Leasing as a Mitigation of Financial Accelerator Effects

Kai Li[1] Jun Yu[2]

[1]HSBC Business School, Peking University

[2]Hong Kong University of Science and Technology

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Motivating Facts: Importance of Leasing

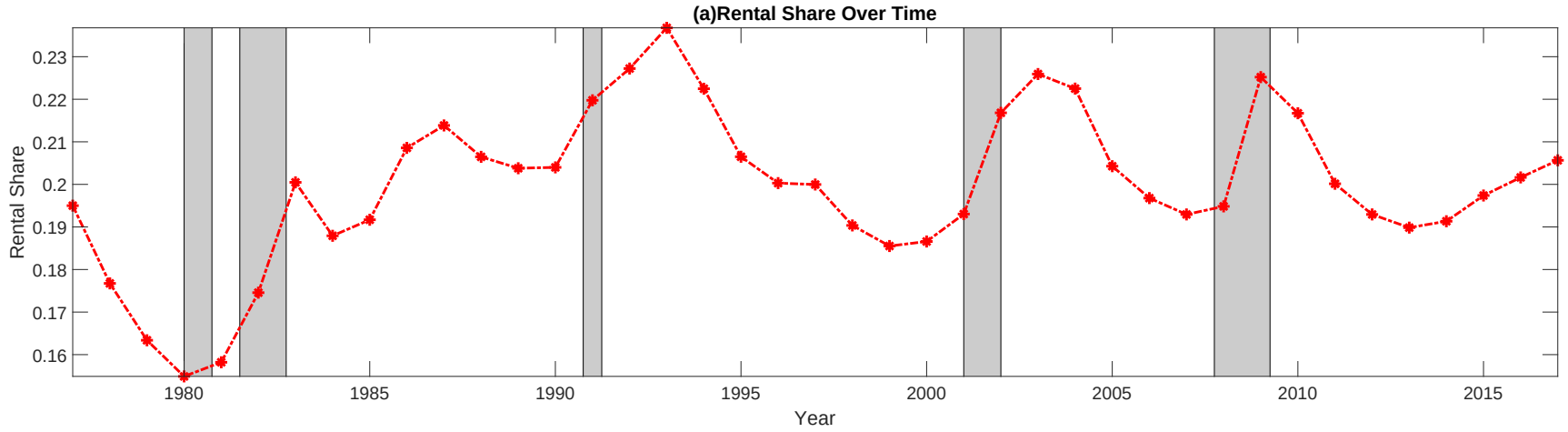
Table 1: Summary Statistic of Leasing Activities among US Public Firms

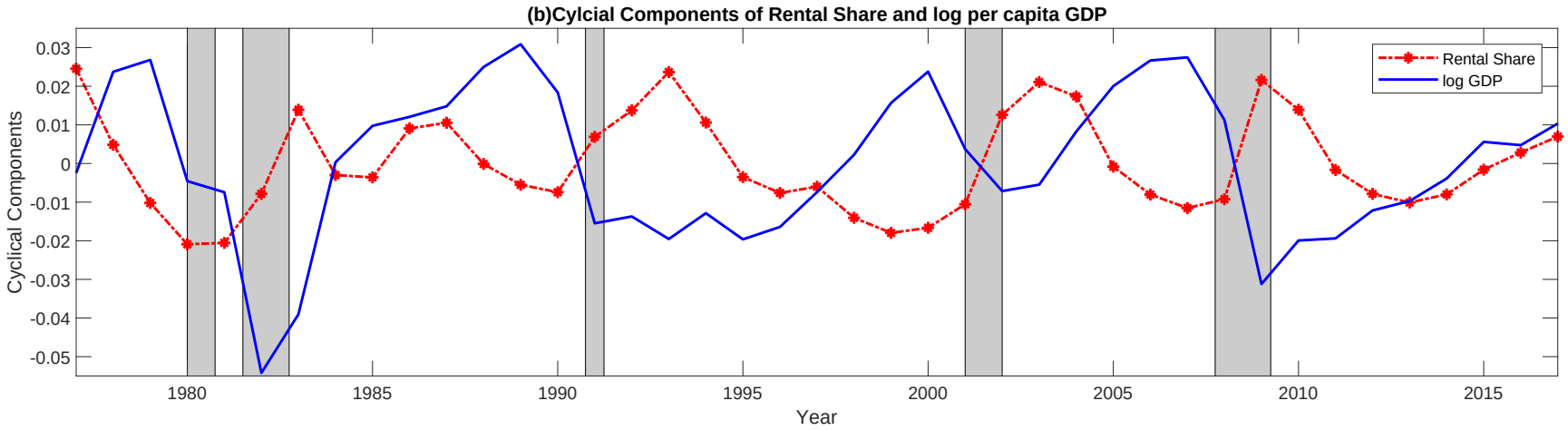
	Aggregate	Size			WW Index		
Variables	Mean	S	M	L	C	MC	UC
LCR1	0.16	0.42	0.31	0.15	0.41	0.31	0.15
LCR2	0.26	0.54	0.43	0.25	0.53	0.42	0.25
Rental Share	0.20	0.40	0.33	0.19	0.42	0.33	0.19
Debt Leverage	0.21	0.14	0.23	0.21	0.14	0.24	0.21
Lease Adjusted Leverage	0.32	0.36	0.41	0.32	0.32	0.41	0.32

- Leased capital accounts for around 20% of productive assets.
- Small and financially constrained firms lease more capital
- Leasing is an important source of external finance

Motivating Facts: Cyclical Pattern of Leased Capital Ratio

- Rental share is counter-cyclical and negatively correlated with the cyclical component of output ($\rho = -0.3$ with t-stat$=-1.97$)

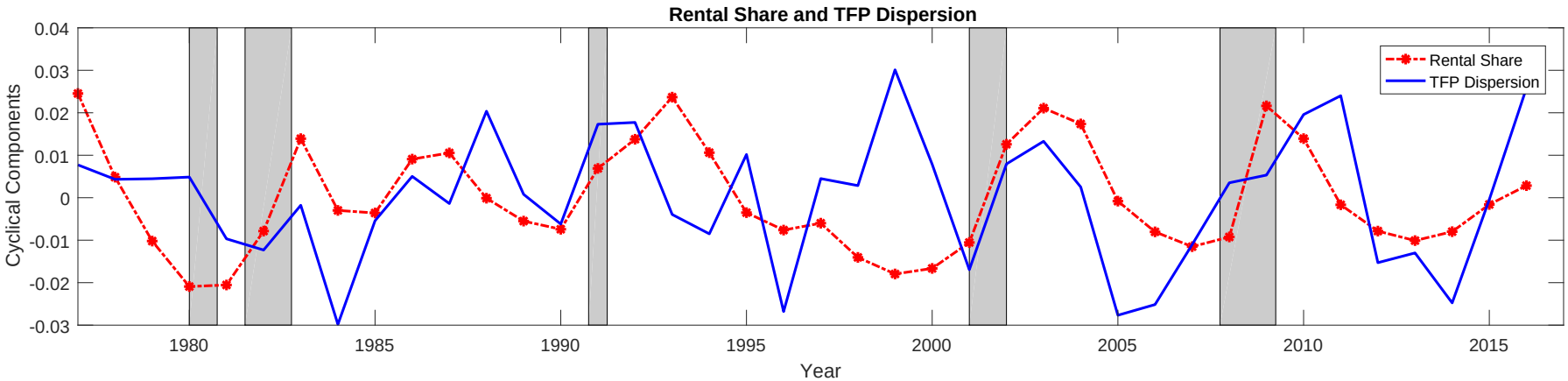




Leasing and the Volatility of Cross-sectional Idiosyncratic Uncertainty

- The cyclical components of rental share and the volatility of uncertainty are positively correlated ($\rho = 0.42$ with t-stat$= 2.82$)

- The volatility of cross-sectional idiosyncratic uncertainty is
  - defined in Christiano, Motto and Rostagno (2014)
  - measured by cross-sectional dispersion of firm level TFP



Motivating Facts: Firm-level Evidence

Table 2: Firm-level Regression: Leasing and TFP Dispersion

	LCR1		LCR2		Rental Share	
	(1)	(2)	(3)	(4)	(5)	(6)
VOL-TFP	0.050***	0.052***	0.040***	0.042***	0.068***	0.069***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GDP Growth	-0.214***	-0.220***	-0.228***	-0.229***	-0.327***	-0.309***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
Lag GDP Growth	-0.046	-0.036	-0.164***	-0.153***	-0.661***	-0.665***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.834	0.839	0.843	0.847	0.691	0.699
Observations	122,573	116,533	132,450	125,796	131,378	124,776

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- Presents a dynamic GE model with financial frictions and a role for leased capital
  - Builds on Bernanke, Gertler, and Gilchrist (1999)
  - Explicitly model the key features of leasing
    - Benefits: repossession advantage in default, larger debt capacity than secured lending
    - Costs: higher cost due to agency problems caused by separation of ownership and control rights

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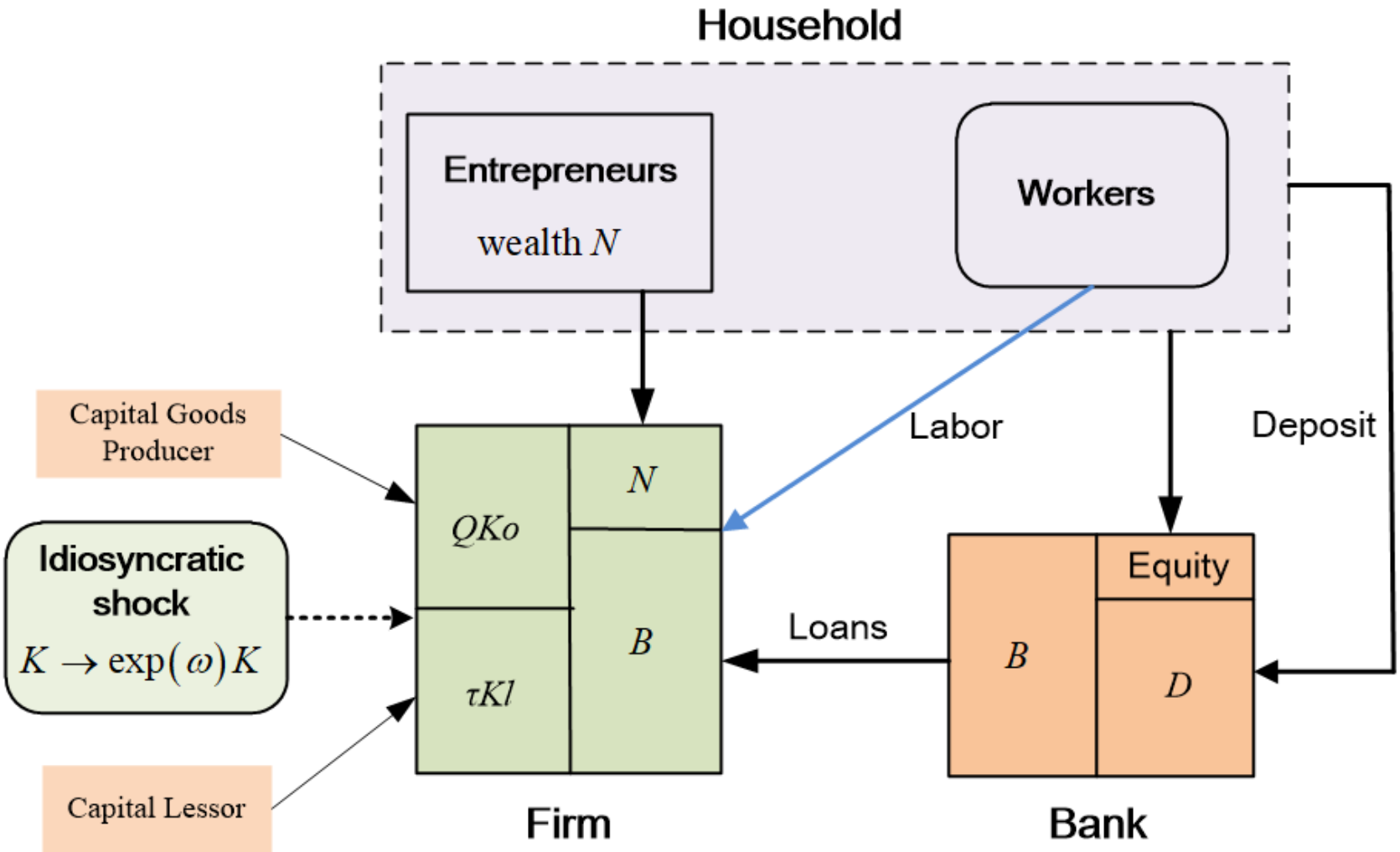
    - Benefits: repossession advantage in default, larger debt capacity than secured lending
    - Costs: higher cost due to agency problems caused by separation of ownership and control rights
- Shows that increased use of leasing when financial constraints becomes tighter in bad states
  - Significantly mitigates the financial accelerator effects
  - Also mitigates the response of macroeconomic variables to negative TFP shocks and risk shocks

Model Environment



Key Model Ingredients (1)

- Firms produce final output using both owned and leased capital

$$Y_t^j = A_t \left(\omega_t^j K_t^j\right)^{\alpha} \left(L_t^j\right)^{1-\alpha}; K_t^j = K_{o,t}^j + K_{l,t}^j. \tag{1}$$

- Entrepreneurs use net worth and bank loan to finance capital

$$B_{t+1}^j + N_t^j = Q_t K_{o,t+1}^j + \tau_{l,t} K_{l,t+1}^j, \tag{2}$$

- Entrepreneur j's maximization problem and bank's break even constraints

$$\max_{\bar{\omega}_{t+1}^j, K_{o,t+1}^j, K_{t+1}^j} E_t \left\{ \left(1 - \Gamma_t\left(\bar{\omega}_{t+1}^j\right)\right) \left(MPK_{t+1} K_{t+1}^j + (1-\delta) Q_{t+1} K_{o,t+1}^j\right) \right\}$$

$$R_{t+1} B_{t+1}^j = \left(MPK_{t+1} K_{t+1}^j + (1-\delta) Q_{t+1} K_{o,t+1}^j\right) \left(\Gamma_t\left(\bar{\omega}_{t+1}^j\right) - \mu G_t\left(\bar{\omega}_{t+1}^j\right)\right)$$

Key Model Ingredients (2)

- The repossession advantage of leasing:
  - the resale value of leased capital in default is obtained by lessors, thus not subject to verification costs

$$(1-\mu)\,\omega_{t+1}^{j}\left[MPK_{t+1}K_{t+1}^{j}+(1-\delta)Q_{t+1}K_{o,t+1}^{j}\right] \tag{3}$$

- The agency problem associated with leasing

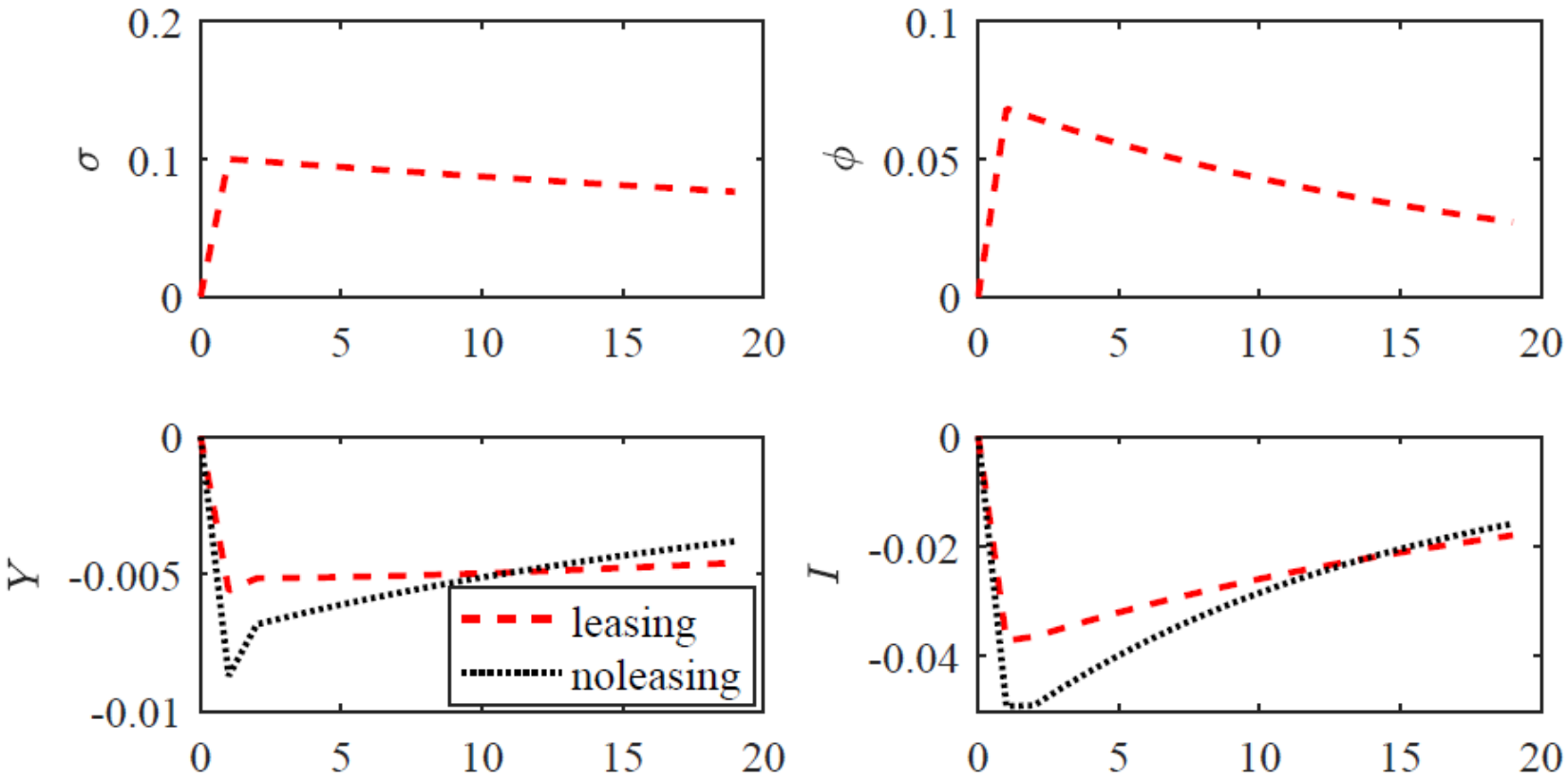
$$\tau_{l,t}=Q_t+\underbrace{Q_t\Theta'\left(K_{l,t+1},K_{t+1}\right)}_{\text{Monitoring Cost}}-(1-\delta)\,E_t\left[M_{t+1}Q_{t+1}\right], \tag{4}$$

- The cross-sectional volatility of Idiosyncratic ω as risk shocks

$$\ln(\sigma_t)-\ln(\overline{\sigma})=\rho_\sigma\left(\ln(\sigma_{t-1})-\ln(\overline{\sigma})\right)+\sigma_\sigma\epsilon_{\sigma,t}. \tag{5}$$

Quantitative Model Predictions: Impulse Response Analysis

- Impulse responses of key variables to a one-standard-deviation positive risk shock



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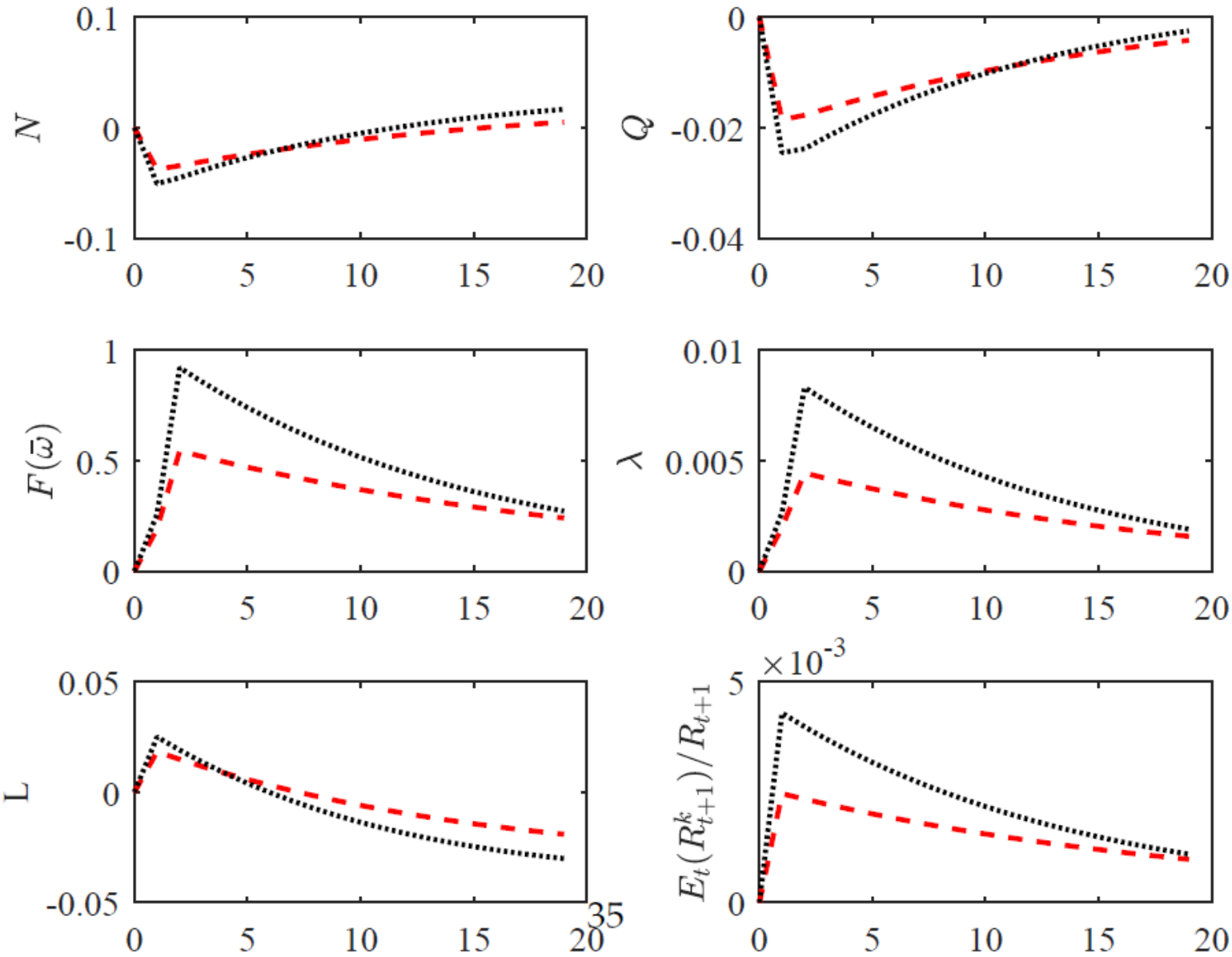


Quantitative Model Predictions: Buy-versus-lease Decision

- The user cost of owned capital

$$\tau_{o,t} = Q_t - (1-\delta)\, E_t\left[\widetilde{M}_{t+1} Q_{t+1}\right] \tag{6}$$

- Where $\widetilde{M}_{t+1}$ is entrepreneurs' effective SDF, deriven by the tightness of breakeven constraints
- Utilize the fact that $\tau_{o,t} = \tau_{l,t}$, we can obtain

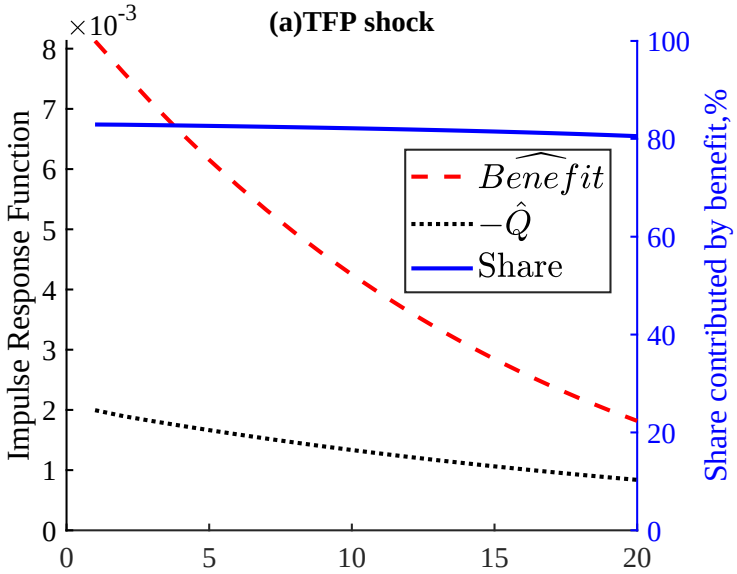
$$Q_t \Theta\left(K_{l,t+1}, K_{t+1}\right)' = \underbrace{(1-\delta)\left[E_t\left(M_{t+1} Q_{t+1}\right) - E_t\left(\tilde{M}_{t+1} Q_{t+1}\right)\right]}_{Benefit}$$

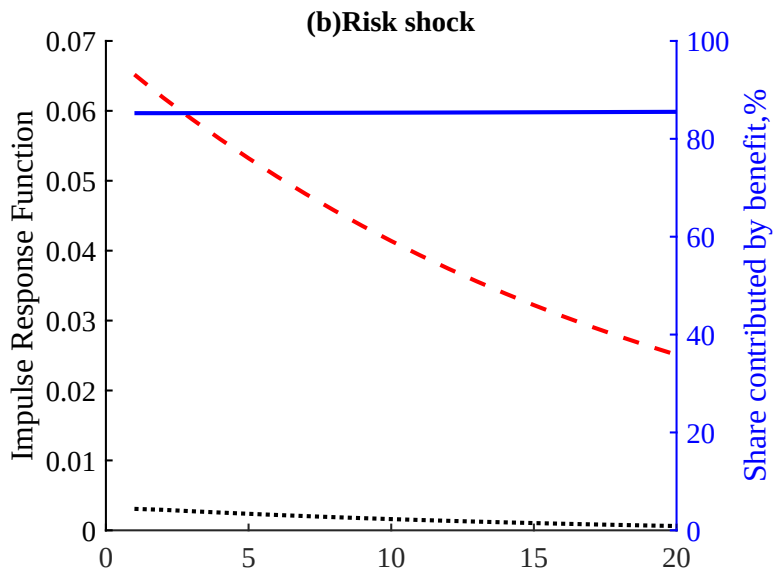
- Log-linearize around the steady states

$$\frac{\phi_{ss} d}{\kappa}\hat{\phi}_t = \widehat{Benefit}_t - \hat{Q}_t, \tag{7}$$

Quantitative Model Predictions: Buy-versus-lease Decision

- Impulse responses functions of benefit term and capital price





- The increase in benefit term dominates the decrease in capital price (thus monitoring cost), it comes from two channels
  - Leasing helps entrepreneurs to save a premium on borrowing cost
  - Leasing provides insurance benefit for entrepreneurs with higher "effective risk aversion"

Cross-sectional Tests and Robustness

- Our theatrical model implies two predictions in the cross section:
  - Financially constrained firms should increase lease by more when uncertainty volatility increase
    - Measure firm level financial constraint by Whited-Wu index and dividend payout dummy
  - Firms with more flexible leasing contracts increase lease by more when uncertainty volatility increase
    - Measure leasing contract flexibility by lease commitment duration
- We show that all the empirical analysis are robust to an alternative measure of uncertainty volatility
  - The cross-sectional dispersion of firms' profit growth

Cross-sectional Tests: Financial Constraint and TFP Dispersion

Table 3: Cross-sectional Tests: Financial Constraint and TFP Dispersion

	WW Index Dummy			Dividend Payout Dummy		
	LCR1	LCR2	Rental Share	LCR1	LCR2	Rental Share
VOL-TFP	0.050***	0.040***	0.066***	0.051***	0.041***	0.069***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
WW dummy × VOL-TFP	0.002***	0.002***	0.003***			
	(0.00)	(0.00)	(0.00)			
Div dummy × VOL-TFP				-0.001***	-0.001***	-0.003***
				(0.00)	(0.00)	(0.00)
GDP Growth	-0.202***	-0.212***	-0.283***	-0.214***	-0.228***	-0.327***
	(0.03)	(0.03)	(0.05)	(0.03)	(0.03)	(0.05)
Lag GDP Growth	-0.021	-0.140***	-0.645***	-0.045	-0.164***	-0.661***
	(0.03)	(0.03)	(0.05)	(0.03)	(0.03)	(0.05)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.839	0.847	0.699	0.834	0.843	0.691
Observations	116,533	125,796	124,776	122,573	132,450	131,378

Cross-sectional Tests: Commitment Duration and TFP Dispersion

Table 4: Cross-sectional Tests: Commitment Duration and TFP Dispersion

	LCR1		LCR2		Rental Share	
	(1)	(2)	(3)	(4)	(5)	(6)
VOL-TFP	0.044***	0.046***	0.037***	0.039***	0.065***	0.066***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Com × VOL-TFP	0.003***	0.003***	0.002***	0.002***	0.002***	0.002***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GDP Growth	-0.194***	-0.202***	-0.214***	-0.218***	-0.313***	-0.298***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
Lag GDP Growth	-0.037	-0.030	-0.153***	-0.145***	-0.655***	-0.662***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
Dividend Payout	-0.014***		-0.011***		-0.028***	
	(0.00)		(0.00)		(0.00)	
WW Index		0.246***		0.222***		0.344***
		(0.03)		(0.04)		(0.04)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.838	0.843	0.843	0.847	0.691	0.699
Observations	122,201	116,493	128,873	122,746	127,833	121,755

Conclusion

- Leasing is an quantitatively important source of productive assets and external finance
- Leasing activities exhibit strong patterns over time
  - Counter-cyclical pattern over the business cycles
  - Positive correlation with uncertainty volatility
- We introduce the role of leasing into the financial accelerator model
  - Increased use of leasing significantly mitigates the financial accelerator mechanism
  - Also mitigates the responses of macro variables to negative shocks
  - The increase in leased capital ratio is predominately driven by the increase of its benefit in bad states

Thank you!