Allocation of Control between Insiders and Outsiders. Non-Verifiable Cash Flows and Debt Contract

DEBT AND TERMINATION (OR LIQUIDATION) THREAT

Bolton and Scharfstein (1990)

Hart and Moore (1989) – to be discussed in sections

Hart (1995), ch. 5.2; Tirole (2006), ch. 3.8; Bolton and Dewatripont (2005); ch. 11.3.2

Essense of termination/liquidation threat models:

- Investors cannot verify cash flows.
- However they can foreclose the assets or terminate funding in case of no-repayment (control is contingent on repayment)
- This threat provides entrepreneur with incentives to repay.

Non-verifiable cash flows $\Longrightarrow$ the possibility of diverting income creates agency problem.

Bolton and Scharfstein (1990). Main Idea:

Borrowers are disciplined by the threat of losing access to further credit.

One-Project Model

An entrepreneur has the usual project with:

- $A = 0$, for simplicity
- $X \in \{0, X^S\}$ and $pX^S > I$
- **Observable but non-verifiable cash flows** (contracts cannot be written on X)

Entrepreneur can divert income (always report that $X = X^F = 0$) without sanctions.

- There is no threat which may induce him to share income with investor.
- Thus, positive NPV project is not funded

Two-Project Model

Assume now two independent projects in a row: Projects 1 and 2

- From one-project model follows that projects cannot be financed independently.

If investor can only finance one isolated project, he is in the same position as investor in one-period model.

$\rightarrow$ It is only possible to depart from the non-funding outcome if contract **links** financing of the two projects.

Assumption: Investor is or can be made crucial (indispensable) for Project 2

If he has decision right, he can block Project 2 (even if the entrepreneur has sufficient funds to self-finance the project). For example because:

- Projects are verifiable (at least ex-post) $\Rightarrow$ investor can have veto power
- Investor owns the key asset (without which it's impossible to do Project 2)

Assumption: Investor has full bargaining power

Since cash-flows are non-verifiable a contract can only specify:

- Repayment R^S to investor after Project 1 (potentially can be negative)

- Who gets control over Project 2, depending on R^S

Note: generally allocation of control depending on R^S can be stochastic, i.e. $\nu(R^S) \equiv \Pr[\text{entrepreneur gets control} | \ R^S]$, $\nu(R^S) \in [0, 1]$ but stochastic allocations are of no use here (can be shown).

The optimal contract is the one that

- Ensures continuation when $X = X^S$
- Gives the investor the highest possible payoff (i.e. maximizes the "likelihood" of financing)

Note: the "first-best", i.e. doing project 1 and doing project 2 regardless of X at $t = 1$ is not feasible here: no matter who has control at $t = 1$, if $X = 0$ project 2 will not be implemented.

Proposition:

The optimal contract is:

- At t=0 investor provides I.
- At t=1 If entrepreneur repays $R^S \geq pX^S - I$ he is granted permission (control) to do Project 2. If $R^S < pX^S - I$, investor blocks Project 2.

In equilibrium, entrepreneur will repay exactly $R^S = pX^S - I$.

Financing will occur iff $-I + p\left(pX^S - I\right) \geq 0$.

Proof:

The entrepreneur has wealth $X^S > I$ after a successful Project 1

$\rightarrow$ He can self finance

$\rightarrow$ Project 2 could potentally be undertaken

But: investor can be made indispensable for Project 2 (by assumption). If he is, he has a choice:

- – to block Project 2
  – to "sell" the right to do Project 2 to the entrepreneur

At what price?

The investor has full bargaining power

$\rightarrow$ Price = Entrepreneur's valuation for running Project 2 = $pX^S - I$

Hence, the optimal contract is the one that has a cutoff value $\widehat{R} = pX^S - I$, such that

- liquidation (Project 2 is blocked) follows any $R^S < \widehat{R}$

- control goes to manager following any $R^S \geq \widehat{R}$

When $X = X^S$ entrepreneur is indifferent between paying $\widehat{R}$ and defaulting

Any $\widehat{R} > pX^S - I$ will be renegotiated down to $pX^S - I$ following $X = X^S$ since entrepreneur will prefer foreclosure to paying more than $pX^H - I$

Any $\widehat{R} < pX^S - I$ gives the investor smaller payoff

Hence no other contract can make the investor better off. With the optimal contract the investor extracts ALL he can:

- Nothing from Project 1
- The whole NPV from Project 2

Hence, the investor's profit

$$-I + p(pX^S - I)$$

The entrepreneur's profit (all from Project 1):

$$pX^S$$

The optimal contract prevents strategic defaults, i.e., induces entrepreneur to repay $pX^H - I$ if high income is realised in Project 1. Hence, it raises the likelihood that Project 1 will be financed.

Note: any contract with $\widehat{R} > pX^S - I$ is also optimal, but not renegotiation-proof.

We compared our contract only with other contracts with a cut-off value for R^S. There can be other types of contracts (rules that allocate control depending on R^S), but they are also (weakly) suboptimal:

- If the contract is such that entrepreneur gets control following some $R^S < \widehat{R} = pX^S - I$, then he will never repay $\widehat{R} \Longrightarrow$ investor looses with respect to our contract
- If the contract is such that the minimum necessary repayment that allows entrepreneur to obtain control is $> \widehat{R} = pX^S - I$, then it will be renegotiated down to $\widehat{R}$ following $X = X^S$

Notes on ex-post inefficiencies:

- Ex-post inefficiency arises here regadless of who has control: if Project 1 did not succeed ($X = X^F = 0$), firm is liquidated, i.e., no Project 2. Hence, investor control is never suboptimal here.
- In a model where inefficient liquidation/termination is avoided under entrepreneur's control, "too much" investor control may be suboptimal. In particular, stochastic control may become optimal (tradeoff between ensuring investors' financing and avoiding ex-post inefficiency in the case when $X = 0$).

The optimal contract may be interpreted as debt:

- The entrepreneur borrows I against promised repayment R^S.
- If he defaults, the investor shuts down further operations.

Comments on renegotiation

Renegotiation

Our optimal contract is renegotiation-proof, following the repayment/default decision:

- If the entrepreneur repays, he wants Project 2 to go ahead (efficient outcome)
- If he strategically defaults (i.e. when $X = X^S$), he is tempted to renegotiate: repay some $R^S < pX^S - I$ in exchange for continuation. But due to the investor's full bargaining power R^S must be $pX^S - I$, i.e. entrepreneur will get 0.

Remark:

Renegotiation-proofness relies on assumption that investor has all bargaining power, i.e., extract all surplus from second-project. Otherwise the above contract is not renegotiation proof.

Why? Because entrepreneur has an incentive to do a strategic default (i.e. when $X = X^S$). Assume the investor's bargaining power is γ. After a strategic default the surplus from renegotiation is $pX^S - I$, both parties' outside option is 0. Hence, in a renegotiation, entrepreneur obtains:

$$0 + (1-\gamma)(pX^S - I)$$

If he does not default and pay $pX^S - I$, he gets 0. Hence, for any $\gamma < 1$ there will be strategic default and renegotiation. Optimal renegotiation-proof R^S solves:

$$\begin{aligned} 0 + (1-\gamma)(pX^S - I) &= pX^S - I - R^S \\ &\Longrightarrow R^S = \gamma(pX^S - I) \end{aligned}$$