Dynamics of Secured and Unsecured Debt Over the Business Cycle

Paul Luk, Hong Kong Baptist University
Tianxiao Zheng, SAIF, Shanghai Jiao Tong University

Introduction

- Firms have heterogeneous debt structure.
- Unsecured debt is much more procyclical than secured debt. (Azariadis, Kaas and Wen, 2016)
- We depart from standard macro-finance setups by modelling heterogeneous debt structure in firms.

Main Findings

- Borrowers and lenders in unsecured debt contracts are more cautious relative to secured debt.
- The model matches following stylized facts:
  - **High-credit-quality firms have lower leverage.**
  - **Unsecured debt is procyclical.**
  - **Secured debt is acyclical.**
- Financial accelerator mechanism associated with unsecured debt has less amplification than Bernanke et al. (1999).

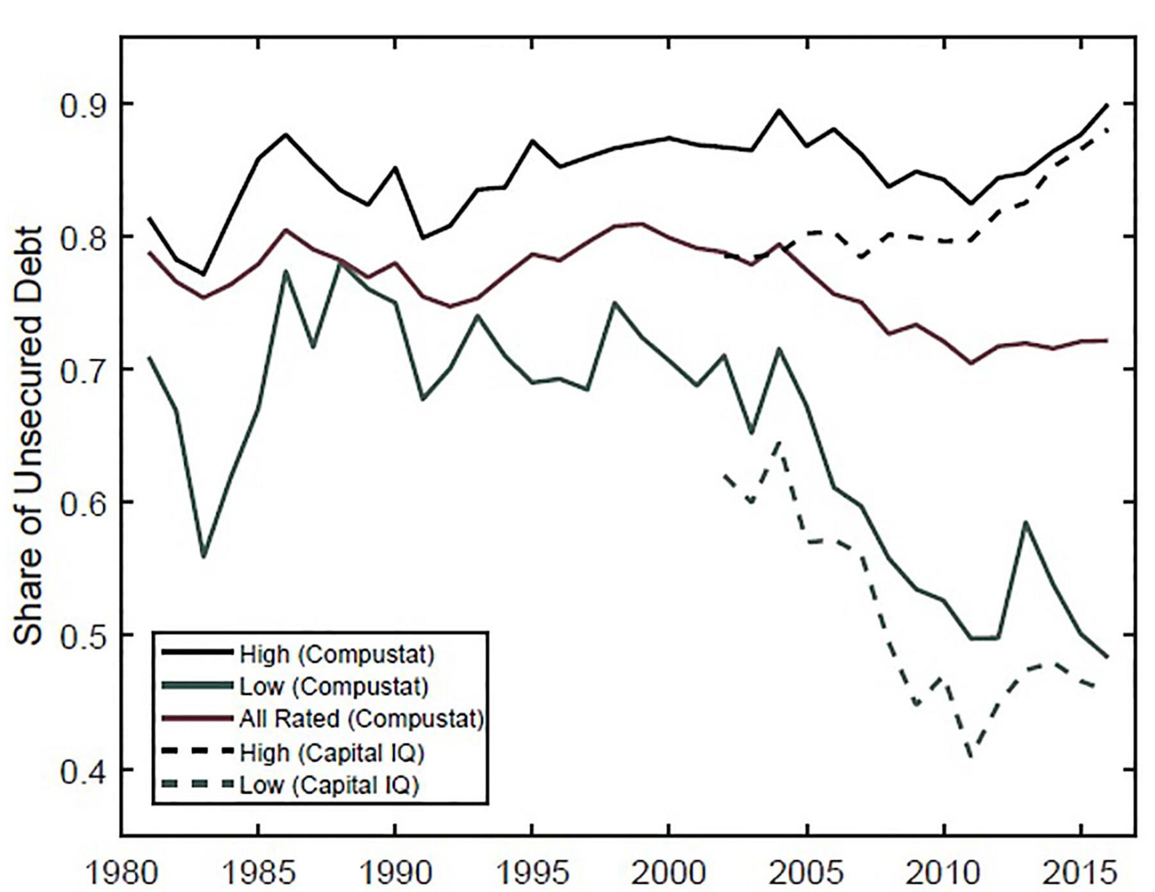
Stylized facts

- Public traded non-financial and non-utility US firms with long-term credit rating. (Source: Compustat)
- 1142 rated firms in 1981-2017 (annual).

Secured debt = `mortgage and other secured debt'
Unsecured debt = `long-term debt + total current debt' – Secured debt

Leverage Ratios Across Quality Distribution

	Leverage		Leverage
AA and above	1.53	B- and below	1.95
BBB and above	1.62	CCC and below	2.13
BBB- and above	1.65	CC and below	2.31



Corr (Y, Debt)	Rated Firms	All Obs.	Model
Secured Debt	0.06	0.15	0.09
Unsecured Debt	0.48	0.50	0.64

Model: Credit Contracts

- We embed heterogeneous firms and secured & unsecured debt in a RBC model.
- Firm $j \in [0,1]$ has return on capital $\omega_{jt} R_t^K$.
- $\log(\omega_{jt}) \sim N(-0.5\sigma_{t-1}^2, \sigma_{t-1}^2)$, with $E(\omega_{jt}) = 1$.
- Each firm carries a publicly observed label $i \in [G, B]$.
- A *G* firm can borrow both secured and unsecured debt. (In eqm., *G* firms only borrow unsecured debt.)
- A *B* firm can only borrow secured debt.

Secured Debt

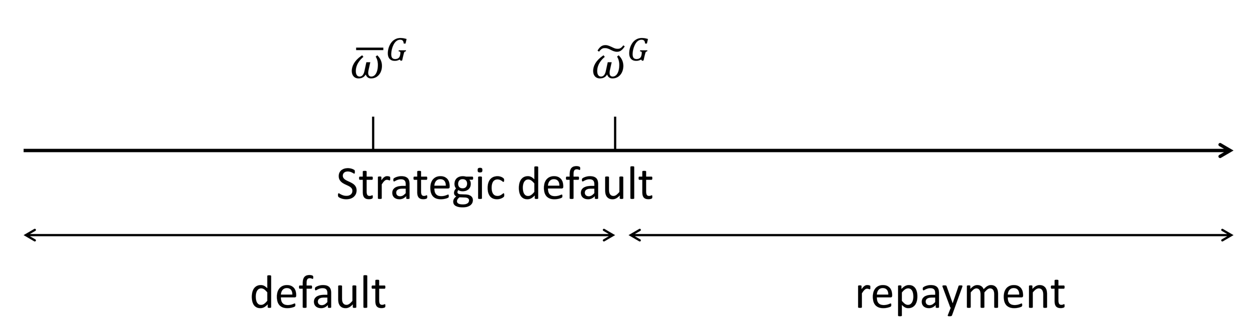
- Define $\bar{\omega}_{jt}^B$. A *B* firm can repay if $\omega_{jt} \geq \bar{\omega}_{jt}^B$.

	$\omega_{jt} \leq \bar{\omega}_{jt}^B$	$\omega_{jt} > \bar{\omega}_{jt}^B$
B firm	Default and bankrupt.	Repay loan. Keep profit.
Lender	Get liquidation value of the firm.	Receive repayment.

Unsecured Debt

- Define $\bar{\omega}_{jt}^G$. A *G* firm *can* repay if $\omega_{jt} \geq \bar{\omega}_{jt}^G$.
- A *G* firm chooses to repay when $\omega_{jt} \geq \tilde{\omega}_{jt}^G$:

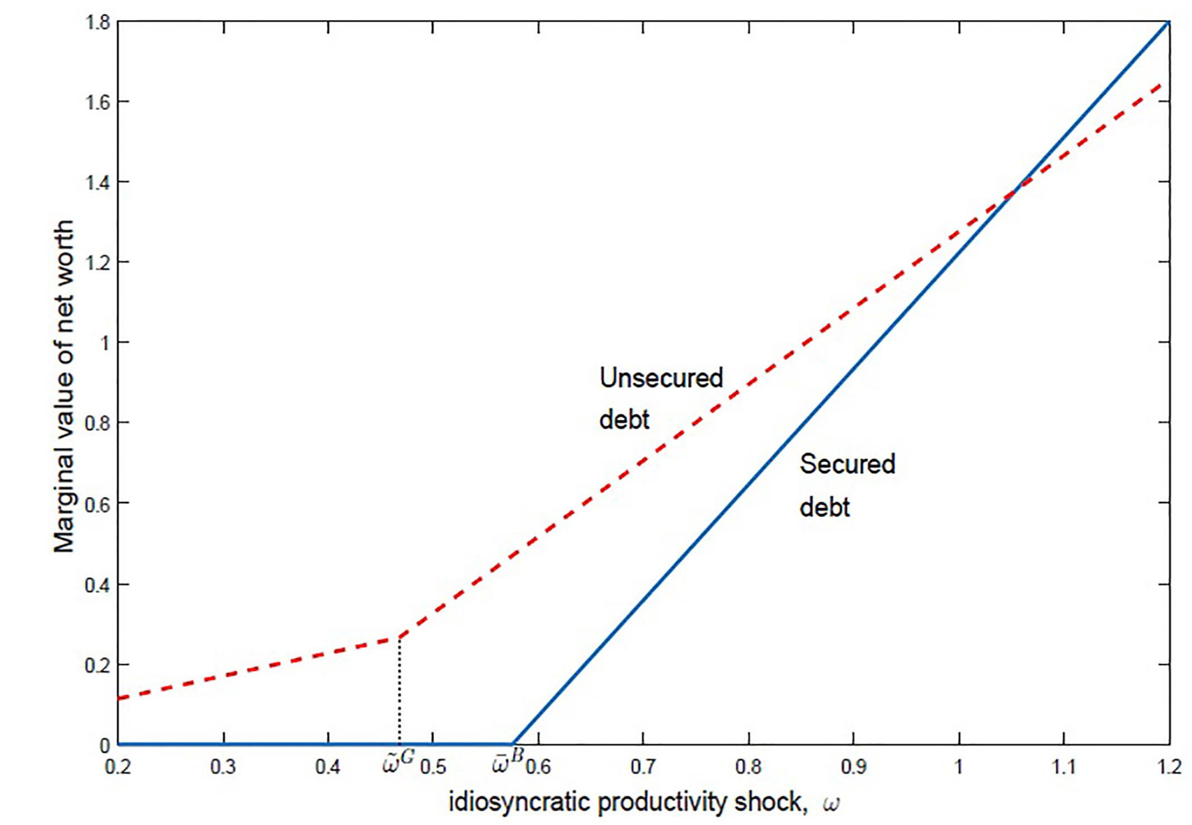
	$\omega_{jt} \leq \tilde{\omega}_{jt}^G$	$\omega_{jt} > \tilde{\omega}_{jt}^G$
G firm	Default: With $Pr = \zeta$, keep assets and becomes B firm; With $\Pr = (1-\zeta)$, gets nothing.	Repay loan. Keep profit.
Lender	Gets zero return.	Receive repayment.

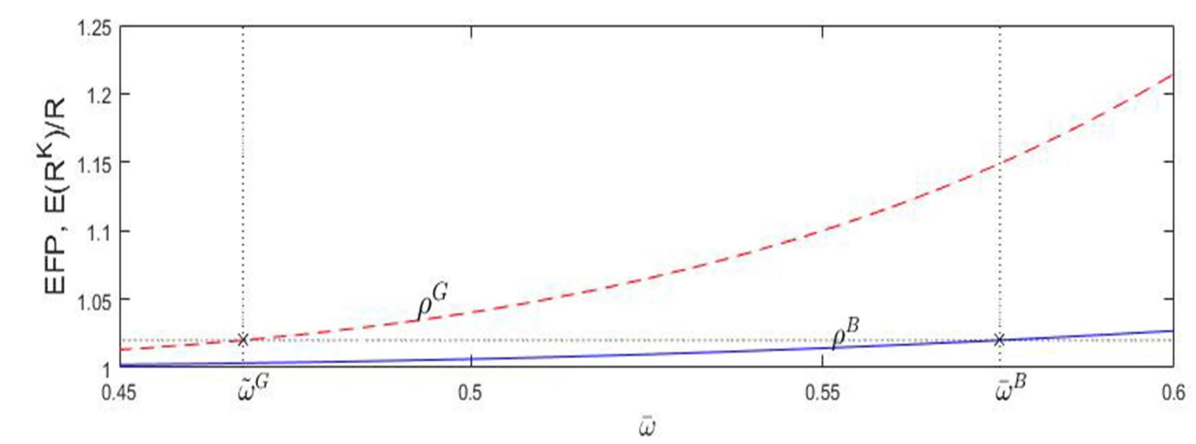


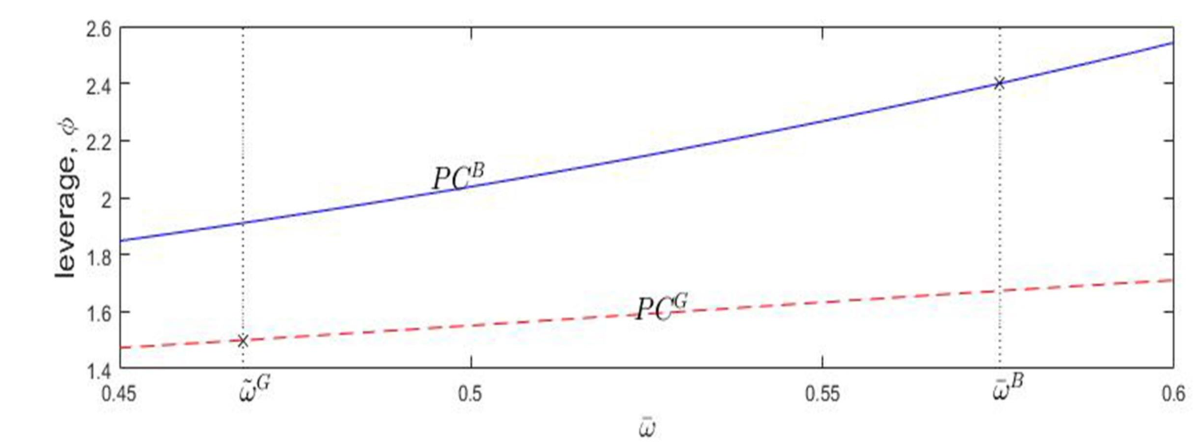
The Optimal Contract

- Each firm maximizes its continuation value subject to lenders' participation constraint (PC).
- Value of a firm is given by $V_t^i(N_{jt}^i) = \lambda_t^i N_{jt}^i$, for $i \in \{G, B\}$, where $\lambda_t^G > \lambda_t^B > 1$.
- All $i \in \{G, B\}$ firms choose same leverage, ϕ_t^i.
- All *G* firms choose same default strategy: $\xi_t \tilde{\omega}_t^G = \bar{\omega}_t^G$, where $\xi_t < 1$ and $\xi_t'(\lambda_t^G/\lambda_t^B) > 0$.

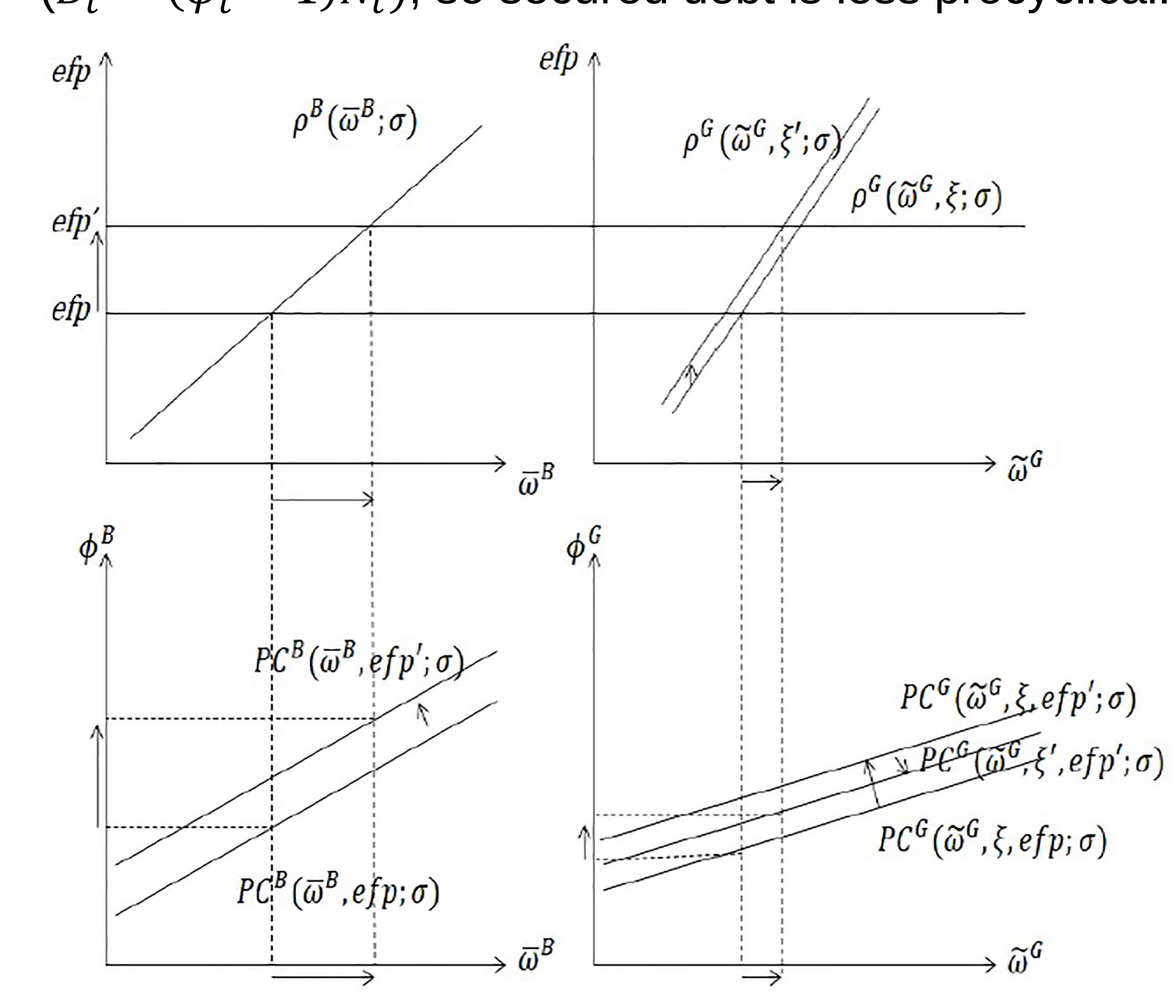
- Secured debt borrowers worry less about downside risks, so *B* firms' FOC ρ^B is less steep than *G* firms'.
- Secured debt lenders worry less about downside risks too, so *B* firms' PC is steeper than *G* firm's PC.
- So, for a given R^K, *B* firms have higher leverage.







- Given relative slopes, a bad shock increases ϕ^B more.
- Debt is increasing in net worth and leverage ($B_t = (\phi_t - 1)N_t$), so secured debt is less procyclical.



Calibration

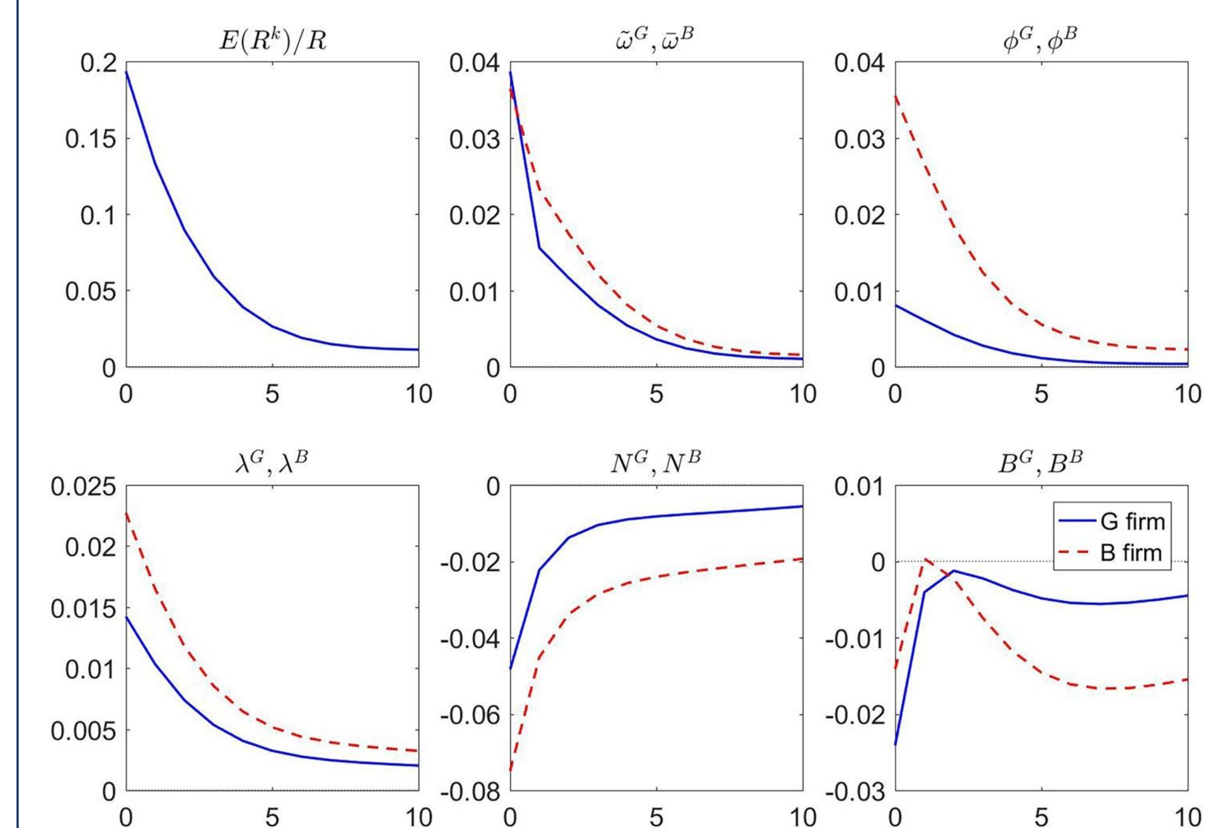
Annual frequency.
Financial market SS targets:
$(a)\ R^K/R$=2%, $(b)\ B^G/B$=0.75, $(c)\ \phi^B$=2.4, (d) ϕ^G=1.5.

Parameter	Value	Meaning
θ	0.87	Firm survival probability
κ	0.017	Initial monitoring cost for secured debt
μ	0.2	Liquidation costs
ς	0.388	Debt restructuring success rate
$\bar{\sigma}$	0.257	Std. dev of idiosyncratic shock
Υ	0.068	Firm initial transfer

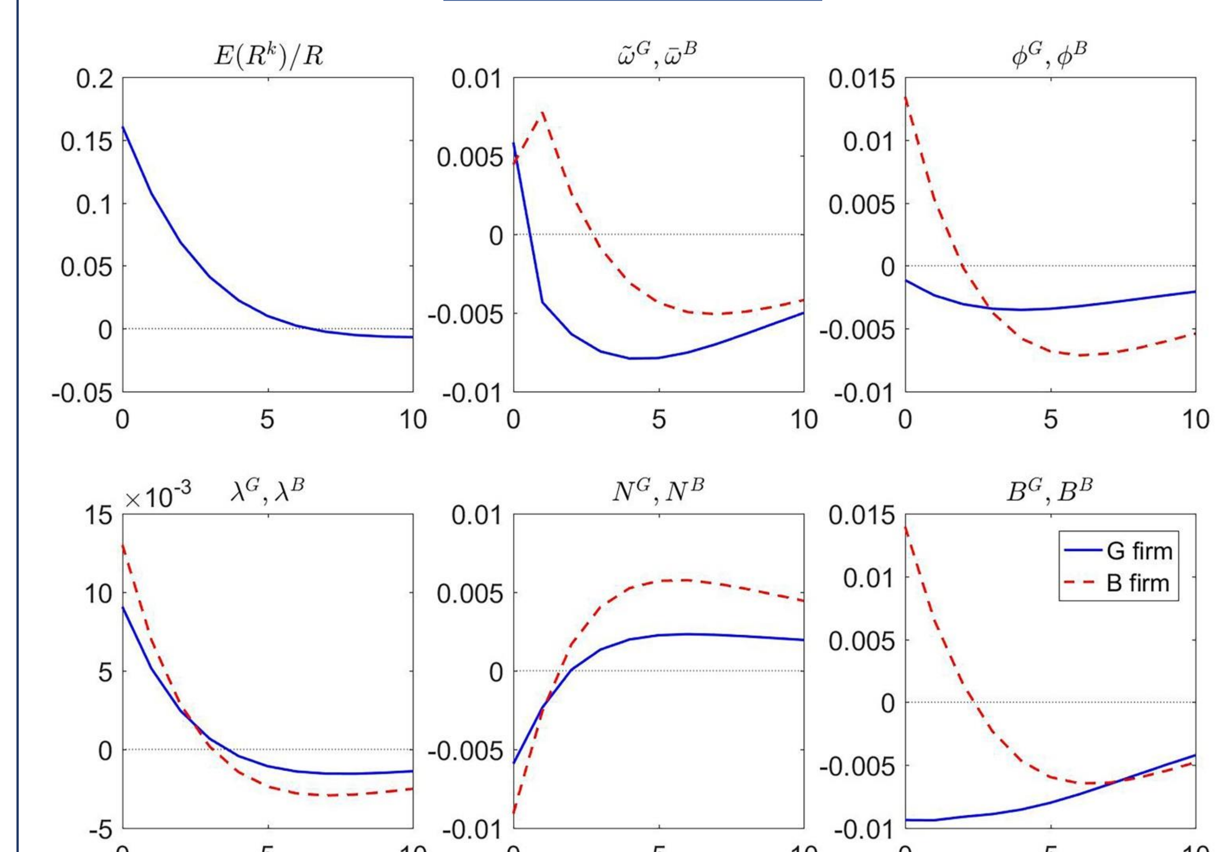
TFP shocks (A_t): $\rho_A = 0.56, s_A = 0.023$.
Volatility shocks (σ_t): $\rho_\sigma = 0.85, s_\sigma = 0.026$.

Results

TFP Shock



Volatility Shock



Conclusions

- We document stylized facts about corporate firms' debt structure.
- We build a model with heterogeneous debt structure, and it matches key stylized facts.
- Dynamics of unsecured debt are important in understanding business cycles.