

The Macroeconomics of Imperfect Capital Markets

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Lecture 6: Financial Amplification

Externalities in Economies with Imperfect Information and Incomplete Markets

- In “imperfect” economies the market equilibrium is generically constrained inefficient
- there always exists a set of interventions that make everybody better off
- intuitively, these interventions are part of the theory of the second-best

Jeanne and Korinek (AER, 2010), Excessive Volatility in Capital Flows: A Pigouvian Taxation Approach

Starting Point

Simplest model of financial amplification effects:

- *borrowing is subject to constraint*
- *constraint depends on asset price*
- *potential for feedback spiral between*
 - *collapsing asset price*
 - *tightening borrowing constraint*
 - *declining consumption*

→ common description of modern financial crises

Three time periods: 0, 1, 2

Two sets of agents:

- 1 Borrowers who own a collateralizable asset (tree)
- 2 Lenders are large in comparison,
provide credit at fixed interest rate $R = 1$

Debt is the only financial contract and is subject to a collateral constraint

Borrowers:

- Utility function $U = u(c_0) + u(c_1) + c_2$
→ first-best level of consumption satisfies $u'(c^*) = 1$
- earns risky endowment income e in period 1,
deterministic payoff y on the asset in period 2
- can borrow d_1 and d_2 in periods 0 and 1:

$$\begin{cases} c_0 = d_1, \\ c_1 + d_1 = e + d_2, \\ c_2 + d_2 = y, \end{cases}$$

- borrowing is subject to a constraint

$$d_2 \leq p_1$$

$$\text{where } p_1 = \frac{y}{u'(c_1)}$$

Solution by backward induction:

- Period 1 problem of decentralized agents (I_f) as a function of liquid asset holdings $m_1 = e - d_1$:

$$V_{I_f}(m_1) = \max_{d_2} \{u(c_1) + c_2\} \quad \text{s.t.} \quad d_2 \leq p_1$$

- Optimality condition: $u'(c_1) = 1 + \lambda_{I_f}$

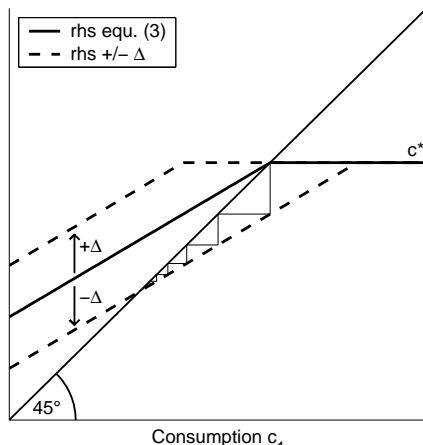
Two possible situations:

- 1 Unconstrained equilibrium: $c_1 = c^*$ if $d_2 = c^* - m_1 < p_1 = y$
- 2 Constrained equilibrium: $\underbrace{c_1 = m_1 + p_1}_{\text{equ. (3)}}$ if $c^* - m_1 > y$

Equilibrium

Illustration of Period 1 Equilibrium

Assume $u(c) = \ln c \rightarrow u'(c) = 1/c$, $p_1 = yc_1$
then constrained $c_1 = m_1 + p_1 = \frac{m_1}{1-y}$ (assume $y < 1$)



Decentralized Period 0 problem:

$$\max_{d_1} u(d_1) + E[V_{lf}(e - d_1)]$$

First-order condition:

$$u'(c_0) = E[V'_{lf}(m_1)] = E[u'(c_1)]$$

→ determines unique level of consumption c_0 and debt d_1

Backward induction by a social planner:

- Period 1 problem internalizes endogeneity of the asset price to level of liquid wealth m_1 , i.e. $p(m_1) = y/u'(c_1)$:

$$V_{sp}(m_1) = \max_{d_2} \{u(c_1) + c_2\} \quad \text{s.t.} \quad d_2 \leq p(m_1)$$

- Derivative of value function

$$V'_{sp}(m_1) = u'(c_1) + \lambda_{sp} \cdot p'(m_1) \geq V'_{lf}(m_1)$$

→ higher marginal valuation of liquid wealth than *lf*

Social Planner's Period 0 problem:

$$\max_{d_1} u(d_1) + E[V_{sp}(e - d_1)]$$

First-order condition:

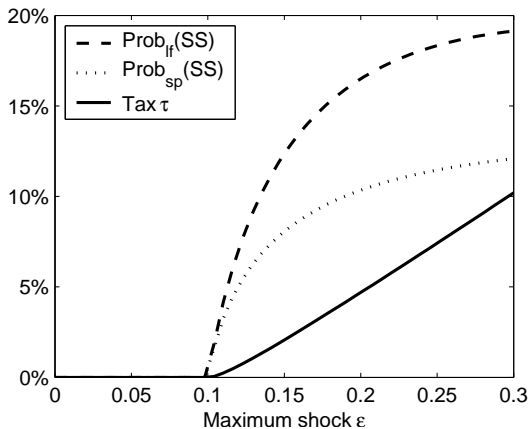
$$u'(c_0) = E[V'_{sp}(m_1)] = E[u'(c_1) + \lambda_{sp} p'(m_1)]$$

Socially efficiency can be restored by imposing a tax on borrowing such that

$$\begin{aligned} u'(c_0) &= (1 + \tau) E_0(u'(c_1)) \\ \text{where } \tau &= \frac{E_0[\lambda_{sp} \cdot p'(m_1)]}{E_0[u'(c_1)]} \end{aligned}$$

Illustration

Sample calibration: $u(c) = \log c$, $e \sim U[\bar{e} \pm \varepsilon]$ where $\bar{e} = 1.3$, $y = .2$



Financial Accelerator = a mechanism by which

- declining net worth
- tightening borrowing capacity
- contracting economic activity
- falling prices

mutually reinforce each other

Note:

- in normal times, market forces are stabilizing
- During financial accelerator: market forces become destabilizing

Illustration of Financial Accelerator

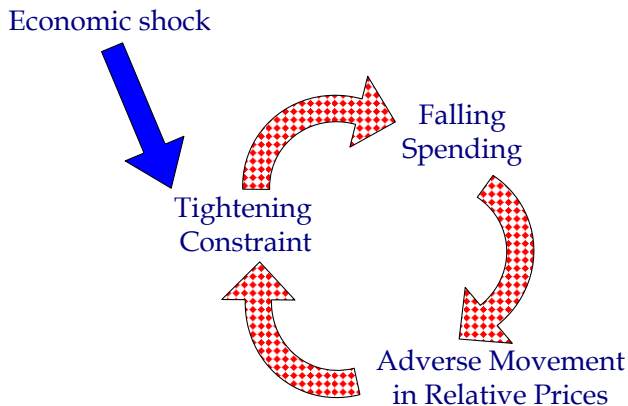
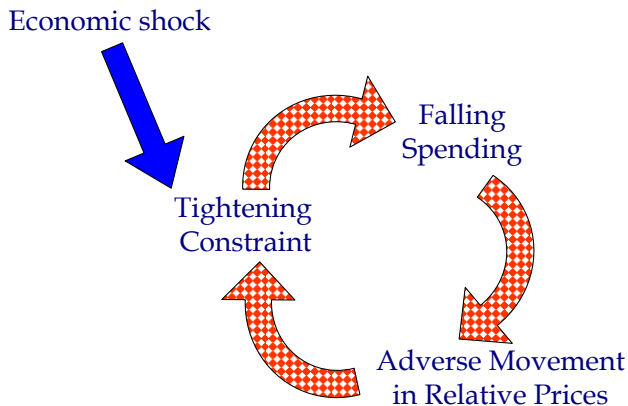


Illustration of Financial Accelerator



Sample episodes of financial accelerator effects:

- Great Depression
- emerging market crises
- housing market 2006 – 201?
- real economy 2008 – 201?

Alternative terms for financial accelerator:

- [Fisherian] debt deflation
- financial amplification (is technically more correct)
- deleveraging cycle
- [financial] feedback loops / spirals

Basic structure required for accelerator effects:

- Two sets of agents:
 - 1 natural borrowers:
comparative advantage in using things
 - 2 natural lenders:
comparative advantage in financing things
- Two sets of goods, for example:
 - 1 consumption good
 - 2 productive asset

Borrowers have comparative advantage in producing, e.g.:

- entrepreneurs who are more productive operating a certain asset (capital, land, labor, ...)
- owners who put a premium on owning an asset (homeowners, local owners in open economy...)
- speculators who are more risk-tolerant (better hedging technologies, preferences, ...)
- agents with informational advantage

Lenders have comparative advantage in financing, e.g.:

- because they hold more wealth:
 - more patient than insiders
 - older than insiders (life-cycle)
 - were previous insiders (technological cycle)
- or because they are better at intermediating, e.g.:
 - banks

First-best allocation in the economy:

productive assets are more valuable in the hands of borrowers

- natural borrowers use things
- natural lenders finance things

Note: “invisible hand” (price mechanism) enforces optimal distribution of assets: natural borrowers are willing to pay most for assets

BUT: only possible if financial markets function well

*Shakespeare (1603), Lord Polonius in "Hamlet":
Neither a borrower nor a lender be;
For loan oft loses both itself and friend,
And borrowing dulls the edge of husbandry.*

Under imperfect capital markets:

borrowing capacity of natural borrowers constrained by net worth/collateral

Effect of shocks:

Assume an adverse shock to one of the following elements:

- net worth
- borrowing capacity
- aggregate demand
- asset prices

that is sufficiently strong to make constraints binding

- demand of natural borrowers is constrained
- asset prices decline
- insider net worth falls
- financial constraints on borrowers tighten further

Reasons for price declines:

- pricing kernel $\frac{\beta u'(c_{t+1})}{u'(c_t)}$ of natural borrowers declines
- negative relative demand shock for goods that are disproportionately demanded by borrowers
- lenders buy assets at fire-sale prices, e.g. because of
 - lower productivity F'
 - inferior information
 - lower risk-bearing capacity

Self-stabilizing forces of the market no longer work:

- normally price declines induce natural borrowers to buy more
- here price declines force them to sell more because of constraints

→ “invisible hand” is upside down

“Perverse” economic implications:

- demand for assets *increasing* in prices
- shocks not mitigated, but amplified
→ increase in uncertainty
- economic allocations constrained inefficient:
market prices do not correctly reflect cost of constraints
- government intervention may be useful,
but is subject to huge moral hazard

- 1 Financial amplification entails pecuniary externalities
- 2 Constrained inefficiency of decentralized equilibrium:
 - excessive debt
 - excessive exposure to binding constraints
 - excessive volatility (systemic risk)
- 3 Rationale for financial regulation as a form of Pigouvian taxation