Macroprudential Regulation Versus Mopping Up After the Crash

Pecuniary Externalities and Second-Best Interventions

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Conference on Incorporating Financial Stability into Inflation Targeting

November 2011
Motivation

Financial crises often involve significant pecuniary externalities

**Example**: financial amplification:
- borrowing is subject to constraints
- constraints depend on asset prices
- potential for feedback spirals (financial amplification) between
  - collapsing asset prices
  - tightening borrowing constraints
  - declining demand
  → financial amplification/financial accelerator/debt deflation/etc...

Jeanne and Korinek (2011)
Feedback Spirals

- Economic shock
- Falling Spending
- Tightening Constraint
- Adverse Movement in Relative Prices

Jeanne and Korinek (2011)
Feedback Spirals

Economic shock

Tightening Constraint

Falling Spending

Adverse Movement in Relative Prices

Jeanne and Korinek (2011)
Pecuniary externalities justify policy intervention:

- Macro-prudential regulations on leverage, investment, risk-taking
  see e.g. Korinek (2007, 2010), Lorenzoni (2007), Jeanne and
  Korinek (2010, 2011), ...

- Ex-post interventions to affect relative prices
  see e.g. Aghion et al. (2000, 2001, 2004), Benigno et al. (2010,
  2011) ...

Goal of this paper: analyze

- conditions under which pecuniary externalities matter
- pecking order of policies to respond to pecuniary externalities
Related policy debate: how should policy respond to crisis risk?

- **“Greenspan doctrine:”**
  
  ex-ante interest rate policy too costly and blunt  
  (e.g. Greenspan, 2002, Blinder and Reis, 2005)  
  → focus on “mopping up after the crash”

- **“Macro-prudential view:”**
  
  financial imbalances build up long before crises  
  (e.g. Borio, 2003)  
  → “macro-prudential” policies desirable
Key Findings:

- The first-best equilibrium is restored if a planner can:
  1. make lump-sum transfers OR
  2. engage in costless crisis lending OR
  3. costlessly manipulate market prices

- Otherwise the economy is characterized by binding constraints:
  → MRS’s of different agents differ
  → role for second-best interventions:
    - ex-ante (prudential) interventions
    - costly ex-post interventions

such that marginal cost/benefit ratios of policies are equal
Three time periods: $t = 0, 1, 2$

Two sets of agents:
1. Mass 1 of representative consumers
2. Lenders: large or risk-neutral, provide credit at rate $R = 1$

Consumers need to borrow for consumption
Debt is the only financial contract
Optimization problem of representative consumer:

\[
\begin{align*}
\max & \quad u(c_0) + E[u(c_1) + c_2] \\
\text{s.t.} & \quad c_0 = d_0 \\
& \quad c_1 = \tilde{e} + d_1 \\
& \quad d_0 + d_1 + c_2 = \theta y
\end{align*}
\]

- owns a tree in fixed supply $\theta = 1$ (e.g. land), which is pledgeable but can only be held by consumers
- Issue long-term debt $d_0$ and short-term debt $d_1$
- Period 1: obtain risky endowment $\tilde{e}$
- Period 2: obtain tree income $y$
Borrowing Constraint

Financial imperfection:

- consumers can threaten default and renegotiate their debts in periods 1 and 2
- lenders can seize at most a fraction $\phi$ of the tree

$\rightarrow$ renegotiability limits borrowing

- in period 1: $d_0 + d_1 \leq \phi \theta_1 P_1$
- in period 2: $d_0 + d_1 \leq \phi \theta_2 P_2$

Note: period 1 constraint is always tighter
**First-Best Solution:** assuming away financial imperfections:

Optimality requires:

\[
\begin{align*}
    u'(c_0) &= E[u'(c_1)] \\
    u'(c_1) &= u'(c^*) = 1 \\
    d_0 &= c^* \\
    d_1 &= c^* - \bar{e} \\
    c_2 &= y + \bar{e} - 2c^*
\end{align*}
\]
Policies Implementing the First-Best Solution:

1. Lump-sum transfers or costless “crisis lending”:
   - Transfer $c^*$ from lenders to consumers in period 0
   - Transfer $c^* - \bar{e}$ in period 1
   - Return $2c^* - \bar{e}$ to lenders in period 2

2. Price subsidies or non-distortionary “asset price support”:
   - Raise a lump-sum tax $s \geq 1 - \frac{\phi y}{2c^* - \bar{e}}$ from consumers
   - Impose subsidy $s$ on asset holdings
     to bring the asset price to a level $P_1 \geq 2c^* - \bar{e}$
   - Together, the subsidy and tax are wealth-neutral, but constraint will be loose
Solution of Decentralized Equilibrium:

First-order conditions:

\[ u'(c_0) = E[u'(c_1)] \]
\[ u'(c_1) = 1 + \lambda \]
\[ P_1 = \frac{y}{u'(c_1)} \]

Case 1: loose financial constraint: choose \((c_0, c_1)\) such that

\[ u'(c_0) = u'(c_1) = 1 \rightarrow P_1 = y \]

→ this is feasible as long as \(2c^* - \tilde{e} \leq \phi y\)
→ replicates the first-best equilibrium

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Case 2: binding financial constraint: equilibrium determined by

\[ c_1 = \bar{e} - d_0 + \frac{\phi y}{u'(c_1)} \]

\[ \Rightarrow \text{solve for } c_1 \]
Introduce a constrained planner:

- subject to the same constraints as private agents
- BUT: she internalizes the effects of her actions on prices

\[ u'(c_0) = E[u'(c_1) - \phi \lambda \cdot \frac{\partial P_1}{\partial d_0}] \]

\[ \text{externality} \]

→ constrained planner borrows less in good times (period 0)
→ can be implemented via Pigouvian taxation

\[ \tau = \text{externality} > 0 \quad \text{if} \quad \lambda > 0 \]

→ “macro-prudential” regulation
Macroprudential Regulation as Second-Best Intervention

Figure: Macroprudential Regulation as Second-Best Intervention
Macroprudential Regulation as Second-Best Intervention

Figure: Macroprudential Regulation as Second-Best Intervention
Insights from the general theory of the 2nd best
(Lipsey and Lancaster, 1956)

- First-order benefit weighed against second-order cost

→ small intervention is always desirable

→ it is not desirable to fully undo a distortion

→ employ all policy instruments that target a distortion:
  - macroprudential regulation (reduce borrowing in good times), including capital controls in open economies
  - distortionary asset price support (relax constraint directly), e.g. through asset purchases or interest rate cuts
  - distortionary crisis lending (circumvent constraint) or transfer policies
  - stimulus policies to labor supply

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Introduce a planner with multiple costly policy instruments:

- a tax on period 0 borrowing: modifies Euler equation to
  \[(1 - \tau)u'(c_0) = E[u'(c_1)]\]
  → restricts borrowing to mitigate binding constraint

- a price subsidy to asset purchases in period 1
  \[P_1 = \frac{y}{(1 - s)u'(c_1)}\]
  that creates a distortion \(L(\alpha)\) because of targeting problems
  → pushes up asset prices to relax binding constraint

- a labor subsidy if period 1 output is a function \(\tilde{\epsilon} = \tilde{A}l\)
  where labor imposes a disutility \(d(l)\):
  \[(1 + s_l)E[\tilde{A}] = d'(l)\]
  → encourages more output to relax period 1 constraint
Mix of Second-Best Policies

The optimal mix of policy measures is to

- restrict borrowing ex-ante by a macroprudential tax
  \[
  \tau = \frac{E[\phi \lambda P_c(c_1, \alpha)]}{E[u'(c_1)]} > 0
  \]

- subsidize asset prices ex-post such that
  \[
  s = \frac{\phi \lambda L''(\alpha)}{\mu P_1} > 0
  \]

- stimulate labor supply ex-post such that
  \[
  s_l = \frac{\phi \lambda p'(c_1)}{u'(c_1)} > 0
  \]

- etc...

→ as long as \( \lambda > 0 \), all of these measures are desirable
Time consistency problem of crisis intervention:

- once a crisis occurs, policymakers have incentive to intervene using costly second-best instruments

- before a crisis, policymakers want to commit to being “tough” to ensure that private sector behavior is not distorted

→ time-consistency problem can be solved by imposing offsetting macro-prudential regulation
Conclusions:

- pecuniary externalities matter if a planner cannot costlessly alleviate binding constraints

- in such situations, all policy interventions are second-best

- it is optimal to use a mix of all available policies, including
  - ex-ante prudential restrictions $\tau > 0$ on borrowing
    → “leaning against the wind”
  - ex-post stimulus measures $s > 0$ to relax binding constraints
    → “mopping up after the crash”