

Discussion of
Muller, Storesletten and Zilibotti,
“Sovereign Debt and Structural Reforms”

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This Paper

- Study joint dynamics of structural reform and debt when:
 - Government cannot commit to repay
 - Reform effort hidden or it cannot be contracted upon
- Results
 - Laissez-faire equilibrium not efficient
 - Not only because of lack of state contingent return
 - Interpret optimum as austerity program imposed by third party authority with restrictions on debt issuance and reform effort

My discussion

- Revisit inefficiency of laissez-faire
 - Reform effort observable in efficient benchmark not under laissez-faire
 - If same frictions then laissez-faire is constrained efficient (Prescott-Townsend)

- Revisit efficient debt dynamics when
 - Reform effort not observable
 - Reform effort taken after debt is contracted (but otherwise observable)

Equilibrium with complete market is constrained efficient
(in a natural sense to me)

Definition Constraint Efficient

Recursive formulation: v promised value to gov't

$$P_L(v) = \max \int \left[\omega_L - c(\phi) + \frac{(1 - p(\phi))}{1 + r} P_L(v'_L(\phi)) + \frac{p(\phi)}{1 + r} P_H(v'_H(\phi)) \right] dF$$

subject to promise keeping constraint

$$\int [u(c(\phi)) - X(p(\phi)) + \beta(1 - p(\phi))v'_L(\phi) + \beta p(\phi)v'_H(\phi)] dF(\phi) = v$$

participation constraint

$$u(c(\phi)) - X(p(\phi)) + \beta(1 - p(\phi))v'_L(\phi) + \beta p(\phi)v'_H(\phi) \geq \underline{v} - \phi$$

incentive compatibility constraint

$$p(\phi) \in \arg \max u(c(\phi)) - X(p) + \beta(1 - p)v'_L(\phi) + \beta p v'_H(\phi)$$

Decentralization

- Government chooses $\{c, p, b'_H(\phi), b'_L(\phi)\}$ to solve

$$W_L(b) = \max u(c) - X(p) + \beta(1-p) \int W_L(b_L(\phi)) dF(\phi') + \beta p \int V_H(b_H(\phi)) dF(\phi')$$

subject to

$$c + b \leq \omega_L + \int \sum_{s=L,H} q_s(b'_L, b'_H) b'_s(\phi') dF(\phi')$$

- Prices satisfy no-arbitrage condition for lenders

$$q_H(b'_L, b'_H) = \begin{cases} \frac{p(b'_L, b'_H)}{1+r} f(\phi) & \text{if } V_H(b'_H(\phi)) \geq v_H - \phi \\ 0 & \text{else} \end{cases}$$
$$q_L(b'_L, b'_H) = \begin{cases} \frac{1-p(b'_L, b'_H)}{1+r} f(\phi) & \text{if } V_L(b_L(\phi)) \geq v_L - \phi \\ 0 & \text{else} \end{cases}$$

where $p(b'_L, b'_H)$ is gov't decision rule

Decentralized Economy is Constrained Efficient _____

- Efficient allocation can be decentralized
- Prescott-Townsend
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Decentralized Economy is Constrained Efficient _____

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- Prescott-Townsend
- (State-contingent securities not necessary: long and short defaultable bond should be enough)
- Why then paper claims inefficient?

Definition Constraint Efficient in the Paper _____

$$P_L(v) = \max \int \left[\omega_L - c(\phi) + \frac{(1 - p(\phi))}{1 + r} P_L(v'_L(\phi)) + \frac{p(\phi)}{1 + r} P_H(v'_H(\phi)) \right] dF$$

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~~incentive compatibility constraint~~

$$~~p(\phi) \in \arg \max u(c(\phi)) - X(p) + \beta(1 - p)v'_L(\phi) + \beta p v'_H(\phi)~~$$

Can Markets Implement Outcome from Relaxed Problem?

- Yes, if bond prices depend on \mathbf{p}
 - Government faces a schedule $q_s(\mathbf{b}'_H, \mathbf{b}'_L, \mathbf{p})$

$$q_H(\mathbf{b}'_L, \mathbf{b}'_H, \mathbf{p}, \phi) = \begin{cases} \frac{\mathbf{p}}{1+r} f(\phi) & \text{if } V_H(\mathbf{b}'_H(\phi)) \geq \underline{v}_H - \phi \\ 0 & \text{else} \end{cases}$$
$$q_L(\mathbf{b}'_L, \mathbf{b}'_H, \mathbf{p}, \phi) = \begin{cases} \frac{1-\mathbf{p}}{1+r} f(\phi) & \text{if } V_L(\mathbf{b}'_L(\phi)) \geq \underline{v}_L - \phi \\ 0 & \text{else} \end{cases}$$

- Intuitively: Gov't does not face anymore flat repayments in its reform effort choice

Can Markets Implement Outcome from Relaxed Problem?

- Yes, if bond prices depend on p
- But it requires debt to be issued *after* reform effort
- Assumptions:
 - Reform effort is observable (by markets, third party gov't...)
 - But new debt issued before reform effort: q cannot depend on p
- But amount repaid next period can depend on p

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 - Reform effort is observable (by markets, third party gov't...)
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- But amount repaid next period can depend on p
 - Government repay $R_s(b'_H, b'_L, p)$

$$R_H(b'_L, b'_H, p, \phi) = \min \left\{ \frac{(1+r)q_H(b'_L, b'_H)}{pf(\phi)}, \frac{R_H^*(\phi)}{b'_H} \right\}$$
$$R_L(b'_L, b'_H, p, \phi) = \min \left\{ \frac{(1+r)q_H(b'_L, b'_H)}{(1-p)f(\phi)}, \frac{R_L^*(\phi)}{b'_L} \right\}$$

where $R_s^*(\phi)$ such that $V_s(R_s^*(\phi)) = \underline{v}_s - \phi$

Definition Constraint Efficient (3rd Def'n) _____

Conjecture: Equilibrium solves following programming problem

$$P_L(\underline{v}) = \max \int \left[\omega_L - c(\phi) + \frac{(1-p(\phi))}{1+r} P_L(v'_L(\phi)) + \frac{p(\phi)}{1+r} P_H(v'_H(\phi)) \right] dF$$

subject to promise keeping constraint

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participation constraint

$$\mathbf{u}(c(\phi)) - X(p(\phi)) + \beta(1-p(\phi))v'_L(\phi) + \beta p(\phi)v'_H(\phi) \geq \underline{v} - \phi$$

incentive compatibility

$$\begin{aligned} & \mathbf{u}(c(\phi)) - X(p(\phi)) + \beta(1-p(\phi))v'_L(\phi) + \beta p(\phi)v'_H(\phi) \\ & \geq \max_p \{ \mathbf{u}(c(\phi)) - X(p) + \beta(1-p)v_{\underline{L}} + \beta p v_{\underline{H}} - \phi \} \end{aligned}$$

(Punish detectable deviations with \underline{v})

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$$\begin{aligned} & -X(p(\phi)) + \beta(1 - p(\phi))v'_L(\phi) + \beta p(\phi)v'_H(\phi) \\ & \geq \max_p \{-X(p) + \beta(1 - p)v_L + \beta p v_H - \phi\} \end{aligned}$$

(Punish detectable deviations with \underline{v})

Recap

- Laissez faire economy not clearly inefficient if markets are complete
- Only reason why laissez-faire with complete markets attains lower value is that the third party authority has extra power

Debt and Incentives for Reform

Debt and Incentives for Reform

- Assumptions about observability of reform effort crucial for design of optimal debt policy
- Paper consider case in which third party authority controls p
 - The optimum provides budget support during recession followed by a debt increase after recovery.
- Here:
 - p not observable
 - p chosen after debt is chosen but observable
- Simplified economy with no shocks to ϕ

Reform Effort Not Observable

$$V(\mathbf{b}) = \max u(\mathbf{c}) - X(p) + \beta(1-p)V(b'_L) + \beta p V(b'_H)$$

subject to budget constraint

$$\mathbf{c} + \mathbf{b} \leq \omega_L + \frac{1-p}{1+r} b'_L + \frac{p}{1+r} b'_H$$

participation constraints

$$V(b'_L) \geq \underline{v}_L, \quad V(b'_H) \geq \underline{v}_H$$

and the incentive compatibility constraint

$$-X(p) + \beta(1-p)V(b'_L) + \beta p V(b'_H) \geq \max_p -X(p) + \beta(1-p)V(b'_L) + \beta p V(b'_H)$$

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$$X'(p) = \beta [V(\mathbf{b}'_H) - V(\mathbf{b}'_L)]$$

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- Want to create a lot of variation in continuation value
- Not obvious that want to increase debt after recovery

Reform Effort Observable but After Debt Chosen _____

$$V(\mathbf{b}) = \max u(\mathbf{c}) - X(p) + \beta(1-p)V(b'_L) + \beta p V(b'_H)$$

subject to budget constraint

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- No need to create separation in cont. values to incentivize reform
- Back-load payments: optimal to have large repayment today

Reform effort not distorted

- There is no distortion/wedge to reform effort

$$X'(p) = \beta [V(b_H) - V(b_L)]$$

- Incentive compatibility just generates another reason for backloading

$$u'(c) = \beta (1+r) \left[(1+\chi) + \frac{\mu_s}{\beta(1-p)} \right] u'(c'_s)$$

with $s = L, H$

Interpreting optimal plan as austerity program

Restriction on debt issuance

Program description

- Country prevented from running independent fiscal policy and reform program
- Need to impose constraint on debt issuance to market

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But

- True that gov't "credit constrained"

$$u'(c(v, \phi)) > \beta(1+r) \sum_s p(s) \int u'(c_s(v'_s(\phi), \phi'))$$

- Gov't debt capacity exhausted:
 - Even if gov't can issue debt, private lenders not willing to lend
- Don't see justification for imposing debt limits

Conclusion

- Interesting and topical paper
- My suggestion:
 - Clarify the nature of reform effort and keep it constant throughout arrangements
 - Market arrangements not clearly inefficient