Dynamic Credit Constraints:
Theory and Evidence from Credit Lines

(Amberg, Jacobson, Quadrini, and Rogantini Picco)

Discussion by Fred Malherbe (UCL)

The paper

- Stylised facts
- Model of dynamic credit constraints
- Empirical tests

An alternative (sketch of a) model

- Budget constraints

$$\begin{cases} x_0 &= e + b_0 \\ x_1 &= x_0 R_1 + b_1 - b_0(1 + r_0) \\ d_2 &= [x_1 R_2 - b_1(1 + r_1)]^+ \end{cases}$$

- Technology

  – Riskfree rate is nil

  – $R_1, R_2 \in \{R_L, R_H\}$, $E[R] > 1$, R_H with probability p_1 and p_2

Financial distress costs

- First focus on date 1 borrowing

Creditor break even condition (assume debt is risky)

$$b_1 = p_2 b_1 (1 + r_1) + (1 - p_2) x_1 [R_L] - \underbrace{(1 - p_2)\kappa \left([b_1 - x_1 R_L]^+ \right)^2}_{\text{default costs}}$$

- Solve for r_1
- Substitute constraints

Static view

- Look at date 1 decision (assuming no default at date 1)

$$\max_{x_1} \underbrace{x_1\left(\overline{R}_2-1\right)+x_0\left(\overline{R}_1-1\right)}_{\text{MM surplus}}+e-\underbrace{(1-p_2)\kappa\left(\left[x_1(1-R_L)+x_0\left(1-R_L\right)-e\right]^+\right)^2}_{\text{financial distress costs}}$$

or

$$\max_{x_1} \underbrace{x_1\left(\overline{R}_2-1\right)+x_0\left(\overline{R}_1-1\right)}_{\text{MM surplus}}+e-\underbrace{(1-p_2)\kappa\left(\left[x_1(1-R_L)+x_0\left(1-R_H\right)-e\right]^+\right)^2}_{\text{financial distress costs}}$$

- Static trade off: surplus versus cost
  - Costs are convex => expected cost increase with volatility
  - No need for dynamics for this

Bring on the dynamics

- Investing at date 0 is positive NPV
- Allows for more equity in expectation at date 1

$$\max_{x_0,x_1} \underbrace{x_1\left(\overline{R}_2-1\right)+x_0\left(\overline{R}_1-1\right)}_{\text{MM surplus}} + e - (1-p_1)(1-p_2)\kappa\left(\left[x_1(1-R_L)-\underbrace{\left(e+x_0\left(R_L-1\right)\right)}_{\text{date-1 equity after } R_L}\right]^+\right)^2$$

$$-\,p_1(1-p_2)\kappa\left(\left[x_1(1-R_L)-\underbrace{\left(e+x_0\left(R_H-1\right)\right)}_{\text{date-1 equity after } R_H}\right]^+\right)^2$$

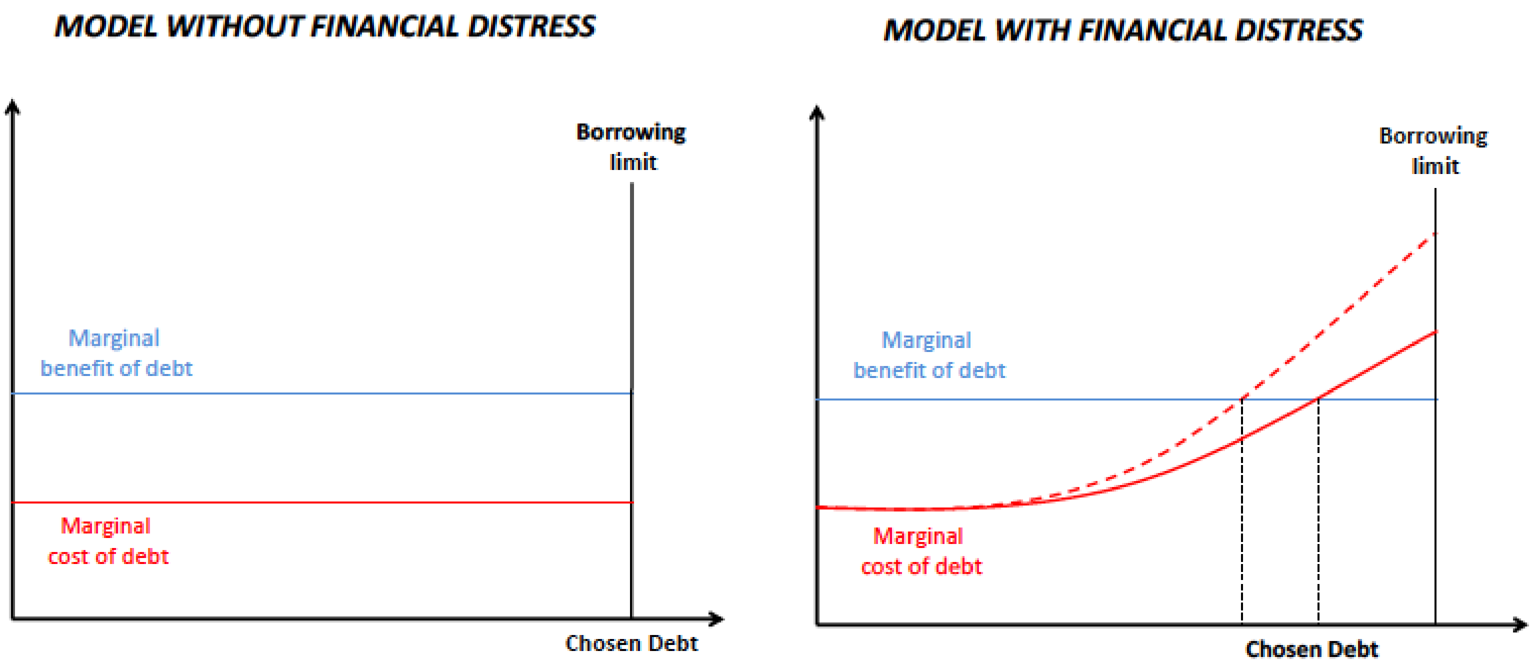
- But increasing b_0 increases leverage, which increases volatility of date-1 equity
- Equity volatility is more costly in a volatile environment
- Less leverage ex-ante for firms facing volatility risk

Remarks

– Playing with κ and $\overline{R}_2$ is similar to compa. statics in the paper

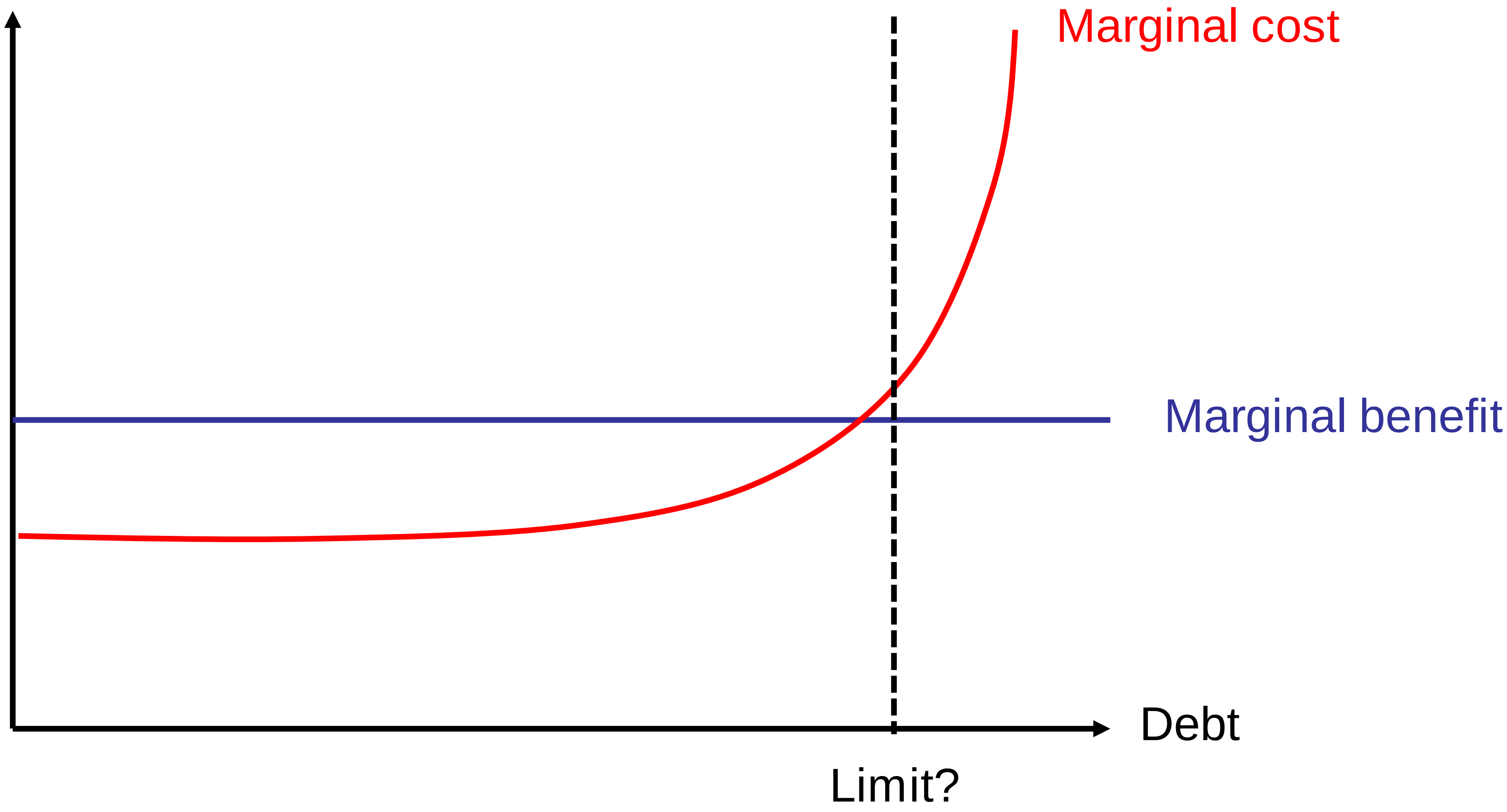
– But where are the credit lines?

Figure 6: Optimal debt policy



Trade off theory

What are borrowing constraints?



Empirical analysis

- Utilisation rate decreases with volatility of cashflows
  - Borrowing related to volatility
  - Speaks to trade off theory
  - How shall we interpret the committed amount?

- Utilisation rate increases with maturity
  - A credit line is an option
  - If the credit line is currently in the money
    * Static: no brainer
    * Dynamic:
      · Refinancing is an issue, short maturity makes it less valuable
      · Role of irreversibility
  - Maturity likely to depend on irreversibility: endogeneity issue

Empirical analysis (2)

- Propensity to draw on increase in borrowing limit is positive and decreasing in distance to limit
  - "Hard to rationalise based on static conceptions of credit constraints"
  - It's positive: in line with trade off theory
  - Decreasing in the distance: link between credit line and borrowing limits

Thank you