

Financing Cycles

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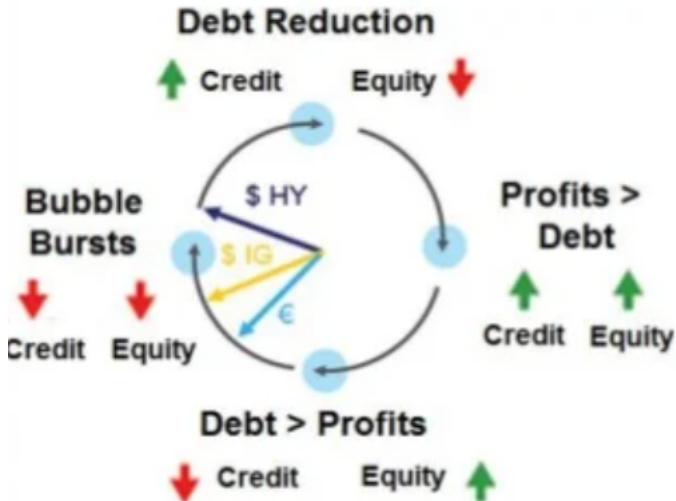
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Cycles

- The economy and financial markets change over the time: there are cycles
- Why do such cycles exist?
- What are the underlying drivers?
- If we understand the drivers, can we use policy to smooth the cycles?

The Leverage Cycle Clock

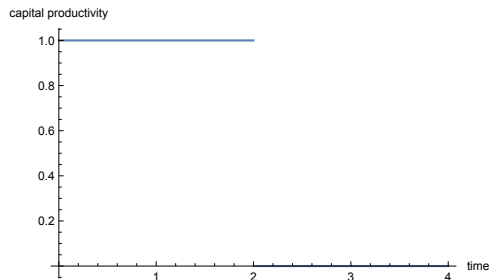


This paper

- Capital exogenously becomes unproductive
- Creates firm-level cycles in investment → firm-level cycles in leverage and debt maturity (financing cycle)
- If capital becomes unproductive in clusters of firms → aggregate financing cycles

Basic Assumption

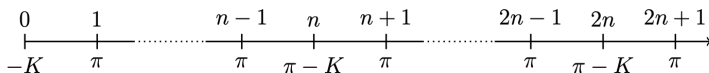
- Capital suddenly switches off like a light bulb



- Investment becomes spiky

Simple Discrete Time Model I

- Single Firm



- Unit of productive capital creates output flow which can be sold for π
- Capital cannot be sold
- Times at which capital exogenously switches off: $\mathcal{S} = \{0, n, 2n, \dots\}$
- For $t \in \mathcal{S}$, new capital is purchased at price K to replace capital which has 'switched off'

Simple Discrete Time Model II

- Time 0: firm has endowment of cash, C_0
- Time t : firm has cash C_t , debt D_t , invests I_t

$$\text{Div}_t = \pi \mathbb{I}_{\{\text{firm produces}\}} - I_t + ND_t - ND_{t-1} \left(1 + \rho_D \mathbb{I}_{\{ND_{t-1} \geq 0\}} + \mathbb{I}_{\{ND_{t-1} < 0\}} \rho_C \right) \geq 0$$

- Net debt, $ND_t = D_t - C_t$
- return on cash, $\rho_C > 0$, is lower than debt repayment interest rate, ρ_D
- Entrepreneur discounts dividends at rate $r > \rho_D$

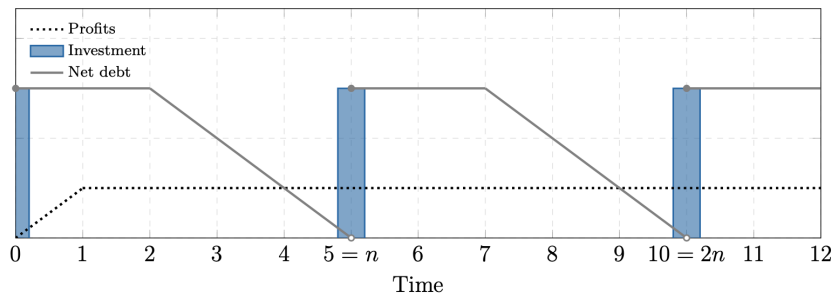
$$E_0 = \sup_{\{I_t, ND_t\}_{t \in \{0,1,2,\dots\}}} \sum_{t \geq 0}^{\infty} \frac{\text{Div}_t}{(1+r)^t}$$

- Constraint: $ND_t \leq \phi \times \pi$
- $\{I_t\}_t$ and $\{ND_t\}_t$ are entrepreneur's controls

Model Solution I

- Investment policy
 - capital is replaced when it reaches the end of its useful life
 - $\forall t \in \mathcal{S} = \{0, n, 2n, \dots\}, I_t = K$
 - $\forall t \in \mathcal{S}^c, I_t = 0$
 - firm-level investment spikes
- Net debt policy
 - $\forall t \in \mathcal{S}^c, ND_{t+1} < ND_t$
 - net debt decreases at times when capital is not replaced
 - firm-level leverage cycles

Model Solution II



In general: $\mathcal{S} = \{0, n, 2n, \dots\}$, $n \in \mathbb{Z}^+$

In figure: $n = 5$, $C_0 = K$

- Impact of capital productivity
 - As K increases, the gradient for net debt dynamics gets steeper
 - $\forall t \in \mathcal{S}^c$, $|ND_{t+1} - ND_t|$ is increasing in K

Model Solution III

- Impact of capital's lifespan
 - As n increases, the gradient for net debt dynamics gets smaller
 - $\forall t \in \mathcal{S}^c$, $|ND_{t+1} - ND_t|$ is decreasing in n

Aggregation

- Assumption: switching off of capital is correlated across firms
- Aggregate investment spikes
- Aggregate debt cycle
- Sensitivity of overall debt in the economy to capital lifespan increases with size of changes to aggregate investment

Empirics

- Model predictions exist in the data
- Focus is on leverage, but not asset prices

Comment I: Empirics – Asset prices

- Financial markets could amplify these effects and they should show up in asset prices
- Empirically, do we see cycles in credit spreads and equity returns associated with investment cycles?

Comment II: Existing work on investment spikes

- Fishman & Jovanovic (2021): also show that the 'switching off' of capital generates investment spikes
- Do not study leverage.
- How does your model differ from theirs?

Comment III: Alternative mechanisms

- Empirically how can we distinguish this mechanism from alternatives?
 - Fostel & Geanakoplos (2008), Geanakoplos (2010) – differences in beliefs in GE
- Important to know drivers of leverage changes if we want to use policy to change the cycle
- Look at asset pricing data to distinguish mechanism from alternatives – back to Comment I

Comment IV: Should we do anything about cycles?

- Monetary policy: could changing r via policy change the investment and or debt cycles?
- Macroprudential policy: could constraining firms financial policies change the debt cycle?
- Fiscal policy: could taxation or government spending change the investment cycle?
- Should the focus of policy be on investment spikes or leverage?
- What would the aggregate effects be?

Comment V: Applications

- The sudden death of productive capacity could be used to study several scenarios
 - Climate change: floods switch off productive capacity and many areas of the world get flooded quite frequently
 - Agricultural societies: weather cycles can create cycles where farm animals are killed and crops are destroyed

Conclusion

- Clear model with important implications
- Need to distinguish from alternative mechanisms – asset prices could be useful here
- Follow up work: policy and climate