Discussion

Can the cure kill the patient?
Corporate credit interventions and debt overhang

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Yale and NBER

Adam Smith Workshop, April 2021

This paper

- Motivation: Business Credit Programs implemented in 2020
  - Corporate Credit Facilities (CCF)
  - Main Street Lending Program (MSLP)
  - Paycheck Protection Program (PPP)
- More broadly: government-backed funding programs

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- This paper: impact of these interventions on
  i) leverage
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  iii) default
- Key modeling feature: **debt overhang**
  - Long-term debt without commitment
  - Within canonical corporate finance model
- **Key insight**: subsidizing credit may exacerbate debt overhang, lowering investment in the recovery
  - Tradeoff with direct gains when financial markets malfunction
  - Quantification

Main results

1. If funding markets function well, credit interventions are
   - Irrelevant if not-subsidized (Ricardian Equivalence)
   - Distortionary if subsidized (higher leverage, low investment; quantitatively small effect)
2. If funding markets do not function well, credit interventions
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   - Lower investment in the long-term

Main results

1. If funding markets function well, credit interventions are
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2. If funding markets do not function well, credit interventions
   - Alleviate funding problems in the short term (quantitatively larger)
   - Lower investment in the long-term
3. Other policies seem to yield similar results

- Paper: facts, model, calibration/estimation, policy experiments
- Careful quantitative exercise

Outline of Discussion

1. A Simplified Model
2. Comments/Thoughts

A simplified model

- Two dates: $t \in \{0, 1\}$
- Equityholders objective:

$$V\left(\bar{b}\right) = \max \underbrace{c_0}_{d_0 - e_0} + \beta^E \int \underbrace{c_1\left(s\right)}_{d_1(s) - e_1(s)} \; dF\left(s\right)$$

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- Firms' budget constraints:

$$d_0 - e_0 = w_0 + \overbrace{Q\left(b_0, \bar{b}\right) k_0}^{\text{debt issued}} - k_0 - \overbrace{\Phi(k_0)}^{\text{adj.cost}}$$

$$d_1(s) - e_1(s) = \max \left\{ sk_0 - b_0 k_0 - \bar{b} k_0 + \underbrace{\Theta(b_0) k_0}_{\text{tax advantage}} \right\}$$

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- $\bar{b}$ is outstanding debt (state variable), b_0 is newly issued debt
- $Q\left(b_0, \bar{b}\right)$ comes from lenders/debtholders:

$$Q\left(b_0, \bar{b}\right) k_0 = \beta^D \left(\int_{b_0 + \bar{b}}^{\bar{s}} b_0 k_0 dF(s) + \frac{b_0}{b_0 + \bar{b}} \alpha \int_{\underline{s}}^{b_0 + \bar{b}} s k_0 dF(s) \right)$$

Firm's problem: Leverage

- Firm's objective:

$$\max_{b_0,k_0}\left[\beta^E\int_{b_0+\bar{b}}^{\bar{s}}\left(s-b_0-\bar{b}+\Theta\left(b_0\right)\right)dF\left(s\right)+Q\left(b_0,\bar{b}\right)-1\right]k_0-\Phi\left(k_0\right)$$

- FOC for leverage b_0: (tradeoff-theory)

$$\underbrace{\left(\beta^E-\beta^D\right)\int_{b_0+\bar{b}}^{\bar{s}}dF\left(s\right)}_{\text{difference in valuation}>0}+\underbrace{\beta^E\Theta'\left(b_0\right)\int_{b_0+\bar{b}}^{\bar{s}}dF\left(s\right)}_{\text{tax advantage}>0}+\underbrace{\beta^D\frac{d\left(\frac{b_0}{b_0+\bar{b}}\right)}{db_0}\alpha\int_{\underline{s}}^{b_0+\bar{b}}sdF\left(s\right)}_{\text{dilution}>0}$$

$$=\underbrace{\beta^D\left(1-\alpha\right)b_0f\left(b_0+\bar{b}\right)}_{\text{DWL}>0}$$

- First element maps to "arbitrage motive" in the paper

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- First element maps to "arbitrage motive" in the paper
- **Remark**: note that b_0 is a function of $\bar{b}$
  - *"Debt overhang refers to a debt burden so large that an entity cannot take on additional debt to finance future projects."*
    - Broader point: $\frac{db_0}{d\bar{b}}$ vs. $\frac{dk_0}{d\bar{b}}$

Firm's problem: Investment

- Firm's objective:

$$\max_{b_0,k_0}\left[\beta^E\int_{b_0+\bar{b}}^{\bar{s}}\left(s-b_0-\bar{b}+\Theta\left(b_0\right)\right)dF\left(s\right)+Q\left(b_0,\bar{b}\right)-1\right]k_0-\Phi\left(k_0\right)$$

- FOC for investment k_0: (q-theory)

$$\beta^E\int_{b_0+\bar{b}}^{\bar{s}}\left(s-b_0-\bar{b}\right)dF\left(s\right)+Q\left(b_0,\bar{b}\right)=1+\Phi'\left(k_0\right)$$

- **Debt overhang**
  - LHS (hence, investment) is decreasing in existing leverage $\bar{b}$
  - Equityholders receive less
  - New debt is more expensive $\frac{\partial Q}{\partial \bar{b}}<0$
    - Default more frequent, lower recovery
- Envelope theorem helpful

Back to the paper

- Two HJB/ODE for equity and debt:
  - $e_t(\bar{x}_t)$ and $d_t(\bar{x}_t)$
  - Scale invariance: single state x_t (leverage)
  - Equity HJB incorporates a choice of investment and leverage
  - Default decision: boundary

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  - Equity HJB incorporates a choice of investment and leverage
  - Default decision: boundary
- Shock: low output (25% drop) + more expensive debt
- Policy experiments
  - Subsidizing debt is the same as increasing β^D
  - Market shutdown imposes constraints directly

Comments/Thoughts

1. **Maturity**: debt-overhang problem is linked to the maturity of the existing debt
   - In the paper, all debt is long-term
     - Sensitivity to choice of m
   - What is the optimal maturity of the intervention?
   - Should it be lined up with the duration of the shock/disturbance?
   - Adding an additional maturity is challenging, but maybe more sensitivity on m (calibrated to 10 years)
   - Related idea: calibrate the model to a cross section of maturities
   - Seniority?

Comments/Thoughts

2. **Welfare** is measured in the paper as

$$W_0 = \int_0^\infty e^{-rt} \left(a_t - \hat{\Phi}_t \right) K_t dt$$

- It would be useful to provide a decomposition of the effects of policies
- For instance, size of DWL's (embedded in that formula)
- Perhaps alternative decompositions
  - static vs dynamic effects
  - fixed leverage/investment
- Comparative statics on the size of the subsidy?
- Is there an optimal/interior size of intervention?

Comments/Thoughts

3. Adding **liquidity** could be important
   - The paper acknowledges this
   - Firms' leverage was growing before 2020, but also cash reserves
4. Firms in the model issue **debt to pay dividends**
   - These are low leverage firms
   - Counterfactual?

Comments/Thoughts

5. Modeling the **corporate tax** seems to be a nuisance
   - Corporate tax calibrated to statutory rate $\Theta = 0.35$, but effective rates are much smaller
   - Little discussion of this issue
   - In newer version, there is no need to have taxes
     - Alternative calibration