

A discussion of
“Collateral, Financial Intermediation, and the
Distribution of Debt Capacity”
by Adriano Rampini and S. Viswanathan

Amil Dasgupta

London School of Economics and CEPR

June 2008

First Annual Conference of the Woolley Centre

goals

- ▶ Careful model of (endogenously) *collateral-constrained lending* in a *production economy* with *heterogeneous firms* in which a *temporary economic downturn* (state with low cash flows and cheap capital) is possible.
- ▶ Study four questions:
 1. Which firms are “conservative” (= conserve debt capacity)
 2. Which firms expand and which firms contract during the downturn
 3. Investment efficiency in the downturn
 4. The impact of financial intermediaries (= expert collateralizers) in such an economy.

results

1. Ex ante: More productive firms fully utilize debt capacity; less productive firms hoard debt capacity.
2. In the downturn: More productive firms contract; Less productive firms expand.
3. In the downturn: Investment capital becomes concentrated in the hands of less productive firms.
4. Financial intermediation can make things worse (discussed later).

the model

- ▶ Time: $t = 0, 1, 2$.
- ▶ Two goods: cash and capital
- ▶ Exogenous cash-price of capital:

$$\phi_0 \quad \begin{matrix} \pi(H) & \phi_1(H) \\ 1 - \pi(H) & \phi_1(L) \end{matrix} \quad \phi_2$$

- ▶ Technology: k units of capital invested at t , yields $A_{t+1}(s)k$ cash + $(1 - \delta)k$ capital at $t + 1$.
- ▶ Firms:
 - ▶ Endowment: w_0 cash.
 - ▶ Utility: Expected total cash at $t = 2$.
 - ▶ Types: $\theta = g$ or b , which $A_t^g(s) > A_t^b(s)$.
- ▶ Economic downturn: $A_1^\theta(H) > A_1^\theta(L)$, $\phi_1(H) > \phi_1(L)$

the “autarky” case – an example

- ▶ The paper augments the model just presented by introducing (endogenously) collateralized state-contingent lending.
- ▶ One way to understand the main results: (a) shut down lending altogether; (b) solve model (c) see how results change with state-contingent collateralized lending.
- ▶ So, assume: No borrowing or lending. Cash can be costlessly stored. Capital can't be stored.

- ▶ Pick some parameter values: Capital prices:

$$\phi_0 = 1 \quad \begin{array}{l} \pi(H) = \frac{1}{2} \\ 1 - \pi(H) = \frac{1}{2} \end{array} \quad \begin{array}{l} \phi_1(H) = 2 \\ \phi_1(L) = \frac{1}{2} \end{array} \quad \phi_2 = 1$$

- ▶ Good firm productivity: $A_1^g(H) = 6$ $A_1^g(L) = \frac{1}{3}$ $A_2^g = 4$
- ▶ Bad firm productivity: $A_1^b(H) = 2$ $A_1^b(L) = 0$ $A_2^b = 2$
- ▶ $\delta = 1$; $w_0 = 1$.

firms' choices

- ▶ Risk-neutrality: invest whole endowment at $t = 0$ or invest nothing and wait until $t = 1$.
- ▶ Good firm ($\theta = g$):
 - ▶ Invest everything at $t = 0$: $\frac{1}{2} \left(\frac{6}{2} \right) 4 + \frac{1}{2} \left(\frac{1/3}{1/2} \right) 4 = \frac{22}{3} > 7$
 - ▶ Wait and invest at $t = 1$: $\frac{1}{2} \left(\frac{1}{2} \right) 4 + \frac{1}{2} \left(\frac{1}{1/2} \right) 4 = 5$
 - ▶ Decision: Invest everything at $t = 0$.
- ▶ Bad firm ($\theta = b$):
 - ▶ Invest everything at $t = 0$: $\frac{1}{2} \left(\frac{2}{2} \right) 2 + \frac{1}{2} \left(\frac{0}{1/2} \right) 2 = 1$
 - ▶ Wait and invest at $t = 1$: $\frac{1}{2} \left(\frac{1}{2} \right) 2 + \frac{1}{2} \left(\frac{1}{1/2} \right) 2 = \frac{5}{2} > 2$
 - ▶ Decision: Do not invest at $t = 0$; wait and invest later.

conclusions from autarky example

1. Ex ante: More productive firms fully utilize investment capacity; less productive firms hoard investment capacity.
2. In the downturn: More productive firms contract ($k_0^g = 1$; $k_1^g(L) = \frac{1/3}{1/2} = \frac{2}{3}$); Less productive firms expand ($k_0^b = 0$; $k_1^b(L) = \frac{1}{1/2} = 2$).
3. In the downturn: Investment capital becomes concentrated in the hands of less productive firms.

conclusions from autarky example

1. Ex ante: More productive firms fully utilize **investment** capacity; less productive firms hoard **investment** capacity.
2. In the downturn: More productive firms contract ($k_0^g = 1$; $k_1^g(L) = \frac{1/3}{1/2} = \frac{2}{3}$); Less productive firms expand ($k_0^b = 0$; $k_1^b(L) = \frac{1}{1/2} = 2$).
3. In the downturn: Investment capital becomes concentrated in the hands of less productive firms.

now introduce collateralized state-contingent lending

- ▶ Introduce RN+competitive investors who lend/borrow at exogenous rate R in a state-contingent manner.
- ▶ Borrowing subject to collateral constraint \Rightarrow borrowing limit = multiple of net worth.

now introduce collateralized state-contingent lending

- ▶ Introduce RN+competitive investors who lend/borrow at exogenous rate R in a state-contingent manner.
- ▶ Borrowing subject to collateral constraint \Rightarrow borrowing limit = multiple of net worth.
- ▶ How does this change the conclusions of the previous slide?

now introduce collateralized state-contingent lending

- ▶ Introduce RN+competitive investors who lend/borrow at exogenous rate R in a state-contingent manner.
- ▶ Borrowing subject to collateral constraint \Rightarrow borrowing limit = multiple of net worth.
- ▶ How does this change the conclusions of the previous slide?
 1. *Productive firms invest early; unproductive firms wait:*
“**Unchanged**”. Replace investment capacity (endowment) by debt capacity (multiple of net worth). Productive (unproductive) firms exhaust (conserve) debt capacity.

now introduce collateralized state-contingent lending

- ▶ Introduce RN+competitive investors who lend/borrow at exogenous rate R in a state-contingent manner.
- ▶ Borrowing subject to collateral constraint \Rightarrow borrowing limit = multiple of net worth.
- ▶ How does this change the conclusions of the previous slide?
 1. *Productive firms invest early; unproductive firms wait:* **“Unchanged”**. Replace investment capacity (endowment) by debt capacity (multiple of net worth). Productive (unproductive) firms exhaust (conserve) debt capacity.
 2. *Productive firms contract during downturns:* **“Unchanged”**. Replace endowment by debt capacity; *relative* investment unchanged.

now introduce collateralized state-contingent lending

- ▶ Introduce RN+competitive investors who lend/borrow at exogenous rate R in a state-contingent manner.
- ▶ Borrowing subject to collateral constraint \Rightarrow borrowing limit = multiple of net worth.
- ▶ How does this change the conclusions of the previous slide?
 1. *Productive firms invest early; unproductive firms wait*: **“Unchanged”**. Replace investment capacity (endowment) by debt capacity (multiple of net worth). Productive (unproductive) firms exhaust (conserve) debt capacity.
 2. *Productive firms contract during downturns*: **“Unchanged”**. Replace endowment by debt capacity; *relative* investment unchanged.
 3. *Capital unproductively deployed during downturn*: **“Gets worse”**. *Risk neutral* low quality firms move *all* resources to economic downturn state, via state contingent markets \Rightarrow makes average quality of investment all the worse!

comments

- ▶ Nice, clean, mechanism.
- ▶ In addition to these results: implications for risk-management “puzzle”:
 - ▶ Froot, Scharfstein, and Stein (1993) and related literature: “more constrained” firms should hedge more.
 - ▶ But large, presumably less constrained, firms seem to hedge more in practice.
 - ▶ This paper: more constrained = more productive, and more productive firms hedge less!

some thoughts

1. Price of capital

- ▶ Endogenize? [macro model...]
- ▶ Function of distribution of firm types?
- ▶ Rich potential set of effects: do they enhance or detract from the results?

2. Welfare

- ▶ What is “bad” about equilibrium outcomes in the downturn state?
- ▶ How does this relate to what we think happens in economic downturns?

3. Do unproductive firms really expand in economic downturns?

more thoughts: collateralized lending mechanism

- ▶ Borrowers can abscond with *all* cash + $1 - \delta$ capital + cannot be excluded from further intertemporal borrowing.
- ▶ All cash + $1 - \delta$ capital \Rightarrow collateral constraints not type dependent (also \Rightarrow constrained firms \equiv productive firms).
- ▶ If lenders could seize *some* cash flows, constraints would be type dependent. Productive borrowers could borrow more...
- ▶ Lack of intertemporal punishment... replace with “lemons” penalty: can move to new market, but will be treated as average borrower.
- ▶ Combination: disincentive for good borrowers to abscond – expands their debt capacity. incentive for bad borrowers to abscond: reduces their debt capacity.
- ▶ A trace of risk-aversion.... potentially even richer conclusions.

intermediation: summary and comments

- ▶ Intermediaries → collateralization experts → increase borrowing capacity → lend to constrained (productive) firms.
- ▶ In low state intermediary capital scarce → spread between intermediated loans and direct loans → adverse impact on constrained borrowers.
- ▶ In Holmstrom-Tirole (1997) intermediary capital declines exogenously... here intermediary capital becomes scarce endogenously, in an economic downturn.
- ▶ Assumption 4: “net lending positive only in downturn” ... sufficient for increased spreads in economic downturns... characterize in terms of primitives?
- ▶ Is the maximum scale of investment assumed in this section really necessary for the results?