Do Creditor Rights Increase Employment Risk? Evidence from Loan Covenants

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Main Questions

- Does finance play a role in firm-level employment decisions?
  - Counter-cyclicality of external financing (Bernanke and Gertler (1995)) could suggest that finance will amplify variation in employment at aggregate level.
- How do increased financial constraints adversely impact labor?

Literature

Large literature on investment and financial constraints:

- Fazzari, Hubbard and Petersen (1988), Poterba (1988), Baker, Wurgler and Stein (2003), Calomiris and Hubbard (1995), Gilchrist and Himmelberg (1995), Hall (1992), Hoshi, Kashyap and Scharfstein (1991), Kaplan and Zingales (1997), Kashyap, Lamont and Stein (1994), Ramirez (1995), Rauh (2006), Whited (1992).

Less about employment and financial constraints:

- Calomiris, Orphanides and Sharpe (1994), Sharpe (1994), Benmelech, Bergman and Enriquez (2012), Benmelech, Bergman and Seru (2015)
- More evidence is accumulating - the paper under review is an excellent addition.

From the Abstract

Financial Contracts that mitigate conflicts between firms and their creditors have a large impact on employees. Using a regression discontinuity design, we provide evidence that there are sharp and substantial employment cuts following loan covenant violations, where creditors gain rights to accelerate, restructure, or terminate a loan...Our analysis identifies a specific channel - loan covenants - through which financing frictions impact employment and offers direct evidence that binding financial contracts are an amplification mechanism of economic downturns.

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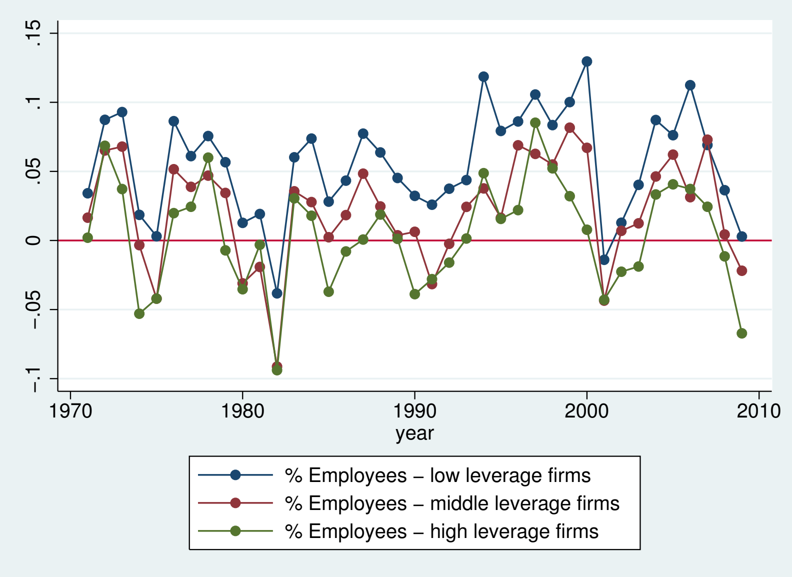
Future Directions

- What is the difference between labor and capital?
- Related to the previous question - what is the nature of the different interactions between labor, capital and financial frictions?
    - Do financial frictions operate differently for labor and capital?

Employment changes stratified by leverage



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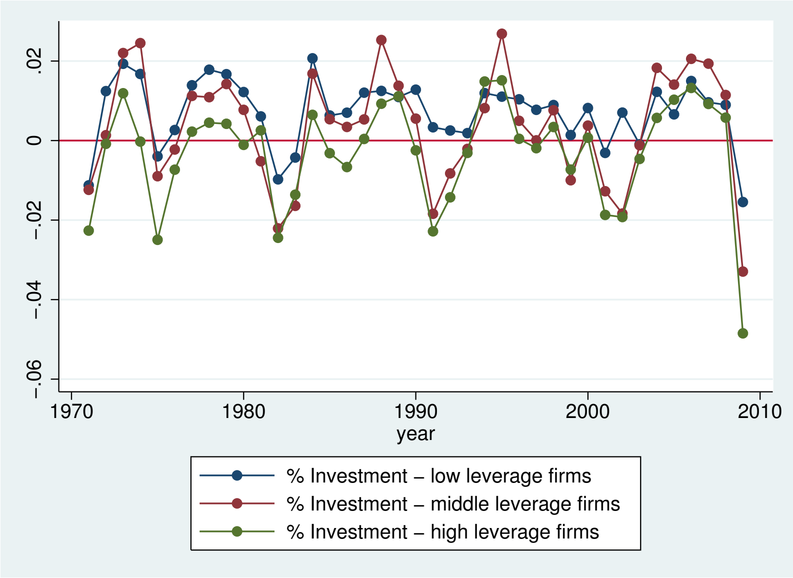


A Simple Model

- Adjustment costs make factor adjustment costly
- Labor adjustment is less costly than capital
  - assets tend to be firm specific
  - takes time to build
  - too costly to sell
  - human capital more adjustable (Ramey and Shapiro (2001))
- In essence the only difference between labor and capital is the degree of adjustment costs
- Adjustment costs make labor more sensitive to economic conditions even in a perfect market

Model Setup -1-

- Kaplan Zingales (1997) setting with capital and labor
- Firm has preexisting, exogenously given stock of K_0 units of capital and L_0 units of labor, with preexisting wealth W
- Firm must decide on the level of capital and labor it will employ to produce output, $F(K_0 + I_1, L_1)$
- Firm can raise external finance $e = I_1 + L_1 - W$ at a cost of $\frac{1}{2}\theta e^2$
- Faces adjustment costs in capital and labor given by $\frac{1}{2}\mu_K I_1^2$ and $\frac{1}{2}\mu_L(L_1 - L_0)^2$
    - Following prior literature, assume $\mu_L < \mu_K$ (see e.g. Hamermesh and Pfann (1996) and Hall (2002))

Model Setup -2-

- Firm faces a static one-period problem in which it maximizes:

$$\max_{I_1, L_1} F(K_0 + I_1, L_1) - I_1 - L_1 - \frac{1}{2}\theta e^2 - \frac{1}{2}\mu_K I_1^2 - \frac{1}{2}\mu_L (L_1 - L_0)^2$$

where $I_1 + L_1 \leq w + e$

- Assuming firm raises external finance at optimum, FOC is:

$$\partial I_1 : F_K(K_0 + I_1^*, L_1^*) - 1 - \theta(I_1^* + L_1^* - W) - \mu_K I_1^* = 0$$
$$\partial L_1 : F_L(K_0 + I_1^*, L_1^*) - 1 - \theta(I_1^* + L_1^* - W) - \mu_L(L_1^* - L_0) = 0.$$

- Standard question: How do capital and labor shift with W?
- Differentiating FOC with respect to W obtain:

$$\mathbf{H}\begin{pmatrix} \frac{\partial I_1^*}{\partial W} \\ \frac{\partial L_1^*}{\partial W} \end{pmatrix} = -\theta \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\textit{where } \mathbf{H} = \begin{pmatrix} F_{KK}^* - \theta - \mu_K & F_{KL}^* - \theta \\ F_{KL}^* - \theta & F_{LL}^* - \theta - \mu_L \end{pmatrix}$$

- $\mathbf{H}$ is the Hessian of F.
- Inverting gives:

$$\begin{pmatrix} \frac{\partial I_1^*}{\partial W} \\ \frac{\partial L_1^*}{\partial W} \end{pmatrix} = -\frac{\theta}{\Delta} \begin{pmatrix} F_{LL}^* - \mu_L - F_{KL}^* \\ F_{KK}^* - \mu_K - F_{KL}^* \end{pmatrix}$$

$$\textit{where } \Delta = \det(\mathbf{H})$$

Investment and Labor Behavior -2-

- **Proposition 1** If firm raises a strictly positive amount of external finance, then $\frac{\partial I_1^*}{\partial W} > 0$ and $\frac{\partial L_1^*}{\partial W} > 0$.
  - Completely standard: Increased wealth relaxes financial constraints and increases both investment and labor.

Investment and Labor Behavior -3-

- **Proposition 2** If firm raises a strictly positive amount of external finance then
  1. $\frac{\partial I_1^*}{\partial \theta} < 0$ and $\frac{\partial L_1^*}{\partial \theta} < 0$
  2. $sign(\frac{\partial L_1^*}{\partial \mu_L}) = sign(L_0 - L_1^*)$ and $sign(\frac{\partial I_1^*}{\partial \mu_L}) = sign[(L_1^* - L_0)(\theta - F_{KL}^*)]$
- Comparative static w.r.t. to θ is standard: investment and labor decreasing in cost of external finance

Investment and Labor Behavior -4-

- Consider comparative static w.r.t μ_L:
  - $sign(\frac{\partial L_1^*}{\partial \mu_L}) = sign(L_0 - L_1^*)$ and $sign(\frac{\partial I_1^*}{\partial \mu_L}) = sign[(L_1^* - L_0)(\theta - F_{KL}^*)]$
- $\frac{\partial L_1^*}{\partial \mu_L}$: If at optimum firm reduces labor ($L_1^* < L_0$), higher adjustment costs will *increase* labor L_1^*.
- $\frac{\partial I_1^*}{\partial \mu_L}$: Consider case where $F_{KL}^* = 0$ and assume $L_1^* < L_0$.
  - As μ_L increases, optimal labor L_1^* increases, making marginal external financing more costly. Hence investment drops.
  - If $F_{KL}^* > 0$, increase in labor will increase marginal return of capital.
    - Two opposing effects on investment: increased cost of external finance vs. increased productivity due to complementarities.
    - $\theta - F_{KL}^*$ in proposition.

Does Labor merely adjust to changes in Capital?

Financial constraints may adversely impact labor *regardless* of whether labor needs to be financed (through F^*_{KL})

- Labor expenditures must be financed:
  1. Kaplan Zingales (1997) model with labor as additional input
  2. Firm must raise capital to make debt payment: firing workers more efficient source of funding than selling capital at fire-sale prices

- Labor expenditures are not financed:
  1. The need to finance losses during a downturn will lead to contraction in employment
  2. Need to finance investment will lead to employment cuts due to complementarities between K and L.

Relative Sensitivity of Capital and Labor to Wealth

- Define relative sensitivity of capital and labor to wealth:

$$r := \frac{\frac{\partial L_1^*}{\partial W}}{\frac{\partial I_1^*}{\partial W}} = \frac{(F_{KK}^* - \mu_K) - F_{KL}^*}{(F_{LL}^* - \mu_L) - F_{KL}^*},$$

- Labor more sensitive to wealth than capital when

$$F_{LL}^* - F_{KK}^* > \mu_L - \mu_K$$

- With no adjustment costs, this condition is $\left|F_{LL}^*\right| < \left|F_{KK}^*\right|$. Firm adjusts more on labor than capital margin when diminishing returns to labor are smaller than those to capital.

- Right hand side of inequality corrects for differential adjustment costs of labor and capital.

Financial Constraints and the Relative Sensitivity of Capital and Labor to Wealth

Consider how the relative sensitivity of labor and capital to wealth varies with the severity of financial constraints.

Proposition 4 The ratio of sensitivities is increasing in the severity of financial constraints, θ, when the matrix

$$\mathbf{C} = \begin{pmatrix} F^*_{KKK} - F^*_{KKL} & F^*_{KKL} - F^*_{KLL} \\ F^*_{KKL} - F^*_{KLL} & F^*_{KLL} - F^*_{LLL} \end{pmatrix}$$

is positive definite.

- As in Kaplan Zingales, third order derivatives appear (with cross partials as well)
- Consider $F^*_{KL} = 0$: C is positive definite when $F^*_{KKK} > 0$ and $F^*_{LLL} < 0$
  - r increases in θ when $\frac{\partial L_1^*}{\partial W}$ increases and $\frac{\partial I_1^*}{\partial W}$ decreases in θ.

Adjustment Costs and the Relative Sensitivity of Capital and Labor to Wealth

Comparative statics with respect to μ_L difficult to sign:

Proposition 5 For the ratio of wealth sensitivities $r = \frac{\partial L_1^*}{\partial W} / \frac{\partial I_1^*}{\partial W}$:

$$sign\left(\frac{\partial r}{\partial \mu_L}\right) = sign[\begin{pmatrix} 1 \\ 1 \end{pmatrix}^T \mathbf{H}^{-1}\mathbf{C}'\mathbf{H}^{-1}\begin{pmatrix} 0 \\ L_1^* - L_0 \end{pmatrix} + \begin{pmatrix} 1 \\ 1 \end{pmatrix}^T \mathbf{H}^{-1}\begin{pmatrix} 0 \\ 1 \end{pmatrix}].$$

For case of no complementarity between labor and capital, if $\mathbf{C}$ is positive definite then $sign\left(\frac{dr}{d\mu_L}\right) = sign(L_1^* - L_0)$.

- If $L_1^* < L_0$: Increases in μ_L increase L_1^* and are hence similar to reductions in cost of external finance, θ. Following Proposition 4, when $\mathbf{C}$ is positive definite, increases in labor adjustment costs will reduce r.

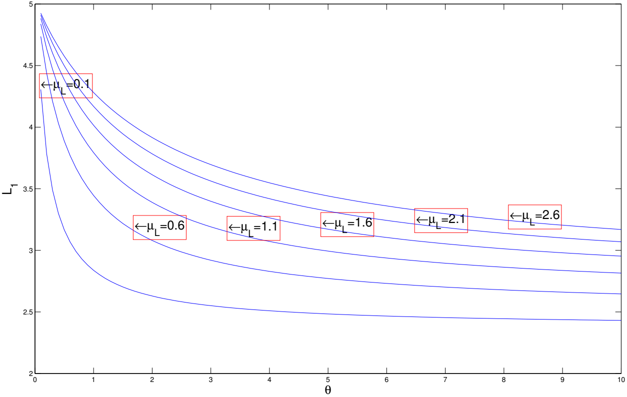
Cobb-Douglas Production

Assume that production is given by $F(K, L) = AK^{\alpha}L^{\beta}$.

- **Proposition 6** If production is labor intensive in that $\beta \geq \alpha$, then for sufficiently small μ_L, we have that $\frac{\partial L_1^*}{\partial W} > \frac{\partial I_1^*}{\partial W}$.
- **Proposition 7** Assume that production is Cobb-Douglas. The matrix **C** in Proposition 4 is neither positive nor negative definite. Hence the sign of $\frac{\partial r}{\partial \theta}$ depends on parameter values.

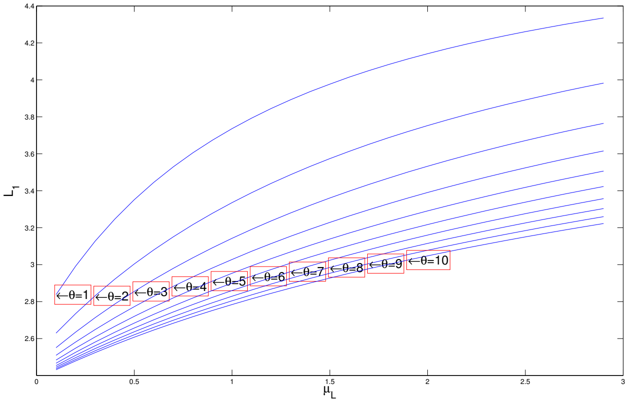
Since cannot sign comparative statics analytically, show numerical comparative statics.

Cobb-Douglas Production: Labor



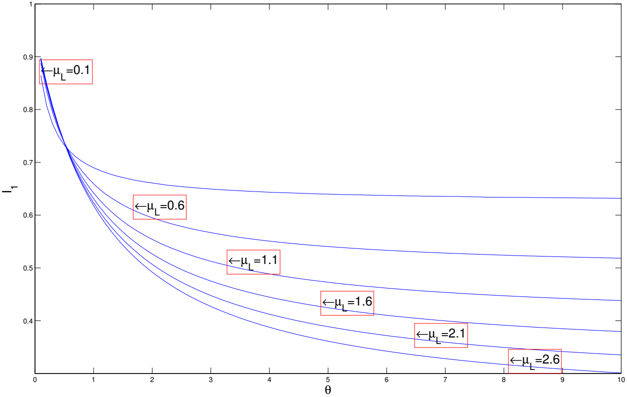
- L_1^* is decreasing in θ

Cobb-Douglas Production: Labor



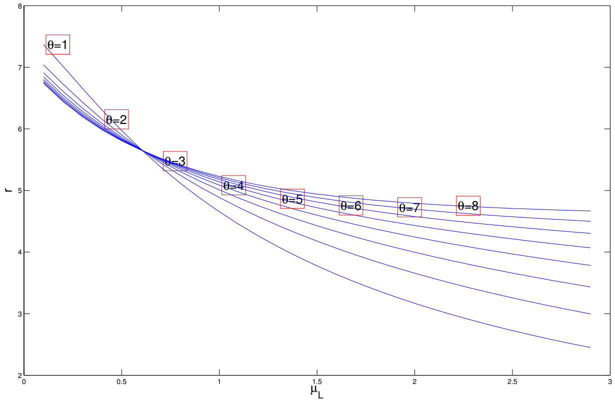
- L_1^* is increasing in μ_L

Cobb-Douglas Production: Capital



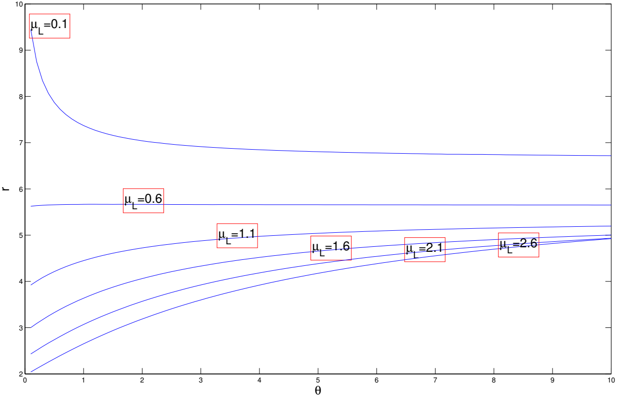
- l_1^* is decreasing in θ

Cobb-Douglas Production: Capital



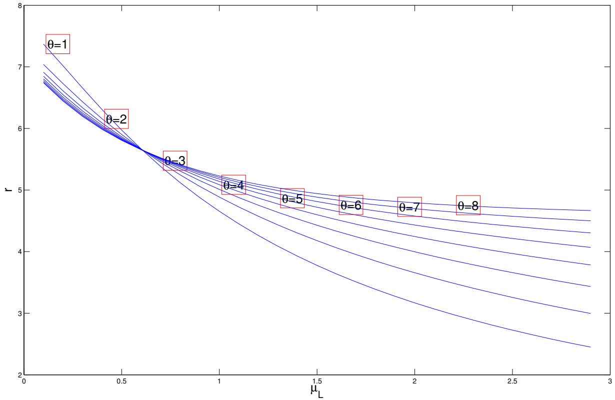
- I_1^* is increasing in μ_L for low θ: complementarity effect dominates external finance effect
- I_1^* is decreasing in μ_L for non-low θ: complementarity effect dominated by external finance effect

Relative Sensitivities of Capital and Labor to Wealth



- r is decreasing in θ for μ_L low and is otherwise increasing in θ.
- Financial constraints amplify r for non-low values of μ_L

Relative Sensitivities of Capital and Labor to Wealth



- r is decreasing in μ_L: as labor adjustment costs increase, labor sensitivity to wealth decreases relative to capital sensitivity to wealth

What's Next

- Literature should try to understand the fundamental difference between labor and capital and its interactions with financial frictions and debt.