# Bank Runs, Fragility, and Credit Easing

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# Motivation

- Financial crises typically involve bank runs
- Short-term debt can make a bank vulnerable to a self-fulfilling run
- Empirically, runs more likely with weak aggregate fundamentals
  - General equilibrium feedbacks potentially important

★ Macroeconomic model essential to understand feedbacks

**Q:** What are the implications for government policy?

# This Paper

Tractable dynamic general equilibrium model of bank runs

- Limited commitment and default as a strategic choice
    - Default due to fundamentals or runs

Analytical characterization:

- Vulnerability of single bank and fraction of banks facing runs
    - Systemic run is one possible outcome (Gertler-Kiyotaki)

**Normative contribution:** desirability of **credit easing** depends on whether a crisis is driven by fundamentals or self-fulfilling runs

# Outline of the Talk

1. Basic environment without runs
    - Bank problem in partial equilibrium
    - General equilibrium
2. Introduce bank runs
3. Credit easing

# Environment

- Discrete time, infinite horizon, no aggregate risk
- Continuum of banks, preferences $\sum_{t=0}^{\infty} \beta^t \log(c_t)$.
- Risk-neutral creditors, discount rate $R$
- Technology
  - Production of consumption good: $y = zk$
  - Capital in fixed supply $\overline{K}$

# Banks' Budget Constraints

All banks start at $t = 0$ with portfolio $(b_0, \overline{K})$

- If repay at time $t$:

$$c = (\bar{z} + p_t)k - Rb + q_t(b', k')b' - p_t k'.$$

where $q_t$ is the price of deposits, $p_t$ is the price of capital

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- If default at time $t$

$$c = (\underline{z} + p_t)k - p_t k'$$

Productivity loss $y = \underline{z}k$

Permanent financial exclusion: $b' = 0$

# Banks' Optimization: Values of Repayment and Default

$$V_t^R(b,k) = \max_{k',b',c} \log(c) + \beta V_{t+1}(b',k')$$

subject to budget constraint & no-Ponzi

$$V_t^D(k) = \max_{k',c} \log(c) + \beta V_{t+1}^D(k')$$

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Repayment decision:

- If $V_t^R(b,k) < V_t^D(k)$, default
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- If $V_t^R(b,k) > V_t^D(k)$, repay
- If $V_t^R(b,k) = V_t^D(k)$, repay for $t > 0$ & **randomize at $t = 0$**

# Equilibrium Consistent Borrowing Limit

- Equilibrium default only at $t = 0$
- Bank pays at $t+1$ if

$$b_{t+1} \leq \gamma_t p_{t+1} k_{t+1}$$

where

$$\frac{\bar{z} + p_{t+1}(1 - \gamma_t R)}{\underline{z} + p_{t+1}} = \left(1 - \gamma_{t+1} \frac{p_{t+2}}{p_{t+1}}\right)^{\beta}$$

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Potentially many solutions, but only one consistent with No-Ponzi

- Existence, uniqueness and comparative statics in the paper

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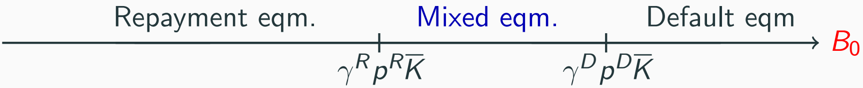


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In the paper:

- Analytical characterization of thresholds
- Unique stationary eqm. and unique transition results
- Repaying banks are net buyers of $k$ in the mixed eqm.

# Self-Fulfilling Bank Runs

Coordination problem between creditors a la Cole-Kehoe

- Creditors may refuse to rollover $\Rightarrow$ repayment more costly
- If optimal to default during a run, a bank is "vulnerable"

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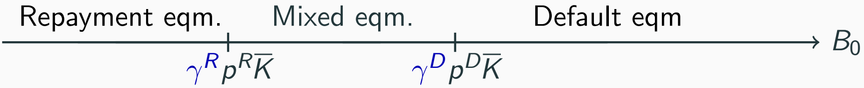

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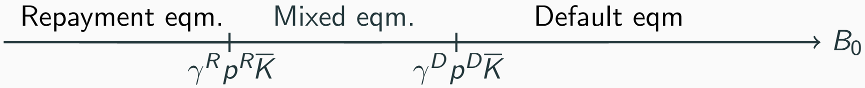


- Lower price of capital
  - Lower $\gamma$, implies lower demand by repaying banks
  - More defaulting banks, which have lower demand for capital

# Credit Easing

Introduce government purchases of assets $K^g$ at $t = 0$

Assume that government makes losses:

- Productivity $z^g < \underline{z}$ and return $(z^g + p_1)/p_0 < R$

$\Rightarrow$ Investors they do not purchase $k$ if same productivity as govt.

**Q:** What are the effects on the share of defaulting banks and welfare?

## Welfare $\Downarrow$ if defaults due to fundamentals

$$\frac{dW}{dK_g} = \left[\phi \frac{dV^D}{dK_g} - (1-\phi)\frac{dV^R}{dK_g}\right] - \left(V^R - V^D\right)\frac{d\phi}{dK_g}$$

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$\Rightarrow$ If $d\phi < 0$, possibility that $dW > 0$

A repaying banks facing a run is a net seller of assets

$\Rightarrow$ benefits from intervention that raises asset prices

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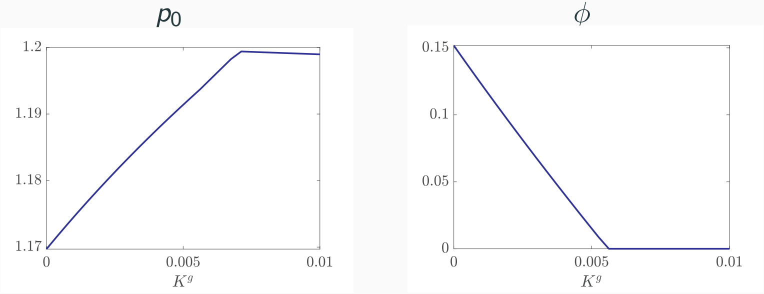
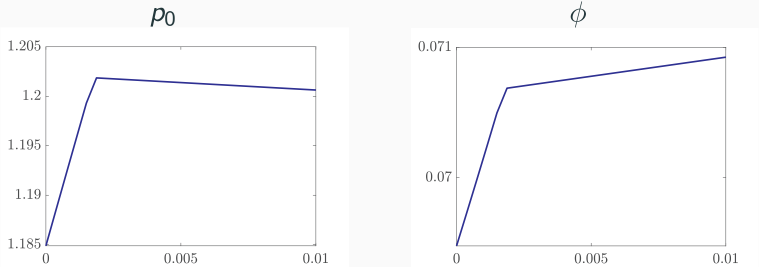
In equilibrium, $d\phi < 0$

# Credit Easing: Self-Fulfilling vs. Fundamentals

## Self-Fulfilling Runs




## Fundamentals



# Credit Easing: Self-Fulfilling vs. Fundamentals

## Self-Fulfilling Runs

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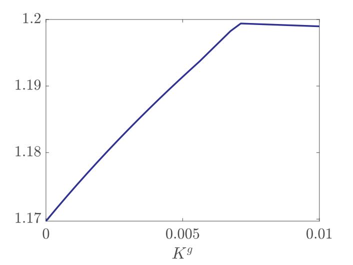


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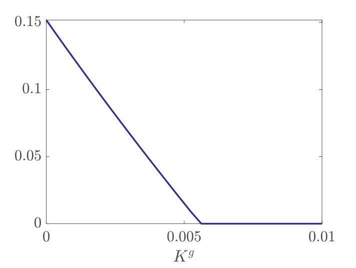


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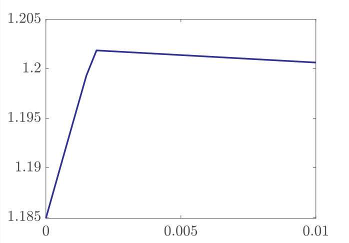


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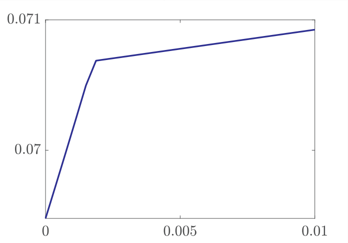

# Conclusions

- A tractable macroeconomic model of self-fulfilling bank runs
- General equilibrium effects crucial to assess govt. policies
- Desirability of credit easing depends on whether a crisis is diriven by fundamentals or self-fulfilling runs
- Agenda:
  - Anticipation effects of credit easing
  - Use framework for other policies, such as macroprudential