

Contract Design and Credit Markets:
Positive and Normative Implications of Non-Exclusive
Contracting

A. Attar, E. Campioni, G. Piaser and F. Castiglionesi

Motivations

Study the relationship between incentives and competition with asymmetric information among agents.

The idea that the way in which agents finance their activities, interact with financial institutions, and choose their contractual arrangements is mostly relevant to understand aggregate outcomes dates back to Irving Fisher (1929) and Gurley and Shaw (1955).

We think of the credit market as a setting where several lenders strategically compete over the contracts they offer to entrepreneurs-borrowers.

Contracts are non-exclusive. Each borrower can simultaneously accept the proposals of many financiers.

Contractual externalities arise: a single lender cannot restrict the borrower's contracting with other financiers.

The analysis of non-exclusive contracts is receiving great attention in economic and financial theory.

Non-Exclusive Markets I

Several financial markets do not seem to operate under exclusive assumptions.

- The US credit card market: consumers typically hold several cards and are often given incentives to open new accounts (Ausubel, 1997).
- The relevance of multiple-banking in several European countries: Ongena-Smith (2000) and Detragiache-Garella-Guiso (2000) emphasize that only less than 15% of European firms maintain a single banking relationship.
- Multiple lending as a consequence of the high cost of implementing exclusive relationships. Smith-Warner (1979), Asquith-Witzman (1990) and Cook-Easterwood-Martin (1994) document few cases where debt covenants explicitly include exclusivity clauses.

Non-Exclusive Markets II

- Insurance markets: both life insurance and annuity contracts are typically nonexclusive.
- The UK legislation requires every pension provider to let the consumer purchase annuities from other companies: Open Market Option (OMO).

Non-Exclusive Markets III

Competition in non-exclusive markets can hardly be reconciled with competitive outcomes.

Credit cards market (US):

- Ausubel (1991): The rate of return to US credit card issuers for the period 1981-1989 has been 3 to 5 times higher than the average of the banking sector.
- Stango (1999): credit cards' profitability remained exceedingly high in the beginning of the '90s.

Insurance markets:

- "There is strong evidence that annuities are priced higher than what is suggested by actuarial considerations, despite the existence of a fairly high number of companies" (British Survey of Annuity Pricing, 2006).
- "It is an established empirical fact in the US and internationally that very few people voluntarily purchase life annuities. Why this is the case has long been a puzzle, because annuities should be of substantial value to risk averse individuals in a standard life-cycle model" (Brown, 2001, p. 20).

Main contributions of the project

Positive:

A general characterization of equilibria in credit markets where intermediaries compete in the presence of moral hazard on the borrowers' side.

Non-exclusivity exacerbates credit rationing and distorts the distribution of the surplus relative to the exclusive scenario.

Normative issue

"Is a competitive economy with moral hazard, adverse selection, or an incomplete set of risk markets "constrained" efficient?"

The word constrained emphasizes that though one surely expects adverse selection and moral hazard to affect the nature of equilibrium, the relevant question is:

even when the informational imperfections cannot be corrected, can government intervention make some individuals better off without making anyone else worse off?" (Arnott-Greenwald-Stiglitz, 1993, p.3).

Contributions: normative

Second best allocations are those achievable by a benevolent central planner who is subject to the same informational constraints of economic agents.

In this set-up, market equilibria may fail to be second-best efficient.

Optimality can be recovered if the social planner can enforce exclusivity clauses.

We then study the situation where the planner cannot directly enforce exclusivity: it is impossible to prevent intermediaries from side contracting. Even in this context, a form of public credit provision is welfare improving. (Attar-Chassagnon, 2007)

Related literatures

- **Competition with non-exclusivity:** Pauly (1974), Helpman-Laffont (1975), Hellwig (1983), Arnott-Stiglitz (1990), Bizer-De Marzo (1992), Kahn-Mookherjee (1998), Biais-Martimort-Rochet (2000), Parlour-Rajan (2001), Bisin-Guaitoli (2004), Biais-Mariotti (2005), Attar-Campioni-Piaser (2006).
- **Common agency:** Peters (2001, 2003, 2004), Martimort-Stole (2002, 2003, 2004), Segal-Whinston (2003).

Today's talk

- Sketch a simple model of competition among lenders in a non-exclusive credit economy with moral hazard.
- Characterize market equilibria, and evaluate their welfare properties.
- Briefly touch policy issues and current developments of our research.

The basic model: agents, technology and information

(Attar-Campioni-Piaser, 2006)

We study a one-period credit economy with a single (representative) borrower and $N \geq 2$ lenders.

The borrower is penniless. She has exclusive access to the production technology of the only existing good, and is protected by limited liability.

Output performance depends on a non-contractible action (effort) that affects the probability of successful realization.

Effort is binary: $e = \{a, b\}$, with $a > b$.

Production technology

Investing I yields:

$$\text{when } e = a \rightarrow \begin{cases} G(I) & \text{with probability } p \\ 0 & \text{with probability } 1 - p \end{cases}$$

$$\text{when } e = b \rightarrow BI \text{ with probability } 1$$

BI is a non-transferable private benefit for the borrower.

The game: common agency with complete information

- Lenders compete over the financial contracts that they offer to the single borrower.

The contract proposed by lender i is the array $K_i = (I_i, R_i)$ including:

- 1) a loan amount, I_i
- 2) a total repayment, R_i

- The borrower is allowed to accept any subset of the lenders' proposals. And, she chooses effort.

Payoffs

Agents are risk-neutral.

If his contract is accepted, the profits of each lender i are:

$$V_i = \begin{cases} pR_i - (1+r)I_i & \text{if } a \text{ is chosen} \\ -(1+r)I_i & \text{if } b \text{ is chosen} \end{cases}$$

where r is the cost of collecting funds. Otherwise, the payoff is zero.

The payoff for the borrower is given by:

$$U = \begin{cases} p[G(I) - R] & \text{if } a \text{ is chosen} \\ BI & \text{if } b \text{ is chosen} \end{cases}$$

where $I = \sum_{i \in \mathcal{Z}} I_i$, and $R = \sum_{i \in \mathcal{Z}} R_i$ are aggregate investment and repayment;

and \mathcal{Z} is the set of accepted contracts.

Remarks

- The choice of b generates a net loss for every lender i . There cannot be any low effort equilibrium.
- At equilibrium, the borrower must have an incentive to select $e = a$

$$p \left[G \left(\sum_{i \in Z} I_i \right) - \left(\sum_{i \in Z} R_i \right) \right] \geq B \sum_{i \in N} I_i$$

- This is the Incentive Compatibility constraint (IC)

Equilibrium Characterization

The aggregate surplus $S(I) = V + U$ is:

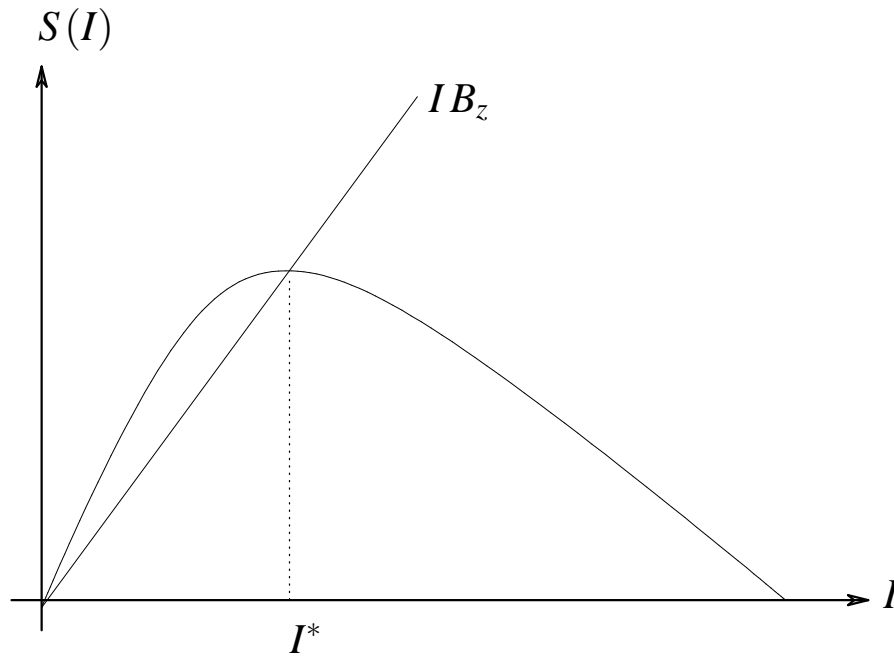
$$S(I) = pG(I) - (1 + r)I$$

Let I^* be the investment level that maximizes $S(I)$:

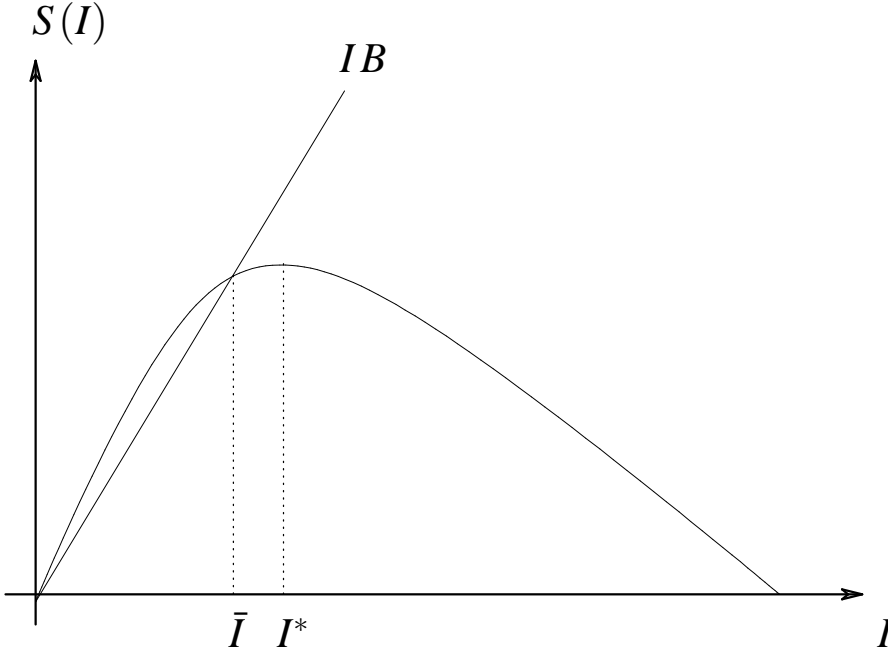
$$pG'(I^*) = (1 + r)I^*$$

Feasibility: (IC) depends on B

We define $B_z : pG(I^*) - (1 + r)I^* = B_z I^*$



If $B > B_z$, then we denote \bar{I} : $\pi G(\bar{I}) - (1 + r)\bar{I} = B\bar{I}$.



Credit market equilibria with exclusivity

If exclusivity clauses are explicitly imposed in the contracts, then the mechanism of undercutting on each opponent's proposal squeezes any possible rent for lenders.

Equilibrium exhibits zero profits for the financiers, and the investment level will be the maximum feasible $\min\{\bar{I}, I^*\}$

Credit market equilibria with non-exclusivity

Competition induces non-competitive results, in the form of positive profits for the financiers.

Equilibria of the non-exclusive game will be characterized in terms of the incentive parameter, B .

Non-Exclusive Equilibria: $B < B_z$

If the incentive to shirk is low enough, the competitive outcome that is typical of exclusive contracting, may also arise under non-exclusivity.

Result 1: Let $B_c = \frac{B_z}{2}$. Then, whenever $B \leq B_c < B_z$, there is a zero-profit equilibrium where at least two lenders offer $K_i = K_j = (I^*, R^*)$, with $pR^* = (1 + r)I^*$.

Intuition: The incentive to take up all contracts and select the low effort is very weak. The low effort choice is not a credible threat \rightarrow a Bertrand argument applies.

Non-Exclusive Equilibria $B \geq B_z$

Result 2: For $B \geq B_z$ there cannot be any zero-profit equilibrium.

Intuition: If an intermediary offers more credit, he increases the social surplus more than the increase in the utility of entrepreneur when doing low effort. The difference constitutes the profit margin for the financier.

Non-Exclusive Equilibria: credit rationing and positive profits

Result 3: *If $B \geq B_z$, there exists a positive profit equilibrium where each lender offers the same $\tilde{K} = (\tilde{I}, \tilde{R})$ and all contracts are accepted.*

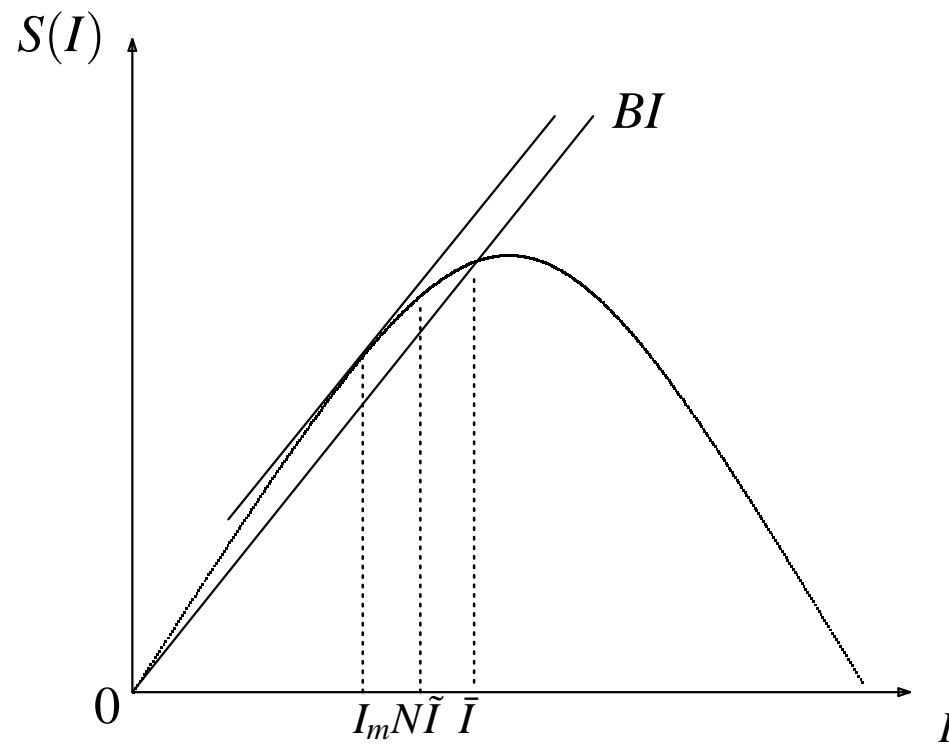
The equilibrium is characterized by:

$$p [G(N\tilde{I}) - N\tilde{R}] = p [G((N-1)\tilde{I}) - (N-1)\tilde{R}] \quad (1)$$

$$p [G(N\tilde{I}) - N\tilde{R}] = BN\tilde{I} \quad (2)$$

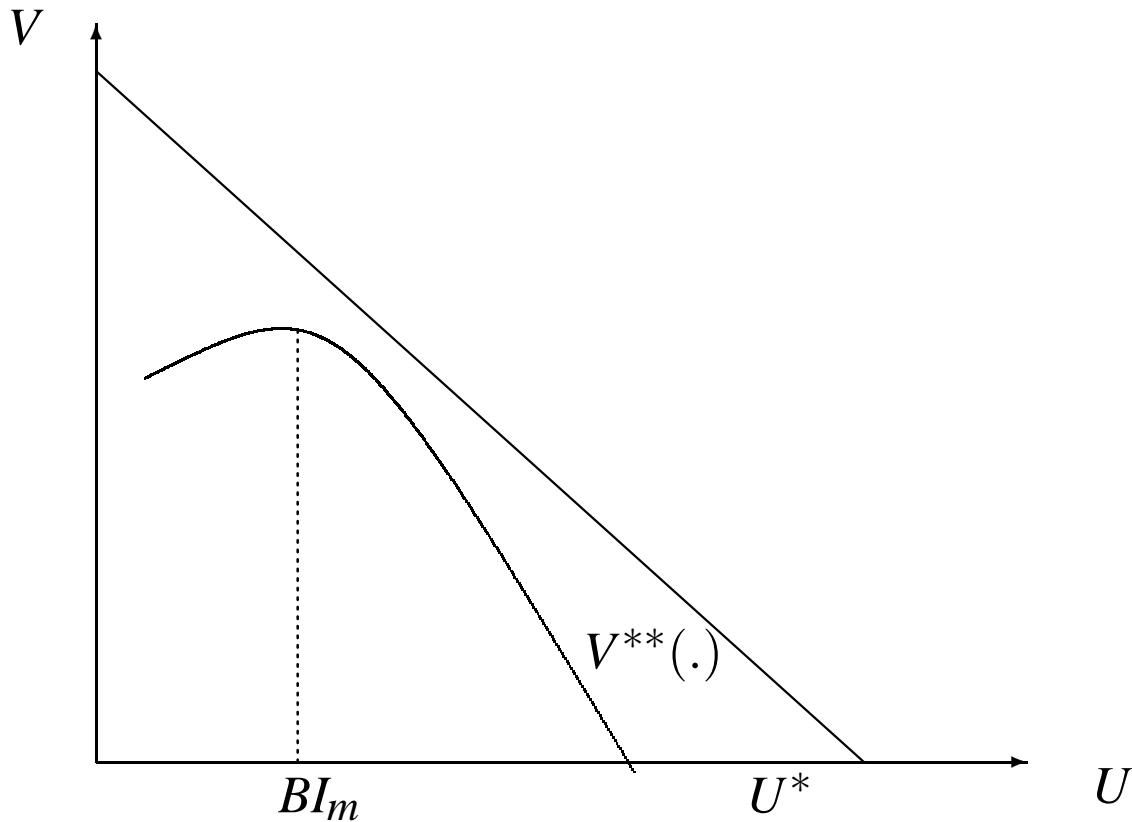
$$(N-1)\tilde{I} > I_m \quad (3)$$

Result 3 implies that the equilibrium level of investment will be in between the monopolistic level I_m and the competitive level \bar{I}



Welfare Analysis I

If $B > B_z$, the first-best level of investment I^* cannot be implemented. The second-best frontier $V^{**}(U^{**}, B)$ will always lie below the first-best one.



Welfare Analysis II: Constrained Efficiency

Result 4: *If $B > B_z$, every (pure strategy) equilibrium allocation belongs to the constrained Pareto frontier $V^{**}(U^{**}, B)$.*

Intuition: The IC constraint always binds at equilibrium. This guarantees that investments at equilibrium and at the optimum will be the same.

Resume

- Non-exclusivity in financial arrangements can deliver non-competitive outcomes. Positive-profits for the lenders and under-investment with respect to the exclusive scenario. Non-exclusive competition exacerbates credit rationing if the moral hazard problem is sufficiently severe.
- Importantly, every equilibrium allocation turns out to be constrained efficient. A planner subject to incentive constraints cannot induce outcomes that Pareto dominate the equilibrium ones.
- Inefficiency of credit market equilibria becomes a typical feature of the analysis if a (slightly) more general set-up is considered.

The general case

Attar-Campioni-Chassagnon-Rajan (2007) develop a general framework to analyze the relationship between competition and incentives under moral hazard.

It is shown that positive profits and constrained inefficiencies are a typical feature of non-exclusive markets.

To fully capture the externalities induced by competition, one has to allow intermediaries to offer more sophisticated contracts (menus).

Macro-economic implications

The macro-economic approach to credit markets' imperfections has rather focused on exclusive arrangements: Reichlin (2004), Bhattacharya-Boot-Thakor (2004).

The framework we presented can be a possible foundation for macro-economic approaches to financial fragility. Under non-exclusivity, equilibria are highly sensitive to B (Campioni-Castiglionesi, 2006).

Re-examine the relationships between real and financial sectors identifying a transmission mechanism based on the structure of contractual arrangements.

Policy

This research emphasizes that competition in non-exclusive markets may be detrimental to consumers-borrowers.

This is essentially due to the impossibility of controlling entrepreneurs trades with other financiers.

In this context, regulatory policies are effective as long as they can indirectly control entrepreneurs portfolio decisions.

Information sharing

The market result would be improved if the financiers exchanged information among entrepreneur's behavior. In practise, we observe that the exchange can be voluntary (credit bureaus) or imposed by regulation (public credit registers).

"When lenders share information about outstanding loans we observe an increase in lending supply and an improvement in the interest rates offered to credit seekers. This relation persists even when one controls for other economic and institutional variables, [...] and information sharing appears to mitigate defaults." (Jappelli-Pagano, 2000, p.14)