Macroprudential Regulation Versus Mopping Up After the Crash

By O. Jeanne and A. Korinek
Motivation

Recent calls for macro-prudential regulation.

But some people doubt its effectiveness.

e.g. “Greenspan Doctrine”

(=Ex ante regulation is too costly compared to ex post “mopping up.”)
Summary

This paper studies the desirability of ex ante vs ex post policies in a very simple setup.

It is shown that the optimal policy consists of a combination of both ex ante & ex post policies.

The point of optimality is determined such that

\[
\text{Marginal cost/benefit of ex ante policy} = \text{Marginal cost/benefit of ex post policy}
\]
Key Assumptions

Financial markets are imperfect:

- borrowing is subject to constraints
- constraints depend on asset prices
- potential for feedback spirals between
  - collapsing asset prices
  - tightening borrowing constraints
  - declining spending

→ financial accelerator, debt deflation, ...
Consider an open economy in a 1-good world with 3 time period $t=0, 1, 2$.

The economy is populated by a continuum of identical consumers with the following utility function.

$$u(c_0) + u(c_1 - d(l_1)) + c_2.$$
Model (Ctd.)

<table>
<thead>
<tr>
<th>Income</th>
<th>Borrowing</th>
<th>Consumption</th>
<th>Repayment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$b_1$</td>
<td>$c_0$</td>
<td>$b_1$</td>
</tr>
<tr>
<td>1</td>
<td>$A_l^1$</td>
<td>$c_1$</td>
<td>$+$</td>
</tr>
<tr>
<td>2</td>
<td>$y_2$</td>
<td>$c_2$</td>
<td>$+$</td>
</tr>
</tbody>
</table>

- From labor
- Stochastic
- Not pledgeable
- From endowed asset
- Deterministic
- Pledgeable

Since there is no default in eqrm, the interest rate is 0.
Collateral Constraint

Assume consumers can buy or sell the asset in a (perfectly competitive) market (in $t=1$).

$p_t$: Price of the asset in period $t$

Also impose the following collateral constraint in $t=1$.

$$b_2 \leq \phi \theta_1 p_1$$

This induces the externality among consumers through $p_t$. 

Constant smaller than 1

The amount of the asset held in $t=1$. 

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Ex Ante & Ex Post Policies

**Ex ante**

A planner can impose a tax on borrowing in $t=0$, which is rebated as a lump sum benefit.

**Ex post**

A planner can subsidize labor in $t=1$, the cost of which is raised via a lump sum tax.
The riskless world interest is normalized to zero. Since there is no default in equilibrium, domestic consumers can borrow at that interest rate.

In period 1, borrowing by consumers is subject to an collateral constraint to the form

$$b_2 \leq (1 - \rho) p_1 (2)$$

The micro-foundation for this constraint is that a consumer could walk away from his debt, following which foreign creditors could seize a fraction $\rho < 1$ of his asset holdings and sell them to other consumers in the domestic market in period 1. As discussed in Jeanne and Korinek (2010ab), this setup leads to financial amplification effects when the constraint becomes binding, as reduced consumption, falling asset prices and declining borrowing capacity mutually reinforce each other. Since decentralized agents do not internalize the pecuniary externalities that lead to financial amplification, they engage in what we termed “excessive borrowing” in that paper.

In order to study optimal ex-ante and ex-post policy measures, we introduce two policy instruments that a planner may use. First, the planner can impose macro-prudential taxes in period 0 to discourage excessive indebtedness. Specifically, the planner can impose a tax $\tau$ on borrowing $b_1$ in period 0, which is rebated as a lump sum $T = \tau b_1$. Secondly, the planner can stimulate the economy ex post in the event of binding constraints by subsidizing labor at rate $s$. This instrument is similar to the one that a planner has available in Benigno et al. (2010ab). For simplicity, the government revenue $R = s A l_1$ necessary to finance the subsidy is raised via a lump-sum tax. We summarize the resulting budget constraints as

\[
\begin{align*}
  c_0 &= (1 - \tau) b_1 + T, \\
  c_1 + b_1 &= (1 + s) A l_1 + b_2 + (\theta_0 - \theta_1) p_1 - R, \\
  c_2 + b_2 &= \theta_1 y_2. 
\end{align*}
\]

The optimization problem of a representative consumer can be described as maximizing the expectation of utility (1) subject to the budget constraints and the borrowing constraint (2) and (3), where we denote the Lagrange multiplier to the borrowing constraint as $\lambda$. The detailed problem is described in the appendix. The consumer’s optimality conditions with respect to $b_1$, $b_2$, $l_1$ and $\lambda$ are

\[
\begin{align*}
  u(c_0)(1 - \tau) &= E[u(c_1)] \\
  u(c_1) &= 1 + \lambda, \\
  p_1 &= \frac{1}{1 - \tau} u(c_1) + \lambda.
\end{align*}
\]

The last equation represents the asset pricing condition for the economy. If the asset could not be used as collateral, the price would just be the ratio of marginal products times the asset payoff. However, the denominator equation (7) captures the additional benefit of owning the asset in providing collateral.
Consumer’s Problem

\[ \max \ u(c_0) + u(c_1 - d(l_1)) + c_2. \]

(Utility function)

\[ \text{s.t.} \begin{cases} 
    c_0 = (1 - \tau) b_1 + T, \\
    c_1 + b_1 = (1 + s) Al_1 + b_2 + (\theta_0 - \theta_1) p_1 - R, \\
    c_2 + b_2 = \theta_1 y_2.
\end{cases} \]

(Budget constraint)

\[ b_2 \leq \phi \theta_1 p_1 \] (Collateral constraint)
Planner’s Problem

To derive the optimal policy, consider the following planner’s problem of maximizing consumer’s utility.

\[
\begin{align*}
&\max_{b_1, l_1, b_2} \ u(b_1) + E \left\{ u(Al_1 - b_1 + b_2 - d(l_1)) + y_2 - b_2 \right\} \\
&\quad - \lambda \left[ b_2 - \phi p(Al_1 - b_1 + b_2) \right] \\
&\quad = c_0 \quad = c_1 \quad = c_2
\end{align*}
\]
Proposition 1

If the collateral constraint is binding with positive prob. in $t=1$, then the planner chooses a positive ex ante tax $\tau > 0$.

Proposition 2

If the collateral constraint is binding in $t=1$, then the planner chooses a positive ex post subsidy $s > 0$. 
Optimal Ex Ante & Ex Post Policies

Proposition 1

If the collateral constraint is binding with positive prob. in $t=1$, then the planner chooses a positive ex ante tax $\tau > 0$.

$$\tau > 0 \rightarrow b_1 \downarrow \rightarrow c_0 \downarrow$$

Negative

$$\tau > 0 \rightarrow b_1 \downarrow \rightarrow c_1 \uparrow \rightarrow p(c_1) \uparrow \rightarrow \text{CC relaxed}$$

Positive
Optimal Ex Ante & Ex Post Policies

Proposition 2

If the collateral constraint is binding in $t=1$, then the planner chooses a positive ex post subsidy $s>0$.

- **Negative**: $s > 0 \rightarrow l_1 \uparrow \rightarrow d(l_1) \uparrow$
- **Positive**: $c_1 \uparrow \rightarrow p(c_1) \uparrow \rightarrow \text{CC relaxed}$
Possibility of “Under-borrowing”

Debt with ex post policy > Debt without ex post policy

This possibility is pointed out by Benigno et al. (09, 10ab).

This result can be replicated as follows.

Fix a level of ex ante policy.

\[ s > 0 \rightarrow l_1 \uparrow \rightarrow c_1 \uparrow \rightarrow c_0 \uparrow \rightarrow b_1 \uparrow \]

\[ u' (c_0) (1 - \tau) = E [u' (c_1)] \]

(FOC for consumer’s problem)
Possibility of “Under-borrowing”

On the other hand, there is also a possibility of “over-borrowing” by ex ante policy.
Fix a level of ex post policy.

\[ \tau > 0 \rightarrow c_0 \downarrow \rightarrow b_1 \downarrow \]

When the planner uses both ex ante & ex post policies, the amount of debt may rise or fall, depending on which policy has a stronger effect.
Alternative Ex Post Policy

Instead of subsidy on labor, we can consider a generic policy instrument $\alpha$ that directly relaxes the collateral constraint as

$$b_2 \leq \phi \theta_1 p_1 + \alpha \text{ with cost of } L(\alpha).$$

Assume $L(\theta) = L'(\theta) = 0 < L''(\alpha)$. 

Note FOC for planner’s problem is $L'(\alpha) = \lambda$. 

Again, $\alpha > 0$ if $\lambda > 0$. 

Lagrange multiplier = Marginal benefit of relaxing the CC
Discussion of

“Managing Credit Booms and Busts: A Pigouvian Taxation Approach,”

by Jeanne and Korinek

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October 15, 2010
Financial Accelerator.

Decline in asset price tightens credit constraint.
Tighter credit constraint lowers consumption.
Lower consumption lowers asset price.
Etc.

But, the tighter credit constraint should also have a positive effect on asset prices because assets help relax the credit constraint. This positive effect should moderate the decline in asset prices coming from the decline in consumption. This effect is missing from their analysis.
Why is CE not Pareto Efficient in model?

1. Missing market?  No.  This is RA setting.
2. Value of endowment is unbounded?  No.
3. Large agents?  No.
4. Explicit “pollution” effect.  No.

I suspected the laissez-faire problem is off the mark.
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