Discussion of
"Household Debt Overhang and Human Capital Investment"
by Manso, Rivera, Wang, and Xia

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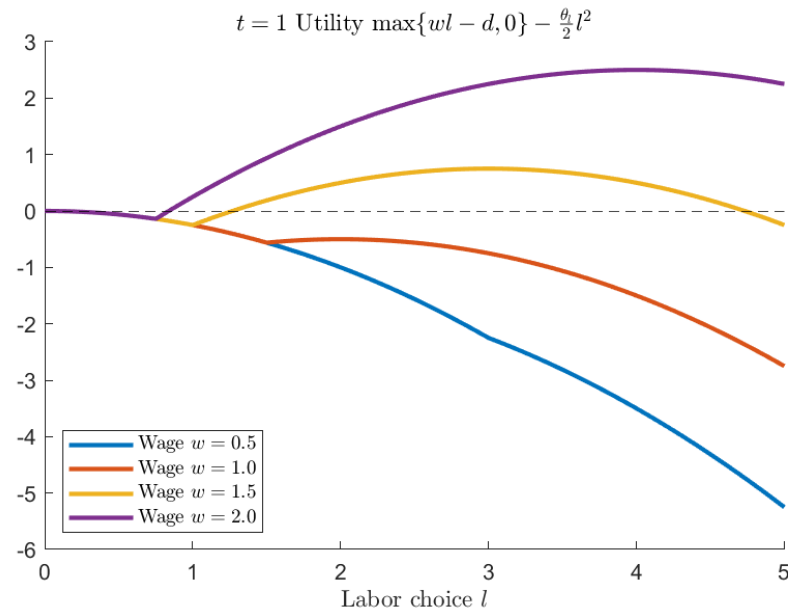ASU Sonoran Finance Conference| February 2023

Overview

- Prior Literature: indebted households may not want to supply labor if income will just go towards paying down the debt – debt overhang
- This paper
  - Households make another labor-related decision – investment in own human capital ("skills")
  - Unlike fin wealth (accumulated largely through earnings for most HHs), skills can't be seized by creditors. Not directly subject to debt overhang, but still exposed to it through future labor supply decisions.
- Model:
  - Skill acquisition and labor supply as functions of leverage
  - Comparative statics in skill depreciation, risk, labor/skill complementarity
- Empirical support using longitudinal survey data (NLSY79 1991-2014)
  - HH leverage instrumented by synthetic leverage ~ "housing market luck"
  - **HH** decision to undergo training **paid for by the employer** (i.e. leverage doesn't affect training decision through financial constraints)

Simple Model

- $t = 0, 1$ and one risk-neutral agent
- At $t = 0$, decides to invest a in own human capital at utility cost $\frac{\theta_a}{2} a^2$
  - Reason to invest? $t = 1$ wage is $w = \bar{w} + a + \epsilon$
- At $t = 1$,
  - ϵ shock is realized
  - Agent chooses how much labor l to supply at utility cost $\frac{\theta_l}{2} l^2$
  - Earns labor income $w\, l$ and makes (exogenous) debt payment d
  - Creditors can only seize labor income, so consumption is max$\{\, w\, l\, - d, 0\, \}$
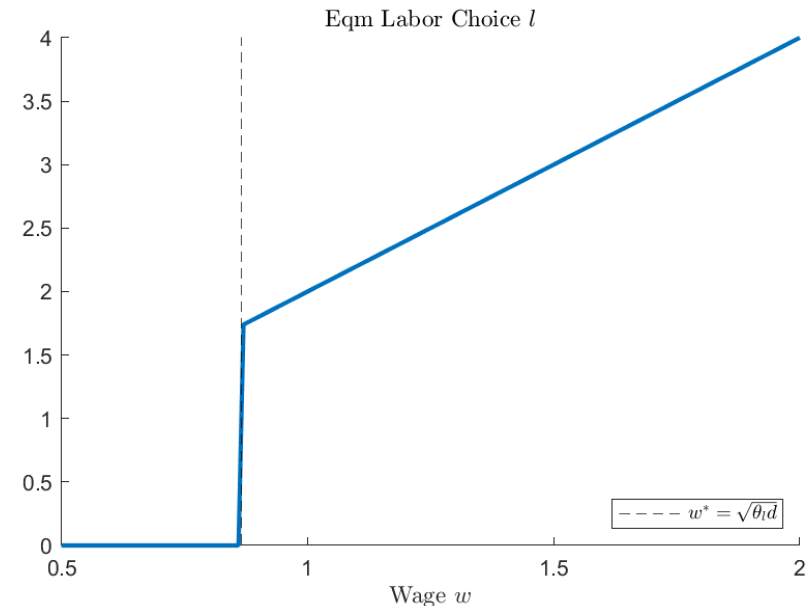- Agent's Problem

$$U = \max_{a, l(\epsilon)} \left\{ -\frac{\theta_a}{2} a^2 + E[(wl - d)^+ - \frac{\theta_l}{2} l^2] \right\}$$

Solve Backwards: $t = 1$ Labor Supply Choice

$t = 1$ Utility $\max\{wl - d, 0\} - \frac{\theta_l}{2}l^2$

Eqm Labor Choice l

$$(wl - d)^+ - \frac{\theta_l}{2}l^2$$

$$l = \begin{cases} 0, w \le \sqrt{\theta_l d} \\ \dfrac{w}{\theta_l}, w > \sqrt{\theta_l d} \end{cases}$$

Convex cost of labor supply vs. **initially zero** then positive consumption benefit

Debt Overhang: threshold wage for positive labor supply depends on debt
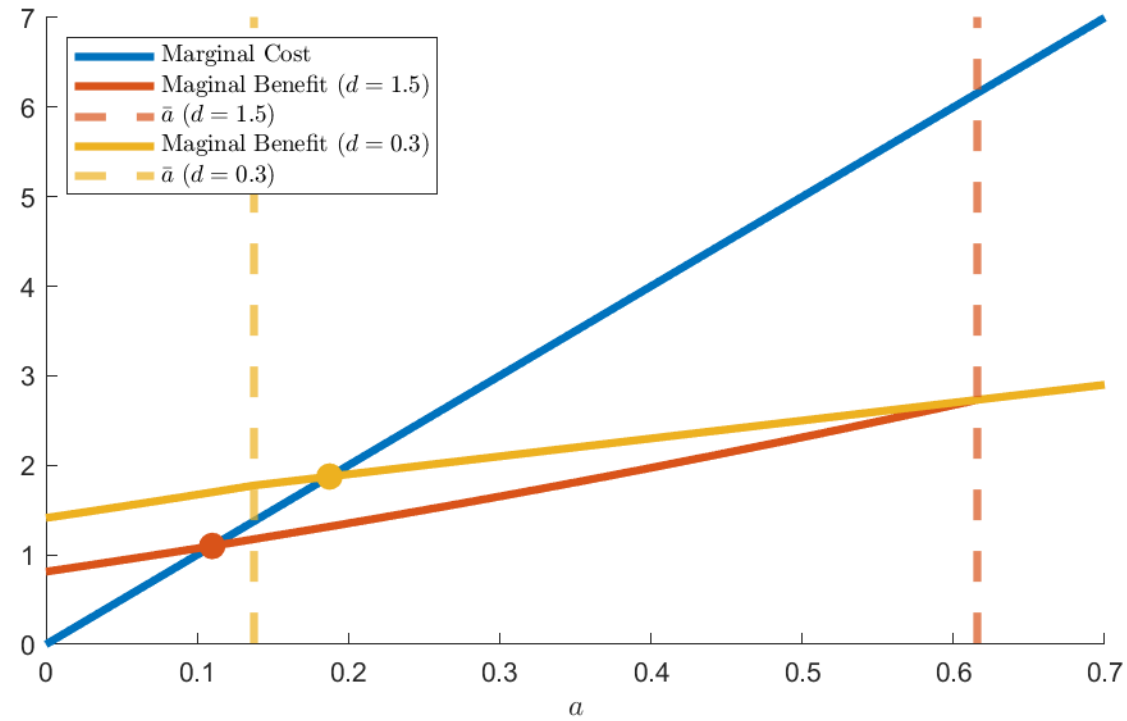
$t = 0$ Human Capital Investment Choice

- Marginal Cost: $MC(a) = \theta_a a$
- Marginal Benefit MB of higher $t = 1$ wages only accrues if the agent works i.e. only if $w > w^*$
  - Only if $\epsilon > \epsilon^*(a) \equiv w^* - \bar{w} - a$
- Assume $\epsilon \sim U_{[-\sigma,\sigma]}$. Then can show that
  - For high enough a, debt doesn't matter, and MB is just expected optimal labor supply $\frac{\bar{w}+a}{\theta_l}$
  - For low enough a, no chance of wages being high enough to justify working so MB is 0
  - In between, MB $= \frac{d}{da} \int_{\epsilon^*(a)}^{\sigma} w(a,e)l(e) \frac{de}{2\sigma} = \frac{1}{4\sigma}\left(\frac{(\bar{w}+a+\sigma)^2}{\theta_l} - d\right),$
    - Higher human capital additionally alleviates future debt overhang in labor supply → has convex marginal benefit
- Regions, interior MB depend on debt d:
  - human capital debt overhang ("back propagation" in the paper's terminology) even though unlike earnings human capital is inalienable
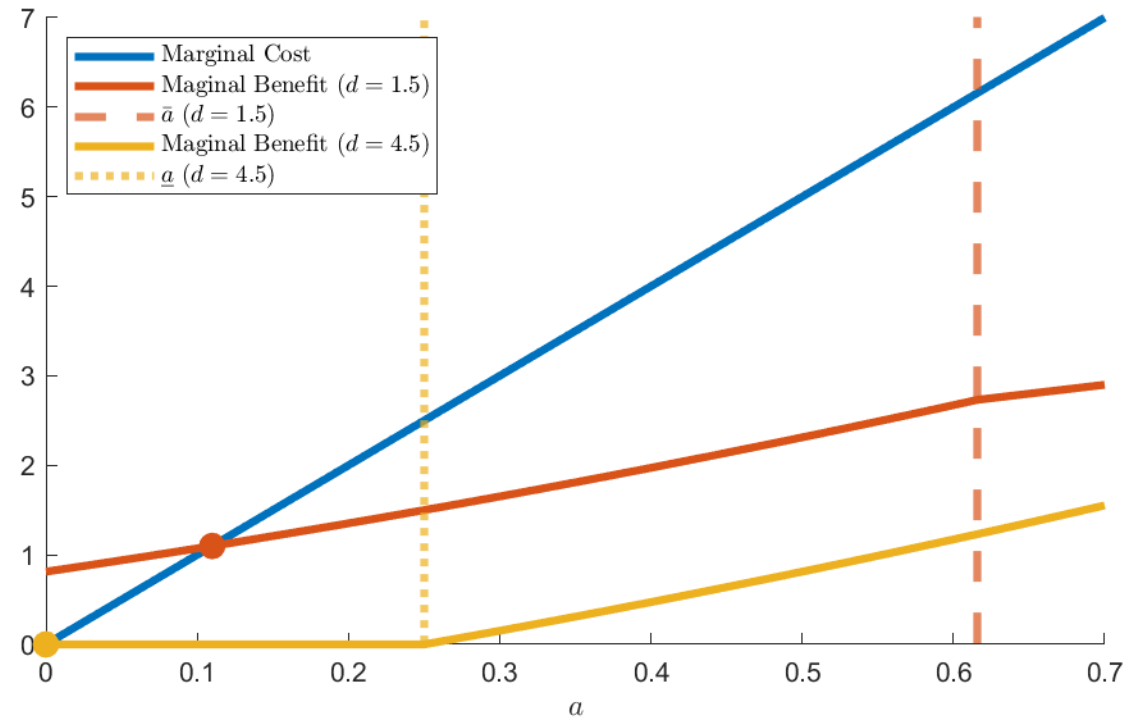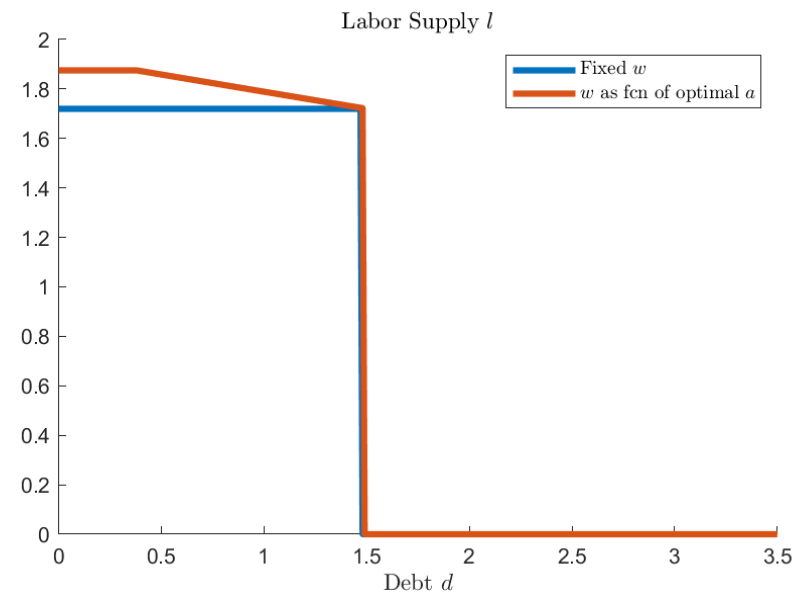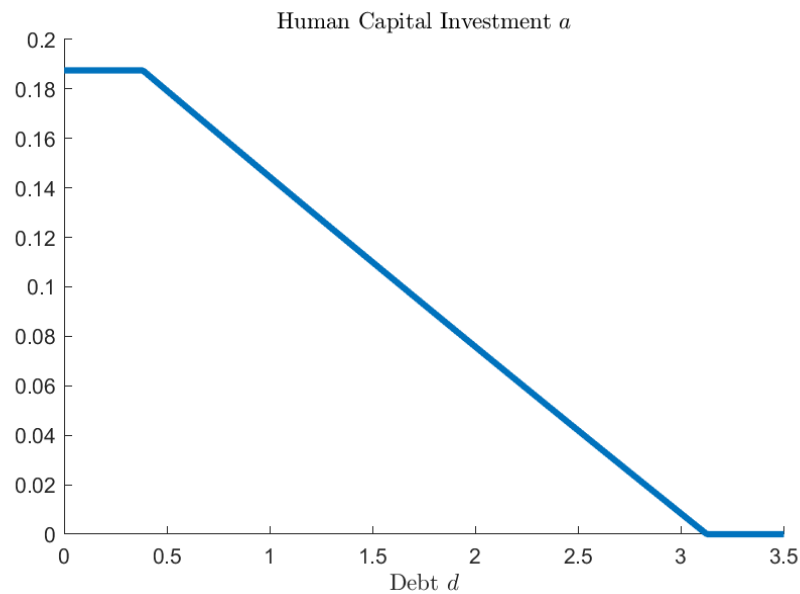
$t=0$ Human Capital Investment Choice
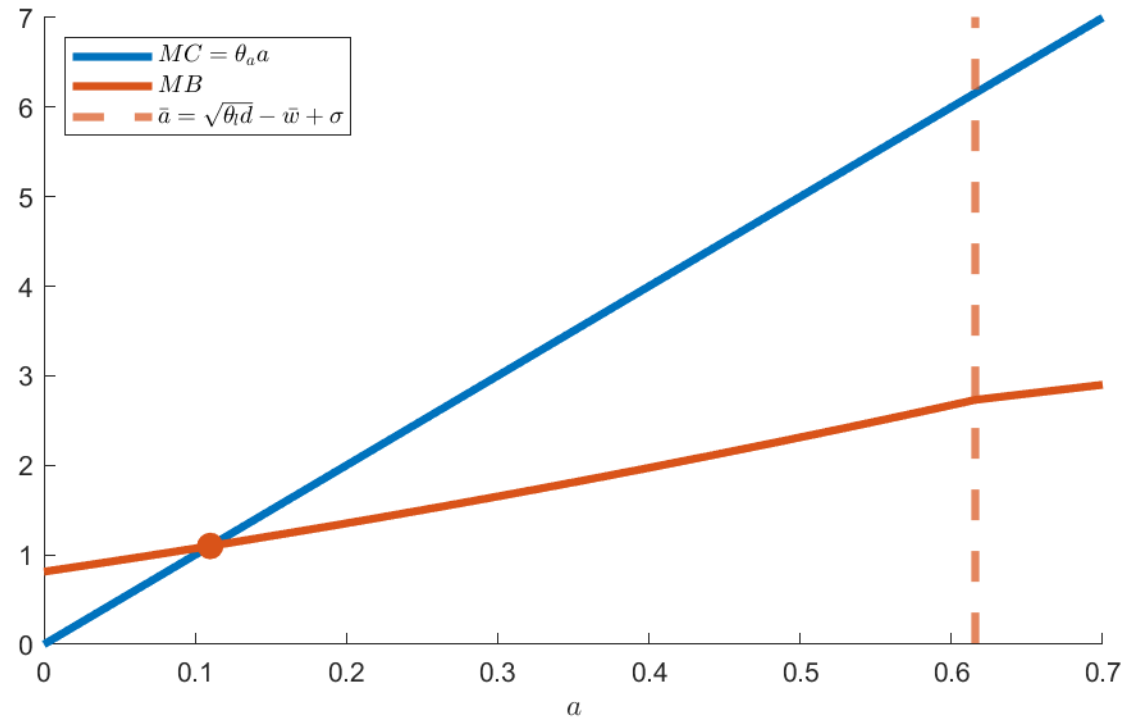
Effect of Lower Debt

Effect of Higher Debt

Human Capital Investment a

Labor Supply l

Two Kinds of Debt Overhang

- Inalienability of human capital + **risky returns** flatten the slope of human capital investment relative to labor supply.
  As σ approaches 0, both lines become vertical (plus multiple equilibria emerge…)

- "Back-propagation" effect on human capital also propagates forward to future labor supply

- Why no upward sloping portion? Constant marginal utility of consumption → no income effect i.e. no desire to work harder/invest more when consumption $w\,l - d$ is smaller

Theory Comments

- Key object in the model: labor demand curve
  - Many different ways to write down preferences over consumption and labor – rich macro literature on this
    - KPR, GHH, JR generalization, etc.
  - Here, separable: income effect exists, both EIS and Frisch elasticity matter
    - Frisch Elasticity = 1
    - EIS =1 → Income and substitution effects perfectly offset each other in autarky
    - Stark predictions! High income effect means that in equilibrium skills are largely a way to earn the same labor income by working less, rather than earning more by working the same
  - Alternatives lose tractability but likely affect predictions qualitatively
- Eternal autarky as penalty for default: harsh!

Theory Extension Idea: Agency Cost of Debt

- In my simple model, d is exogenous. In the paper (and in the data), its demand is not.
  - Supply still is – partial equilibrium model
- How does modeling debt overhang in human capital investment affect the debt market?
  - Lowers demand for debt: households anticipate lower labor income as marginal cost of borrowing
  - Increases default probability / lowers time to default τ
    - Increase credit spreads? Reduced access to credit markets?
    - Not in the model – rate r is fixed, does not depend on τ
  - (Outside this model) changes duration of credit risk
    - Under-investment in human capital $\rightarrow$ lower wages for a long time $\rightarrow$ higher default probability at longer horizons (relative to effect of under-provision of labor supply alone)
    - If risk-averse lenders prefer early resolution of uncertainty, source of risk premia

Taking Model to Data

- Model distinction is stark
  - Human capital: inalienable, long-term
  - Labor supply: can be garnished, static problem (except through complementarity with human capital investment)
- Less clear in the data: labor supply has many capital-like properties
  - Labor supply is difficult to adjust at high frequency
  - Labor supply can preserve human capital even if investment costs are non complementary
    - E.g. $K' = (1 - \rho)K + a + f(l)$
  - Largest category of debt for households are mortgages, which are non-recourse either de jure or typically de facto. Non-housing financial assets are probably safe, incentive to accumulate them through labor earnings still there
- Aggregate implications?
  - Leverage increases in bad times, when labor market most likely not to clear/to have slack
  - Eqm hours are determined by labor demand, fluctuations in labor supply don't matter

Empirical Strategy

- Compare 3 45yo content managers working in healthcare in Maricopa County, AZ in 2010
  - Alice bought her house in 1995
  - Maria bought her house in 2002
  - Janet bought her house in 2006
- Leverage effectively instrumented by purchase timing: Alice < Maria < Janet
  - Is it all luck/all exogenous?
- Maria goes for training, Alice and Janet don't
  - Is it because of leverage?

(A) Skills Acquisition

(B) Labor Supply

S&P/Case-Shiller AZ-Phoenix Home Price Index
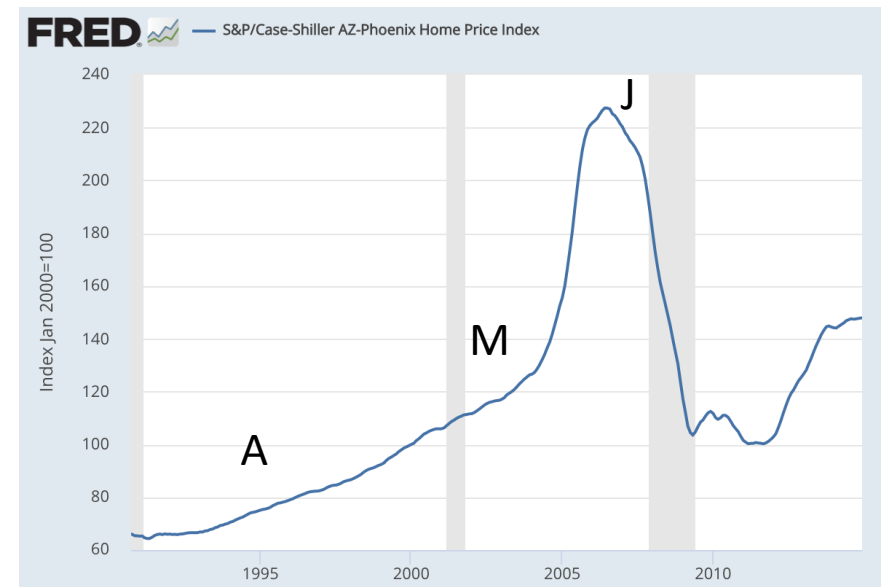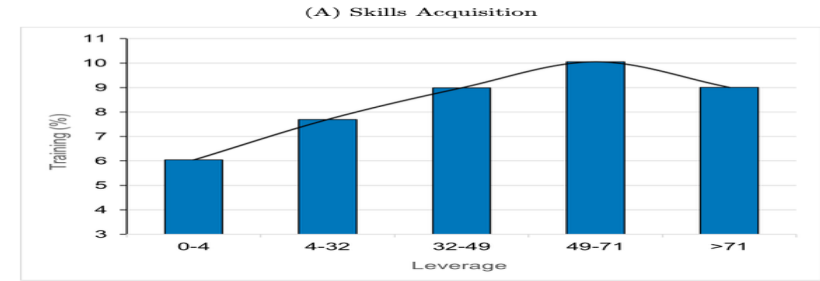
Kicking the exclusion restriction's tires

- What else is different between Alice, Maria, and Janet's house purchasing decisions that could be relevant to training choice?
  - Job tenure (idea: moved for the job)
    - Early: no **optional** training opportunities yet available
    - Mid: great time to boost career trajectory
    - Late: already senior enough, not much new to get trained on
  - Age of kids (idea: moved to start a family)
    - Young: take up a lot of time, can't worry about training
    - HS: need to pay for their college soon, train me up and give me a raise!
    - Adult: no need to support them anymore
- Solutions
  - Include job tenure directly if observable
  - Restrict sample to those who buy house in year of divorce/separation – a plausibly exogenous reason for purchase decisions (Struyven 2015)

Grab-bag of Empirical Questions/Comments

- How do 2SLS coefficients compare to OLS **for the same sample of homebuyers?**
  - Helps to gauge if IV resolves the bias you expect it to resolve
- Why is the (OLS) effect more pronounced among non-homeowners?
  - Seems like both non-homeowners and home buyers have a sharper hump than the overall sample? How? Only due to longtime homeowners?
  - Same peak (76 vs. 78% LTV) but very different recourse for various assets and types of debt – surprising!
    - $500K house with a $400K mortgage != $50K 401(k) with $40K credit card debt
- Training decisions may be jump-shaped in age: replace ln(age) with age and age^2 as common in labor econ literature
- Hours worked are an equilibrium quantity, not labor **supply** – what happens to wages?
  - If their growth decreases in leverage, maybe a sign of supply. Otherwise, demand?
- Comparative statics
  - Skills depreciation measured by pace of post-training wage growth controlling for industry and occupation
  - Wouldn't it be more interesting to compare between industries or occupations?
  - Is interaction of depreciation/volatility and leverage identified?

Conclusion

- Overall, an interesting paper – I enjoyed reading it a lot

- Great combination of model and empirics

- Advances our understanding of how financial frictions affect the supply side of labor markets

- Next steps
  - Empirics: sharpen ID
  - Theory: some more comparative statics in currently implicit parameters/functional forms
  - Theory: GE implications particularly for pricing and rationing of credit?