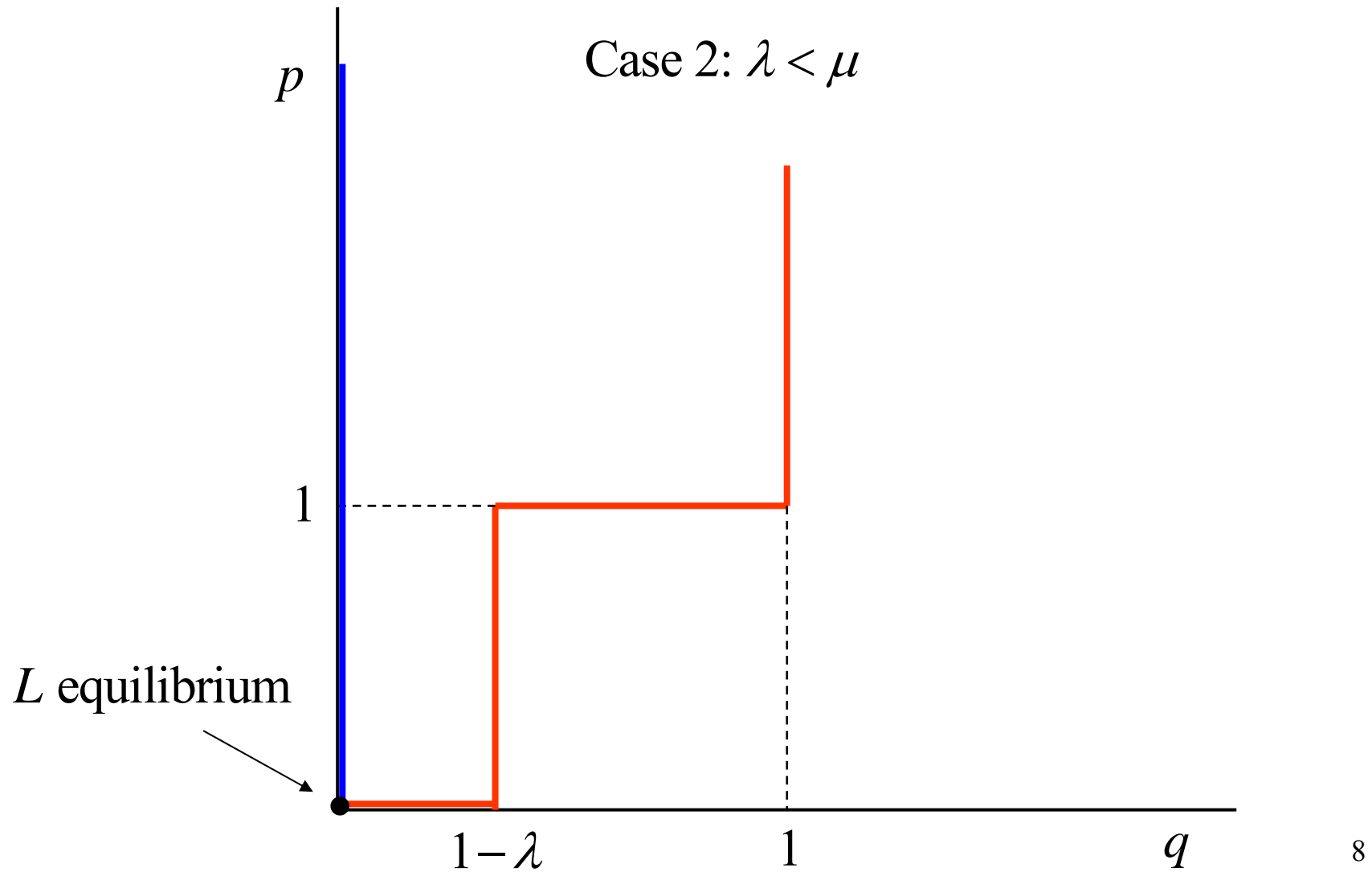
# Static Akerlof model

- High price equilibrium: both types are traded
  - Buyers' willingness to buy:  $p\mu \leq \lambda \rightarrow p \leq \lambda / \mu$
  - $H$  sellers' willingness to sell:  $p \geq 1$
- Low price equilibrium: only type  $L$  is traded
  - Buyers' willingness to buy:  $p\mu \leq 0$
  - $H$  sellers' unwillingness to sell:  $p < 1$

# Static Akerlof model

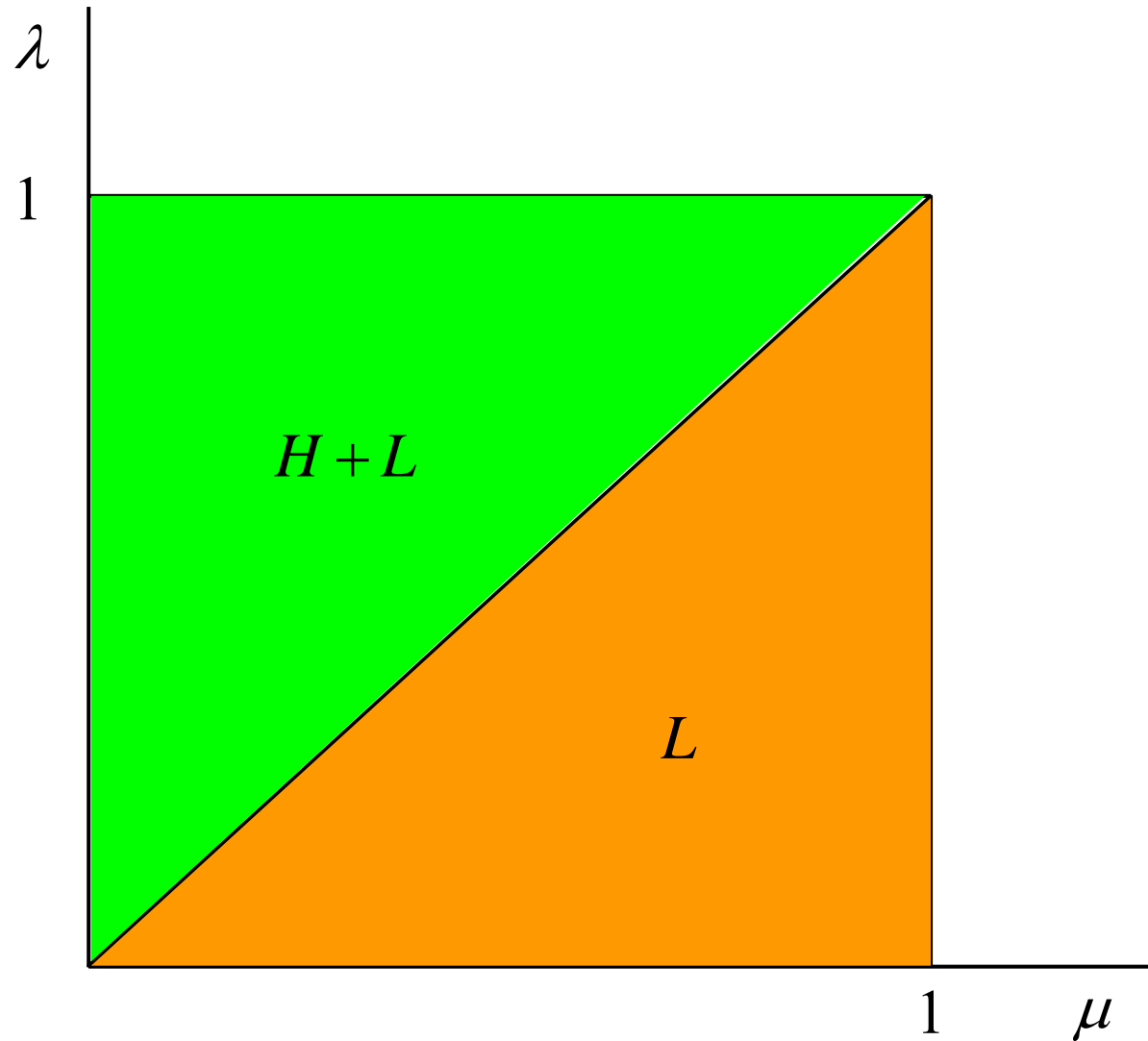


# Static Akerlof model





# Static Akerlof model



# Static Akerlof model

- There may be two Walrasian equilibria
  - It is argued that only the  $H$  equilibrium is Nash
  - What is the extensive form of the game?

# Static Akerlof model

## Comment 1

- The extensive form of the game needs to be spelled out
- A possible game
  - Each buyer  $i$  offers price  $p_i$
  - Sellers are matched to buyers
  - Each seller decides whether to accept or reject offer
- Result: If  $H$  equilibrium exists it is unique Nash equilibrium

# Dynamic Akerlof model

- Discrete time  $t = 1, 2, \dots$  with discount factor  $\beta < 1$
- Agents alternate their marginal utilities of income
  - Odd agents are sellers in odd and buyers in even periods
  - Even agents are sellers in even and buyers in odd periods
- Assets
  - Two types which give dividend per period  $H = 1$  or  $L = 0$
  - Asymmetric information: only sellers know type
  - Let  $\lambda$  denote the proportion of type  $H$

# Dynamic Akerlof model

- High price equilibrium: both types are traded

- Buyers' willingness to buy:

$$p\mu \leq \beta(\lambda + p) \rightarrow p(\mu - \beta) \leq \beta\lambda$$

- $H$  sellers' willingness to sell:

$$p \geq \beta\mu(1 + p) \rightarrow p(1 - \beta\mu) \geq \beta\mu$$

# Dynamic Akerlof model

- Low price equilibrium: only type  $L$  is traded

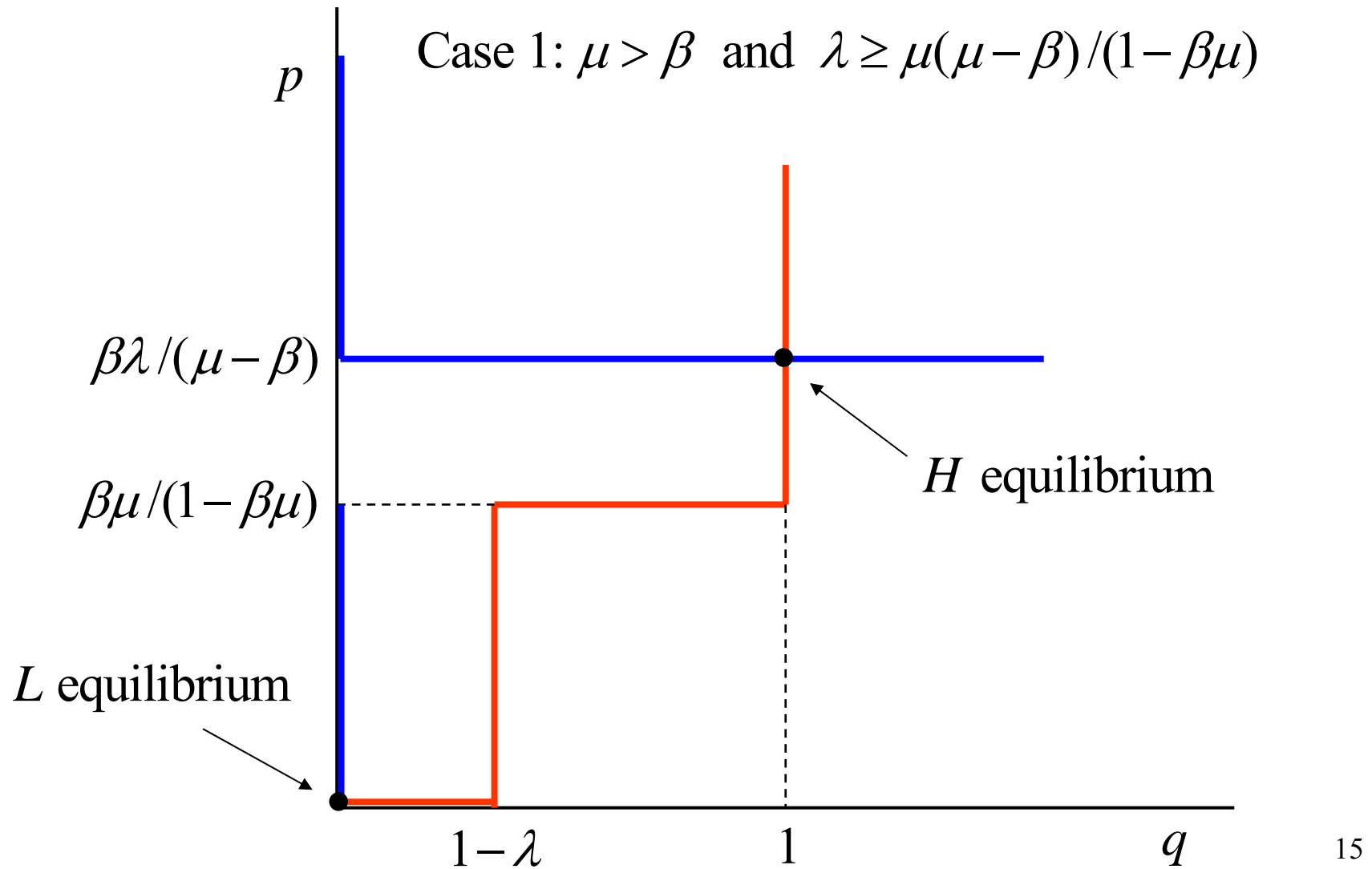
- Buyers' willingness to buy:

$$p\mu \leq \beta p \rightarrow p(\mu - \beta) \leq 0$$

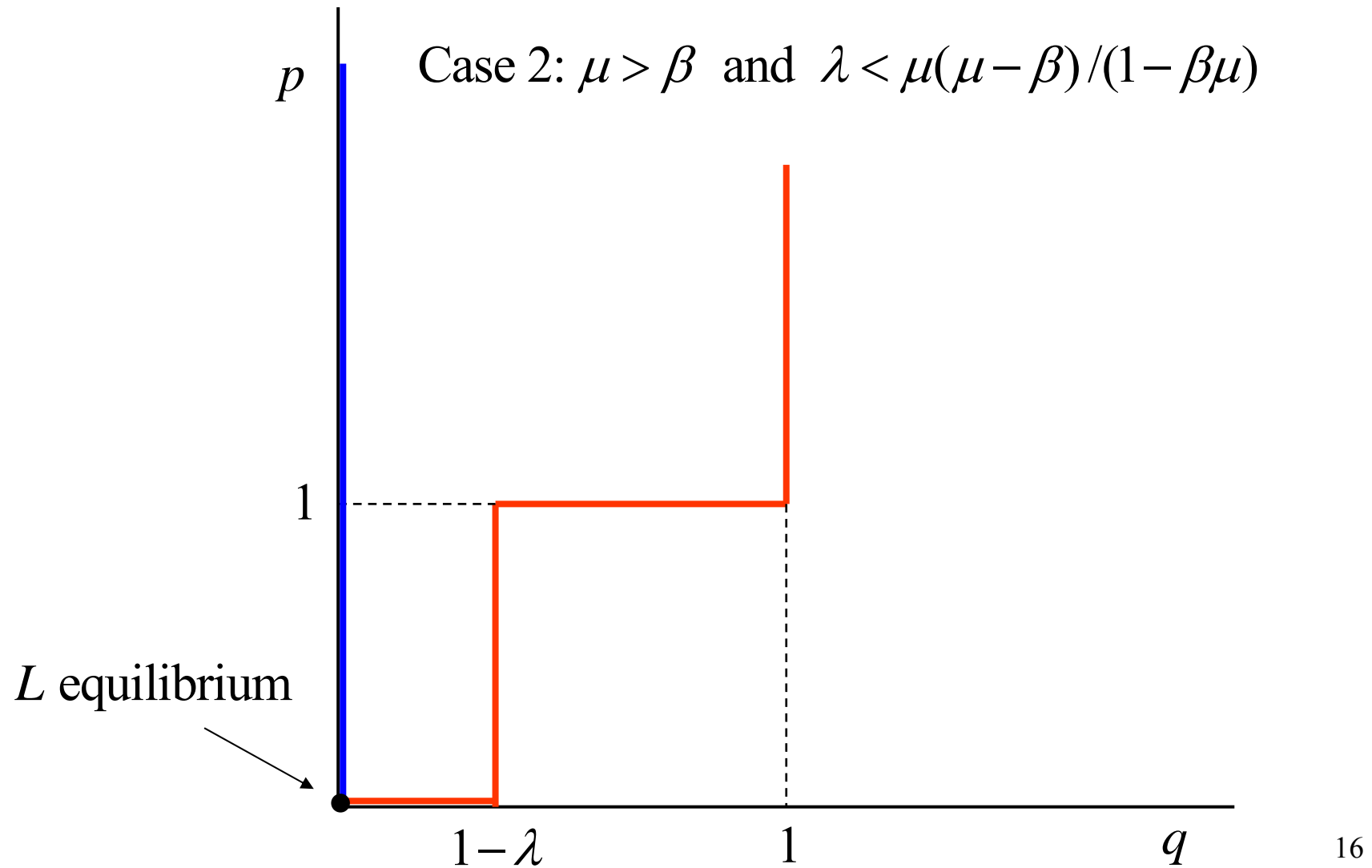
- $H$  sellers' unwillingness to sell:

$$p < \beta\mu(1 + p) \rightarrow p(1 - \beta\mu) < \beta\mu$$

# Dynamic Akerlof model

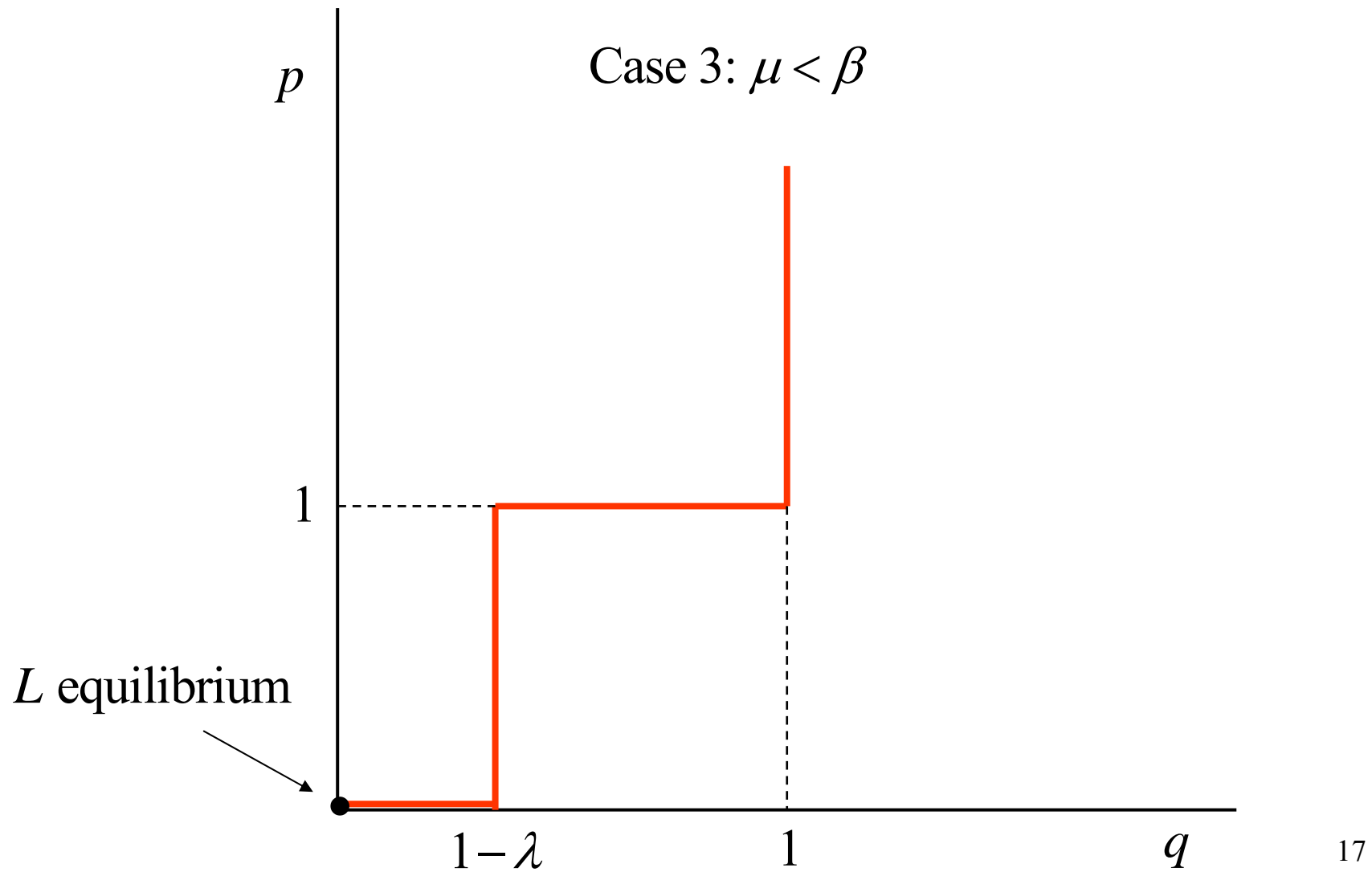


# Dynamic Akerlof model

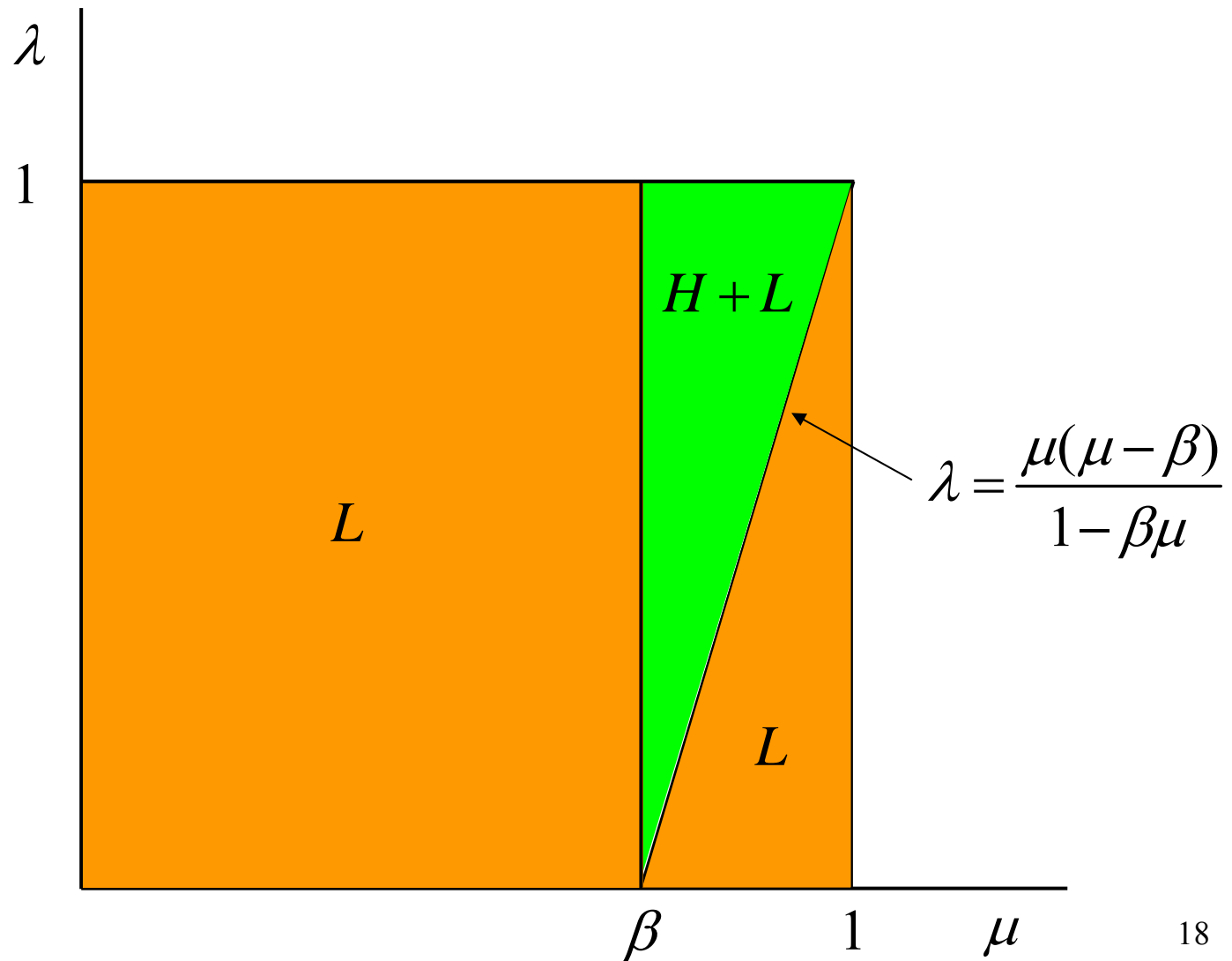




# Dynamic Akerlof model



# Dynamic Akerlof model



# Dynamic Akerlof model

- There may be two Walrasian equilibria
  - It is argued that only the  $H$  equilibrium is Nash
  - What is the extensive form of the game?

# Dynamic Akerlof model

## Comment 2

- The extensive form of the game needs to be spelled out
- More complicated than before because of dynamic setup
  - Is  $H$  the unique subgame perfect equilibrium?

# Model of contagious illiquidity

## Model setup

- Discrete time  $t = 1, 2, \dots$
- Infinitely-lived agents with stochastic death
- Alternating investment opportunities (odd and even agents)
- Investing agents
  - Borrow from non-investing agents
  - Face borrowing constraints
  - Restrict their consumption
  - Have higher marginal utility of income → endogenous  $\mu$

# Model of contagious illiquidity

## Model setup

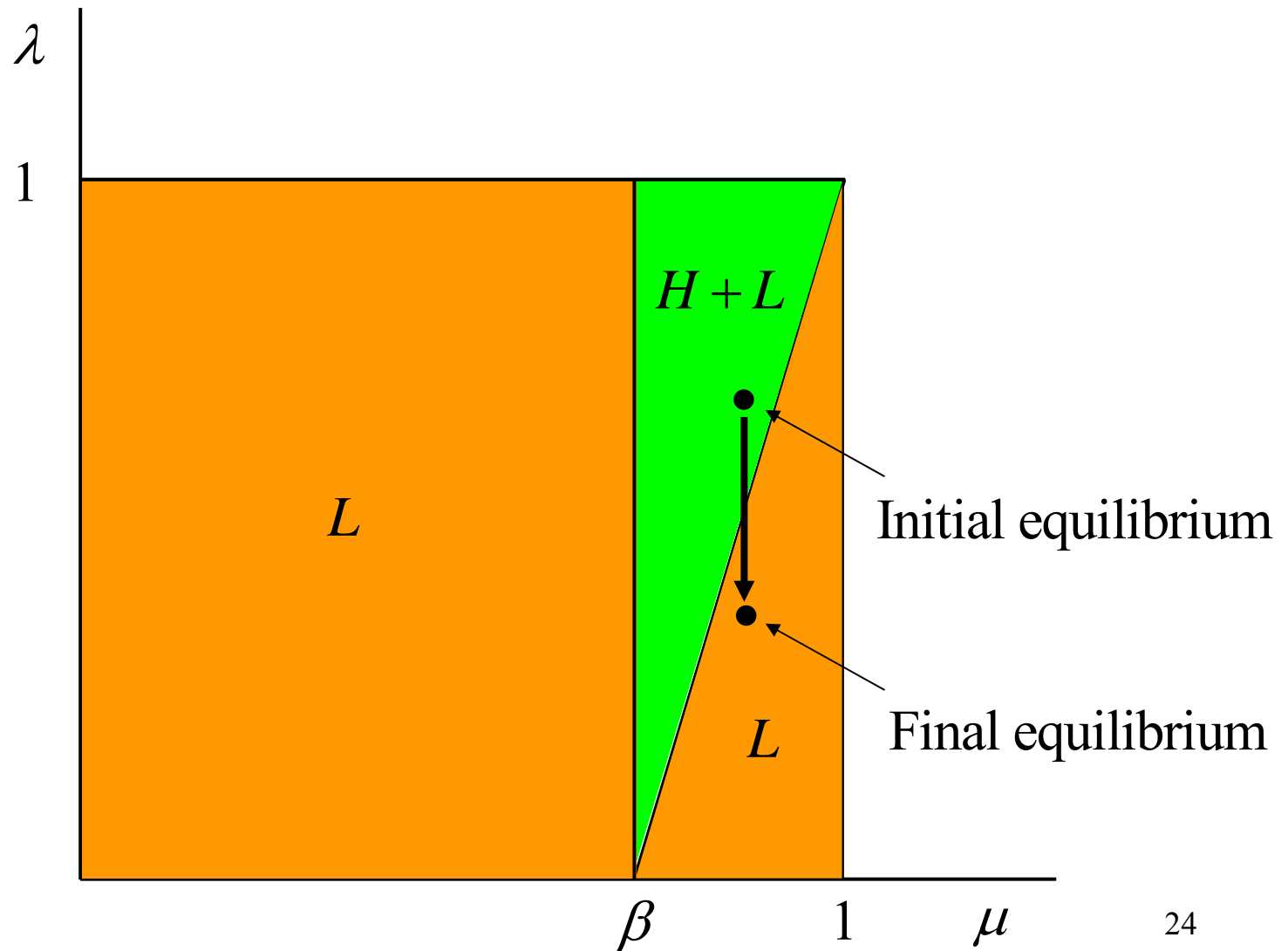
- Real assets (trees)
  - Yield 1 unit of output if investor is alive
- Financial assets (stochastic consoles)
  - Pay 1 unit of output if issuer is alive
- Asymmetric information
  - Agents privately learn whether they will die tomorrow
- Agents hold debt on both sides of balance sheet

# Model of contagious illiquidity

## Main result

- Suppose: shock reduces price of an investing agent's debt
  - Reduce his real investment
  - Reduce his sales of others' debt
  - Worsen adverse selection problem  
(because he does not trade on private information)
  - Lower  $\lambda$  may push economy into  $L$  equilibrium

# Model of contagious illiquidity





# Model of contagious illiquidity

## Comment 3

- Very difficult to follow formal arguments
  - Need full model with proofs

# Model of contagious illiquidity

## Comment 4

- Why debt?
  - Why not fund investments by selling shares?
  - Does it make any difference?

# Model of contagious illiquidity

## Comment 5

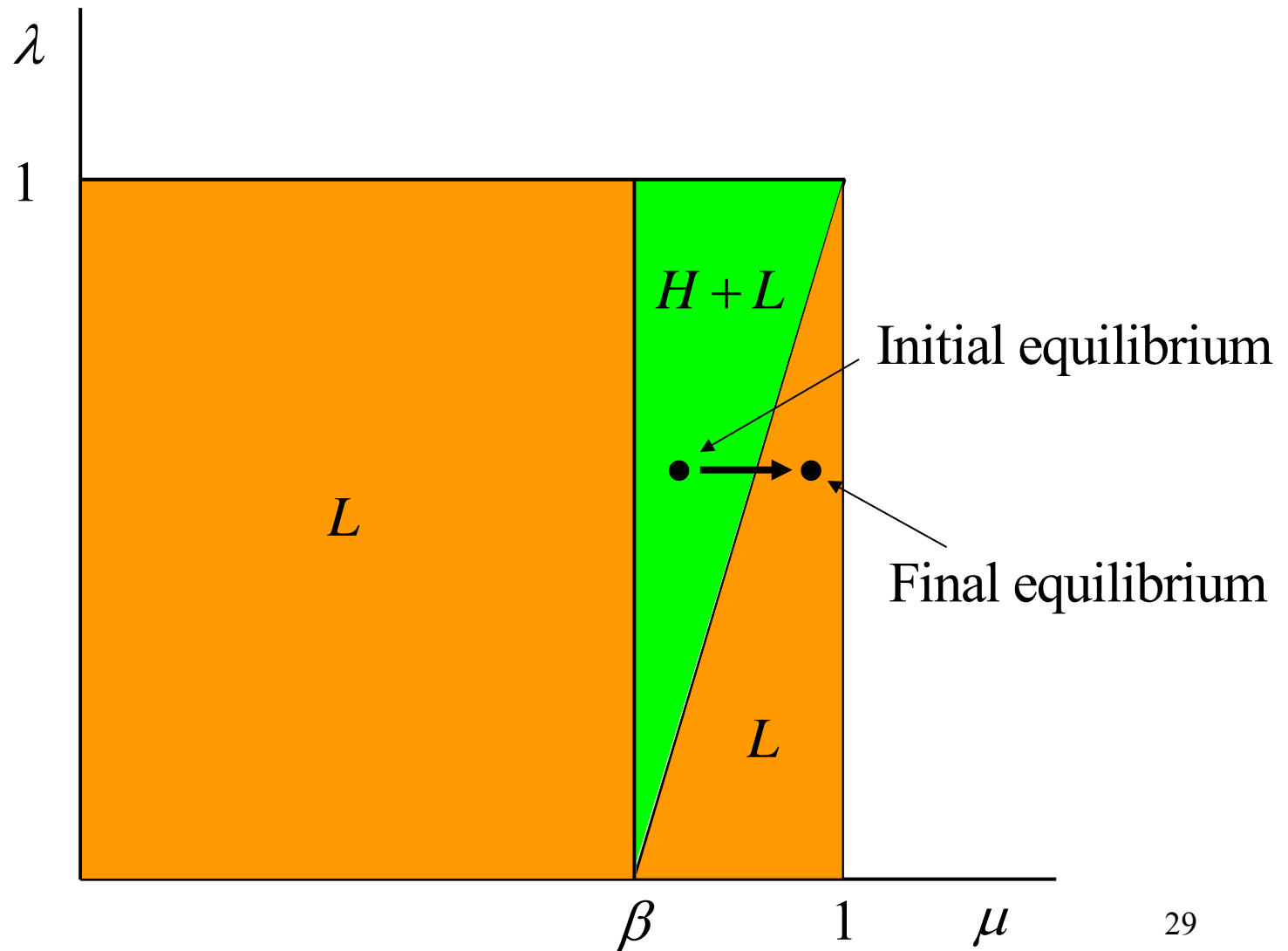
- Unanticipated shocks?
  - Fine as a first step
  - But ideally one would like agents to anticipate them

# Model of contagious illiquidity

## Comment 6

- Many things are happening at the same time
  - Another contagion channel?
  - If investing agents reduce their investment
  - Marginal utilities will get closer ( $\mu \rightarrow 1$ )
  - May also push economy into  $L$  equilibrium

# Model of contagious illiquidity

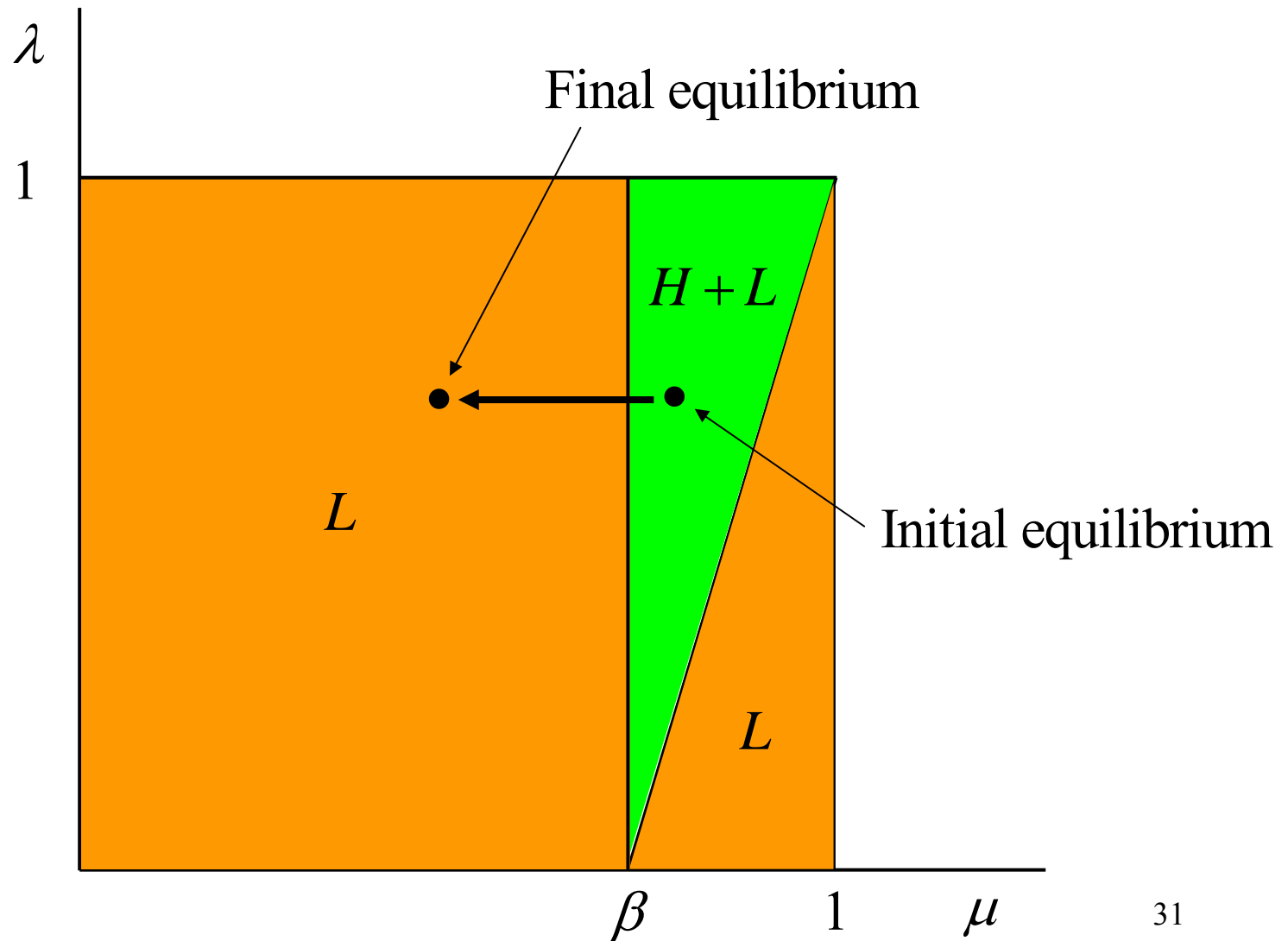


# Model of contagious illiquidity

## Comment 7

- Other possible results
  - Tightening of borrowing constraints
  - If investing agents reduce their consumption
  - Marginal utilities will get further apart (lower  $\mu$ )
  - May also push economy into  $L$  equilibrium

# Model of contagious illiquidity



# Concluding remarks

- Many things that I like
  - Focus on adverse selection
  - Novel channel of contagion
- More work needs to be done
  - Properly close model
  - Relate results to events during recent crisis