How labor market frictions affect capital structure

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How does labor market frictions affect capital structure?

- Modigliani Miller 1958

  Why does capital structure matter at all?

  Bankruptcy costs can be high(er) after accounting for stakeholders who might not be (fully) represented at the bargaining table.
- A firm's labor force is one such under-represented entity.
- **This paper:** How does adding capital structure to a workhorse labor market search model affect capital structure decisions?

What we do

- Highlight empirical findings in the literature that call for the models we present.
- Present a simple three period model to highlight the channels.
- Present a fully dynamic model and do something...

Main channels

- Absent any search frictions, owners of production utilize optimal quantities of debt.
- With labor market frictions, the firm partners with a risk averse worker who potentially has the option to quit the partnership.
- While this quitting in a partial equilibrium setting benefits workers ex-post, it leads to less entry, less-than-optimal debt use, lower equilibrium wages and ex-ante lower value to workers.

Literature

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Empirical observations

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Model without Labor Market Frictions

- Debt is riskless. Borrows pay interest rate r and return all borrowed capital.
- A single agent with initial wealth chooses debt to maximize payoffs in two periods. The output in the first period must be weakly positive.

$$\max_{D} \mathbb{E}u(c_1) + \beta\mathbb{E}u(c_2)$$

- where

$$c_t(\phi_t) = \phi_t(W + D)^\gamma - rD$$

is some decreasing returns production function. Productivity shock $\phi_t \in U[0,1]$ and $c_2 = b$ for sure if $c_1 < 0$.

Model without Labor Market Frictions: Solution

- In this setup the optimal choice for debt D is defined by

$$ads$$

where the trade-off is between producing a positive quantity in the second period in order to obtain a chance at producing in the last period where the minimum level of production is b.

Model without Labor Market Frictions: Solution

- The first order condition from earlier yields

$$ads$$

where we how the incompleteness of markets drives a wedge in the typical solution for equation the expected return of capital to the interest rate r.

- Finally, note here that the owner of the firm can be the worker or the firm in a setting with both agents.

Labor Market Frictions with Capital Structure

Next, we consider how labor market frictions affects debt choice.

- Mortensen and Pissarides style search frictions.
- Entrepreneurs/firms own wealth W and borrow at rate r. Debt is riskless.
- Debt choice is made before entry. No new debt or equity.
- Wage contracts are specified by *unconstrained wages*, $\tilde{w}$.
- $\tilde{w}$ is restricted to be identical in both periods.
- Perfect commitment assumed.
- No storage technology.

Timing

1. **Period 0.** Firms with wealth, W choose debt D and enter.
   - All workers are unemployed.
   - Firm's post wage contracts, matching occurs.
   - Unmatched firms exit immediately.
2. **Period 1.** Draw productivity ϕ_1.
   - If output is weakly negative, match is broken. Firm exits.
   - Production $+$ consumption occurs.
   - Unmatched workers consume b.
3. **Period 2.** Draw roductivity ϕ_2.
   - Separation if output is below b.
   - Production $+$ consumption occurs.
   - Unmatched workers consume b.

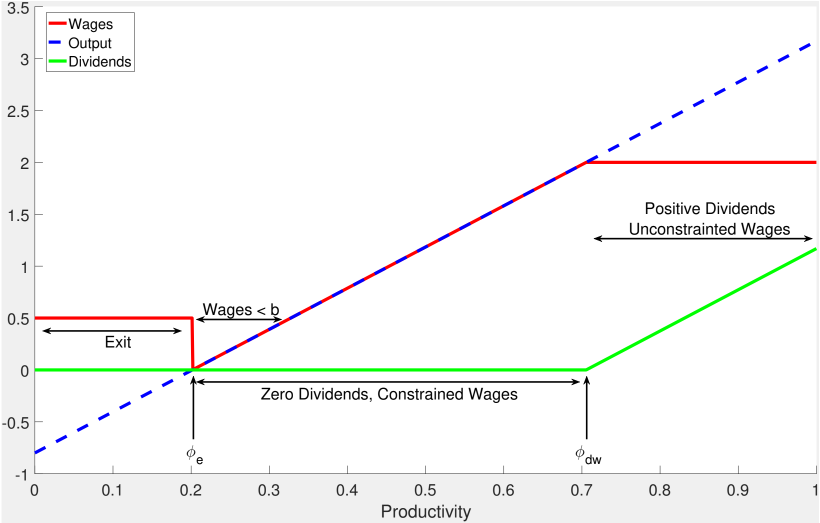
Period production

- Period output is given by

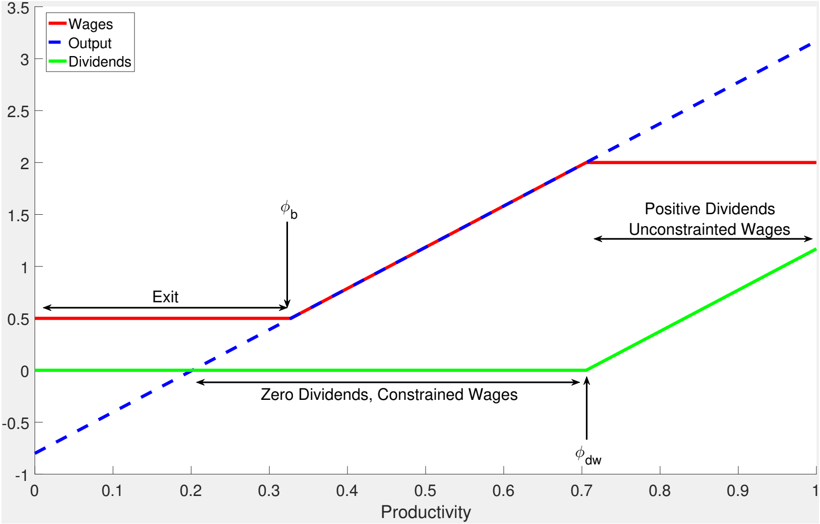
$$\phi_t(W + D)^\gamma - Dr$$

- If period output is negative, exit occurs.
- If output exceeds $\tilde{w}$, workers are paid $\tilde{w}$.
- Dividends are positive iff $(W + D)^\gamma - Dr \geq \tilde{w}$
- Don't worry, we have pictures.

Period 1 Wages



Period 2 Wages



Promised Value of a Contract

- $E(\tilde{w})$ is the promised value of contract $\tilde{w}$.

$$
\begin{aligned}
E(\tilde{w}) &= \underbrace{\phi_e(1+\beta)u(b)}_{f(\phi_1)<0,\ \text{exit}} \\
&+ \underbrace{\int_{\phi_e}^{\phi_{dw}} f(\phi_t)d\phi}_{\text{wage = output, zero div.}} + \underbrace{\int_{\phi_{dw}}^{1} \tilde{w}d\phi}_{\text{wage} = \tilde{w}\text{, positive div.}} \\
&+ (1-\phi_e)\underbrace{\left(\phi_b u(b) + \int_{\phi_b}^{\phi_{dw}} f(\phi_t)d\phi + \int_{\phi_{dw}}^{1} \tilde{w}d\phi\right)}_{\text{final period wages}}
\end{aligned}
$$

where ϕ_e, ϕ_b and $\phi_d w$ are the cutoffs seen earlier.

Worker's Problem

- $\theta(\tilde{w})$ is market tightness for a given contract
- $p(\theta(\tilde{w})) = m(\theta(\tilde{w}))/s$ is job finding probability
- $$U = \max_{\tilde{w}} \underbrace{p(\theta(\tilde{w}))E(\tilde{w})}_{\text{indifference condition}}$$

Expected Profits of a Contract

- $V(\tilde{w})$ is the value of contract $\tilde{w}$ taking debt as given

$$
\begin{aligned}
V(\tilde{w}) &= \underbrace{\phi_e(1+\beta)\cdot 0}_{f(\phi_1)<0,\text{ exit}} \\
&+ \underbrace{\int_{\phi_e}^{\phi_{dw}} 0\; d\phi}_{\text{wage = output, zero div.}} + \underbrace{\int_{\phi_{dw}}^{1} f(\phi_1) - \tilde{w}\; d\phi}_{\text{wage} = \tilde{w}\text{, positive div.}} \\
&+ (1-\phi_e)\underbrace{\left(\phi_b\cdot 0 + \int_{\phi_b}^{\phi_{dw}} 0\; d\phi + \int_{\phi_{dw}}^{1} f(\phi_2) - \tilde{w}\; d\phi\right)}_{\text{final period wages}}
\end{aligned}
$$

where ϕ_e, ϕ_b and $\phi_d w$ are the cutoffs seen earlier.

Firms's Problem

- $q(\theta(\tilde{w})) = m(\theta(\tilde{w}))/v$ is vacancy filling probability

$$W = \max_{\tilde{w};D} \underbrace{q(\theta(\tilde{w}))V(\tilde{w};D)}_{\text{indifference condition}}$$

- Optimal debt choice will involve firms choosing debt and posting the corresponding profit maximizing contract $\tilde{w}$ which maximizes ex-ante value, U for workers.

Results: Wages

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Results: Entry

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Results: Ex-ante Value of Unemployment

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Results: Profits condition on Matching

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Dynamic Model with Labor Market Frictions

Conclusion

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