

NOTES ON ILLIQUIDITY PANICS

GUIDO LORENZONI

1. MULTIPLE EQUILIBRIA

- We now consider a simple version of a financial accelerator model in which panics are possible
- The model lasts 2 periods, $t = 0, 1$
- As in the baseline Kiyotaki-Moore model there is a fixed supply of capital

$$k^h + k = \bar{k}$$

- Initial net worth

$$n = pk_0 - d_0$$

- Invest in capital yields

$$Ak$$

- Inferior technology

$$y^h = f(k^h)$$

- Assumption: efficient allocation has all capital in banks

$$f'(0) \leq A = p^*$$

- Equilibrium:

– optimality for households (always unconstrained)

$$p = f'(\bar{k} - k)$$

– optimality for banks: three cases,

* if $p > A$ then $k = 0$,

* if $p = A$ then any

$$0 \leq k \leq \frac{pk_0 - d_0}{p - \theta A}$$

is optimal

* if $p < A$ then

$$k = \frac{pk_0 - d_0}{p - \theta A}$$

- So far we have focused on equilibria where banks are not bankrupt, so $pk_0 > d_0$, more below on bankrupt banks
- Equilibrium, pair p, k that satisfies conditions above
- Multiple equilibria?
- Yes, but only possible if

$$\frac{pk_0 - d_0}{p - \theta A}$$

is increasing in p (for $p < A$)

- This requires

$$k_0(p - \theta A) > pk_0 - d_0$$

or, equivalently,

$$\frac{d_0}{k_0} > \theta A$$

high enough initial leverage

- We also have converse result: if $d_0/k_0 > \theta A$ then we can find a function f such that the model admits multiple equilibria
- Proof:
 - Choose f piecewise linear, $f'(k^h) = \bar{a}$ if $k^h \leq \hat{k}$ and $f'(k^h) = \underline{a}$ if $k^h > \hat{k}$
 - Choose \underline{a}, \bar{a} so that $\frac{d_0}{k_0} < \underline{a} < \bar{a} < A$
 - Then choose \bar{k} and \hat{k} so that

$$\frac{\underline{a}k_0 - d_0}{\underline{a} - \theta A} < \bar{k} - \hat{k} < \frac{\bar{a}k_0 - d_0}{\bar{a} - \theta A}$$

(which can be done since $\frac{pk_0 - d_0}{p - \theta A}$ is increasing)

- Then there are 2 equilibria, one at $p = \underline{a}$ and one at $p = \bar{a}$
- So far we have ignored the question whether d_0 is sustainable, that is if, in equilibrium

$$pk_0 > d_0$$

- If we allow for bankrupt banks it is even easier to find multiple equilibria
- However it is harder to embed model with bankrupt banks in dynamic model as we need to allow for defaultable debt
- Lending of last resort
- Suppose there is a good equilibrium with $p = A$
- Tax consumers and buy capital at price $A - \epsilon$
- Even if the government only can get $A_g \ll A$ the announcement of the policy eliminates the bad equilibrium