Credit Shocks in an Economy with Heterogeneous Firms and Default

by Aubhik Khan, Tatsuro Senga and Julia K. Thomas

Discussed by Urban Jermann

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  - Slow recovery
- Fluctuations in entry and exit are important

Model

- Firms' production function

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- Labor choice

$$\begin{aligned} \pi(k, \varepsilon; s, \mu) &= \max_n z\varepsilon k^a n^\nu - \omega(s, \mu)\, n \\ &= (1-\nu)\, y(k, \varepsilon; s, \mu) \end{aligned}$$

Financing

- One-period defaultable debt

$$\begin{aligned} \text{due} &: \quad b_i \\ \text{sold} &: \quad q\left(k_i', b_i', \varepsilon_i; s, \mu\right) b_i' \end{aligned}$$

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$$\chi_\theta(s)\,\xi_1(\varepsilon), \text{ with } \begin{array}{l} \chi_\theta(s) = 1, \text{ if } \theta \in \text{ crisis} \\ \chi_\theta(s) = 0, \text{ if } \theta \notin \text{ crisis} \end{array}$$

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- Cash on hand

$$x\left(.\right) = \left(1-\nu\right) y\left(.\right) + \left(1-\delta\right) k - b - \xi_0 - \chi_\theta\left(s\right)\xi_1\left(\varepsilon\right)$$

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- Dividends

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- Nonnegative dividends, no external equity

$$D \geq 0$$

Default

- Firms with negative equity default

$$V^1(x, \varepsilon; s_l, \mu) = \pi_d x + (1 - \pi_d) V^2(x, \varepsilon; s_l, \mu) < 0$$

Default

- Firms with negative equity default

$$V^1(x,\varepsilon;s_l,\mu)=\pi_d x+(1-\pi_d)V^2(x,\varepsilon;s_l,\mu)<0$$

- with

$$V^2(.)=\max_{k',b'}\left[\begin{array}{c} x-k'+q(.)b'+ \\ \sum_{m=1}^{N_s}\pi_{lm}^s d_m(s_l,\mu)\sum\pi_{ij}^{\varepsilon}V^0(.') \end{array}\right]$$

s.t.

$$x-k'+q(.)b'\geq 0$$

Debt pricing

- $q\left(k', b', \varepsilon_i; s_l, \mu\right) b' =$

$$\sum_{m=1}^{N_s} \pi^s_{lm} d_m\left(.\right) \sum \pi^{\varepsilon}_{ij} \left[\begin{array}{c} \chi\left(x'_{jm}, \varepsilon_j; s_m, \mu'\right) b' + \\ \left(1 - \chi\left(.\right)\right) \min\left\{b', \rho\left(\theta\right)\left(1-\delta\right) k\right\} \end{array} \right]$$

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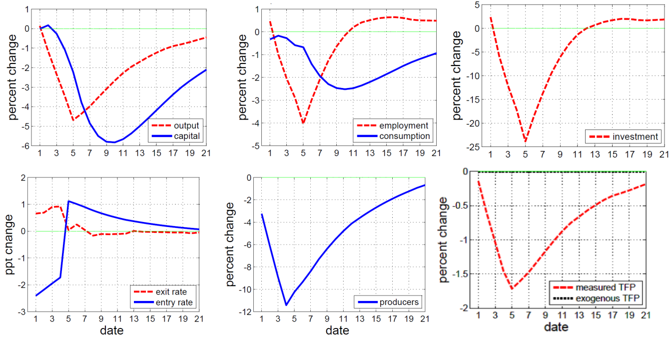
- Exit & entry

Credit Shock



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  - 10% probability of $\varepsilon = 0$

Simplified partial equilibrium model

- $$V(x) =$$

$$= \max_{k',b'} \left[\begin{array}{c} x - k' + q(k', b') b' \\ +\beta E \max \left\{ \left(\begin{array}{c} A\varepsilon' k'^{\frac{a}{1-\nu}} + (1-\delta) k' \\ -b - \xi_0 - \chi_\theta(\theta') \xi_1(\varepsilon') \end{array} \right), 0 \right\} \end{array} \right]$$

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- Assume
$$k' = q(b')\, b' + x$$

Simplified partial equilibrium model II

- $$\max_{B'} \beta E \int_{\varepsilon^{*\prime}(B')}^{\bar{\varepsilon}'} \left\{ \begin{array}{c} \varepsilon' \left[\begin{array}{c} A\left(B'+x\right)^{\frac{a}{1-\nu}} \\ +\left(1-\delta\right)\left(B'+x\right) \end{array} \right] \\ \\ -B'R^{c}\left(B'\right)-\xi_{0}-\chi_{\theta}\left(\theta'\right)\xi\varepsilon' \end{array} \right\} d\Phi\left(\varepsilon'\right)$$

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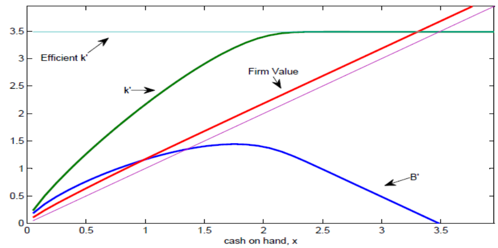
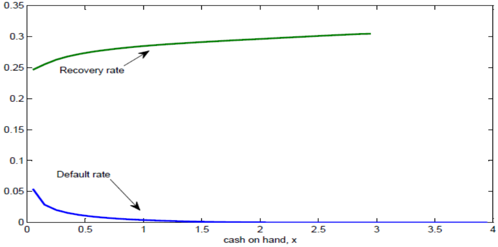
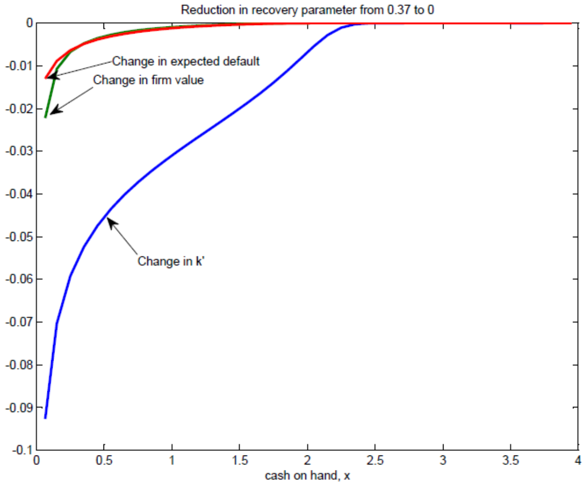
- $$\frac{B'}{\beta} = E\left\{\Phi\left(\varepsilon^{*\prime}\right) BR^c\right\}$$
$$+E\left\{\int_{\underline{\varepsilon}}^{\varepsilon^{*\prime}(B')} \min\left[\rho\left(\theta\right)\left(1-\delta\right)\varepsilon'\left(B'+x\right), BR^c\right] d\Phi\left(\varepsilon'\right)\right\}$$

Optimal policies

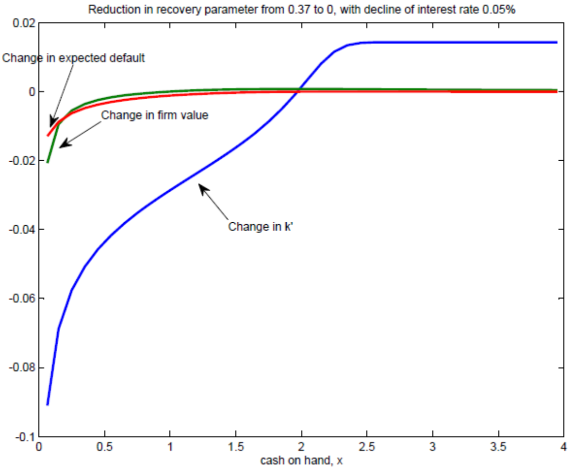




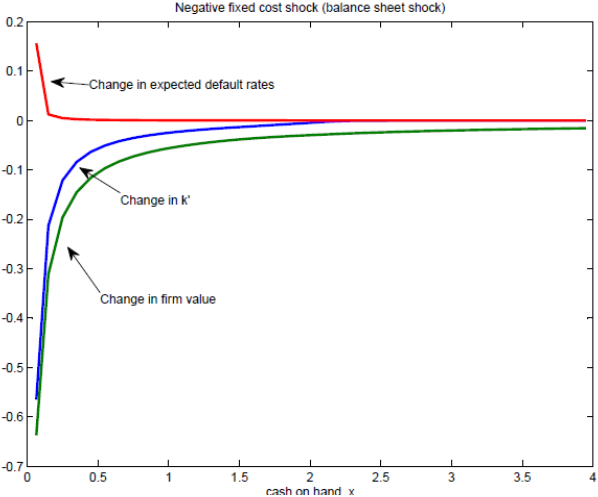
Recovery rate shock



Recovery rate shock with lower interest rate



Fixed cost shock (balance sheet shock)



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