

Markets, Contracts and Information

Research Presentation

Piero Gottardi

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- Investigate market allocations and contractual arrangements in economies with uncertainty and, possibly, asymmetric information. both in competitive and strategic environments
- Study effects of various 'frictions': asymmetric information, limited commitment,
- Consider various applications

A) Competitive Markets under Uncertainty

(i) Corporate Finance and Traded Equity

- Stochastic dynamic general equilibrium economy with production
 - Macroeconomic models with production under uncertainty typically exhibit either no traded equity (individual firms only) or complete markets/ representative consumer.
 - Issue: what is the objective of firms when markets are incomplete and firms can be bought and sold (equity traded)?
For this need to specify firms' conjectures over their market valuation for different choices of production and financial plans?

Basic Economy

- Consumers:

$$\max_{\theta^i, b^i, c^i} u(c_0^i) + \beta E u(c^i(s))$$

subject to

$$\begin{aligned}c_0^i &= w_0^i + [-k + q + p B] \theta_0^i - q \theta^i - p b^i \\c^i(s) &= w^i(s) + [f(k; s) - B] \theta^i + b^i, \quad \forall s, \\ \theta^i, b^i &\geq 0\end{aligned}$$

Note: borrowing constraints

- Firms:

$$V = \max_{k, B} -k + q(k, B) + p B$$

- Price conjectures: production and financial decision affects the firm's cashflow, possibly also the hedging possibilities available to consumers

$$q(k, B) = ??$$

- Can we find $q(k, B)$ so that shareholders unanimously support the firm's objective of maximizing the firm's value?
- If so the study competitive equilibria where equity is traded in the market has a solid foundation.
 - are competitive equilibria efficient (in some sense)?
- Firms' capital structure is, at least partly, determinate because constraints in financial markets (borrowing constraints) imply that MM does not hold.
 - Corporate finance quantities jointly determined with production decisions, thus affecting asset prices.
Can investigate how capital structure varies with the business cycle, and interaction between financial decisions and production, risk sharing, ...

Extensions:

- Allow also for:
 - risky (defaultable) corporate debt,
 - short sales:

firms' decisions have even greater effect on consumers' hedging possibilities

- Allow for informational asymmetries between manager and shareholders (as in standard corporate finance models):
e.g. some of the production decisions not observable by outside investors (equityholders and/or bondholders), or controlling shareholders have some private information over some characteristics of the firm's returns.

- Bisin, Gottardi, Ruta (2009, 2010).

(ii) Liquidity, Investment and Asset Pricing

- Show that firms' decisions may be distorted by their undervaluation occurring in illiquid markets.

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- Show that firms' decisions may be distorted by their undervaluation occurring in illiquid markets.
- Consider a competitive environment where:
 - firms can only finance their investments by issuing short term debt (market incompleteness),
 - there is uncertainty over the timing of the firm's output: can arise at $t=1$ or $t=2$.

In some states firms' revenue insufficient to repay debt: either debt renegotiation succeeds and debt is rolled over, or it fails, when

$$d_0 > q_1 y_2$$

and firm has then to default.

- default requires payment of creditors from immediate sale of assets; if markets are illiquid this sale takes place at firesale prices
- this mispricing is the only friction and the only cost of default in the model

- The anticipation of such losses distorts asset prices and hence also firms' investment decisions.
 - Bankruptcy is efficient ex post: but, if liquidity is scarce at the time of default, shareholders suffers a loss, which equals the gain of firm's buyers (Result obtains even with a representative consumer).
 - Still, the shareholders' loss induces value-maximizing managers to make inefficient decisions

- Questions:

- Under what conditions do we have an illiquid market?
- Can have endogenous crises, where a self-fulfilling shortage of liquidity and a collapse in asset prices?
- Which kind of interventions allow to restore efficiency?
- How does analysis change if firms can get funding also via equity (reduces default but is more costly)? Study firms' equilibrium dynamics.
- Gale, Gottardi (2009, 2010)

(iii) Dynamic Economies with Collateral

- Infinite horizon stochastic economy
- Complete financial markets but borrowers can walk away of their obligations with no punishment.



borrowing is collateralized with durable goods/physical assets: this is the friction in the environment

effective payoff of assets:

$$\min \{r(s); Cq(s)\}$$

with C collateral requirement, $q(s)$ future value of collateral

- When is efficient risk sharing still attained at a competitive equilibrium?
When is collateral plentiful?
- When collateral is scarce and equilibrium inefficient, what is the pattern of risk sharing? and of asset prices?
What are the difference wrt other frictions/borrowing restrictions?
- When many assets, with different margin requirements and different types of collateral, are available for trade which ones are selected in equilibrium?
- When does a stationary equilibrium, where prices and allocations only depend on the current state, exist?
- Gottardi, Kubler (2010)

(iv) Optimal Taxation with Uninsurable Risk

- Economy with uninsurable income risks (markets are incomplete)
- Can distortionary taxation of capital and labor be welfare improving? If so, should we tax or subsidize capital/and labor?

$$\max_{c_i, k_i, l_i} U_i(c_i, l_i) := v_i(c_i^0) + \mathbf{E}[u_i(c_i(s_i), \bar{L}_i - l_i(s_i))]$$

subject to

$$c_i^0 = e_i - k_i$$
$$c_i(s_i) = (1 - \tau_K)r\rho_K(s_i)k_i + (1 - \tau_L)wl_i(s_i)\rho_L(s_i) + T_i$$

- A firm with constant-returns-to-scale technology $y = F(k, l)$. Profit maximization condition implies:

$$r = F_K(K, L) \text{ and } w = F_L(K, L)$$

- market clearing: $K = \frac{1}{I} \sum \mathbf{E} [k_i \rho_K(s_i)]$, and $L = \frac{1}{I} \sum \mathbf{E} [l_i(s_i) \rho_L(s_i)]$
- Taxes have an insurance and a redistribution effect.
- When is there over or under - accumulation of capital in equilibrium?

• Gottardi, Kajii, Nakajima (2010)

(v) Intergenerational Risk Sharing and Social Security

- Risk Sharing across generations imperfect even with complete financial markets: consumers unable to insure against realization of uncertainty at their birth.

Can we find on such basis a justification for a PAYGO social security system, entailing transfers from young to old agents?

Trade-off: such SS system (state contingent transfers from young to old agents) may improve intergenerational risk sharing, but also tend to reduce savings, hence capital accumulation and output

- Determine the GE effects of SS in a OLG economy with production:
 - direct transfer,
 - indirect transfer generated by price changes (in wages, asset prices) induced by SS transfer,
 - output loss induced by changes in savings (crowding out)

- Identify conditions:
 - on the correlation between the shocks affecting agents' consumption when young and when old,
 - on the agents' risk aversion,
 - on the stochastic structure of the production shocks (determining the correlation between wages and returns to capital),

under which the introduction of the different types of pay-as-you-go transfer systems is welfare improving.

- What is then the optimal design of a PAYGO system?
- And how big are the welfare gains from the optimal reform of such system?

• Gottardi, Kubler (2009)

on a somewhat different line:

(vi) Financial Linkages, Risk Sharing and Contagion

- • Financial linkages among financial institutions (exchange of assets, credit lines, exchange of deposits, etc.) are common arrangements to improve sharing of risks among them.
- But such linkages also constitute channels through which those shocks can spread the risk of contagion in the system.

Trade-off between risk sharing and contagion.

- Focus on two dimensions of the network structure (capturing such financial linkages):
 - The degree of segmentation of the network into disjoint components.
 - The tightness of the connections within each component (e.g. completely intraconnected structure - where mutual exposure is uniform - or ring structure - where degree of mutual exposure decays).
- Maximal risk sharing is attained in the most connected structure. But this also exposes system to maximal risk of contagion.
- Study optimal financial architecture, which minimizes expected defaults.
See how it varies with the probability structure of shocks
- Cabrales, Gottardi and Vega Redondo (2010).

2. Competitive Markets with Asymmetric Information

Private information over idiosyncratic sources of uncertainty
(individual states)

- Agents face incentive problem (private information, limited commitment,...)
- If they can trade in markets, this will affect their incentives.
- Information over the agents' trades in the market is important to evaluate their incentives

Prices of contracts and allocations determined in equilibrium

E.g.: insurance contract under moral hazard:

net payments: y_H, y_L in individual states s_H, s_L
 $\Pr \{s^i = s_H\}$ depends on (unobservable) effort: e^i

- consumer can also trade in competitive markets: a riskless bond/contingent claims
- consumers' trades observable: hence the prices of the insurance contract and of the contingent claims will depend on such trades (reflecting the effect of different levels of trade on anticipated effort level): contracts are exclusive
- consumers' trades not observable: prices cannot depend on the level of such trades (linear), contracts are non exclusive.
- * What are the properties (efficiency, risk sharing, ..) of equilibrium allocations in the two cases?
 - Bisin, Gottardi (1999, 2003, 2006, 2007)
 - Gottardi, Jerez (2007)

Applications:

(i) What is the form of the optimal managerial compensation when the manager can hedge the risk in his compensation by trading in the market?

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- Market for executive hedging appears sizeable, various concerns for managers' hedging activity expressed in legal profession and financial press

- *Question:*
- What does optimal incentive compensation look like when:
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 - there are limited possibilities for legal action by shareholders?
- What we find:
 - Monitoring of manager's portfolio optimally occurs only when firm's performance is poor.
 - Incentives are always steeper (variability of the manager's compensation is higher) when cost of monitoring is higher
 - What are the consequences of financial development, of the developments of new financial instruments?
 - Bisin, Gottardi, Rampini (2008)

(ii) Optimal Taxation (of Capital and Assets):

Question:

- in this environment (with non exclusive contracts), if the government has the same or even less information as insurance firms on agents' actions and trades, can linear (distorting) taxes on asset trades (Ramsey) be beneficial?

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- When is the optimal tax on capital positive?

Answer depends on:

(i) instruments available to government (is gov. able to observe individual shocks and hence provide additional insurance via state contingent lump sum transfers?)

(ii) severity of moral hazard (has the map $e \rightarrow \pi$ full support? If not private insurance markets cannot exist)

what is then the optimal design of taxes on assets? and what is their effect on the level of incentives and agents' risk sharing which can be sustained in equilibrium?

- Gottardi, Pavoni (2010).

(iii) Effects of Securitization

- Borrower/lender relationship, where the lender must exert some costly monitoring effort to discipline the borrower.
- Securitization allows the lender to sell (part of) the loans on its balance sheet.

Such sale may be beneficial for the lender as it may allow risk diversification/lower capital requirements, ...

But it may also weaken the lender's incentives to monitor.

- Does securitization improve the efficiency of the system or actually make it worse?

The answer crucially depends on whether the level of sales made by the lender is observable by third parties.

3. Markets with Strategic Traders and Asymmetric Information

(i) Speed of Information revelation and market power

- Private information over aggregate sources of risk (e.g. returns of assets traded):
if insiders use their private information to trade aggressively, this will have a - possibly - significant impact on equilibrium prices and allow non informed to learn from observed prices
- In a dynamic trading set-up, trade-off between immediate benefits of using info and future losses associated to shorter duration of superior information

Market performance with insider traders

- In the set-up of a model of dynamic trading, find:
 - with only one seller (informed), only part of his information is revealed in the first period, and none at any later date.
 - with n sellers (a fraction informed):
 - with a highly transparent market (competition is intense), information is fully and immediately revealed in every equilibrium for n large, whatever the structure of the information.
 - otherwise, there are equilibria where information is never revealed.
- Thus the intensity of competition proves more effective than the non exclusivity of information in inducing full and immediate disclosure of information.

- Gottardi, Serrano (2005)

(ii) Information Acquisition and Transmission

- acquisition of information relevant to trades in markets is typically costly
- information is often of common interest to traders
 - ⇒ incentive for arranging exchange/sale of information
- But: information has also often "rival" nature
 - ⇒ conflicts of interest: incentives for manipulating information
- Some motivating examples:
 - financial analysts
 - recent regulatory interventions to address their conflicts of interest

Objective: to understand

- When is information traded in the market?
- If a market for information forms, what is the market structure? (Who trades in the market? how competitive is the market? which type of information is traded? and how truthful is the information transmitted?)
- Is the market outcome efficient? Under what conditions can efficiency be attained?
- In particular, are regulatory restrictions on who can sell information (e.g. Chinese walls) beneficial?

- Consider an environment where we have information acquisition, exchange of information and action (trade) on the basis of information:
- all market participants can acquire relevant information, at a cost
- Agents who acquired information can sell reports over it to uninformed buyers
- Reports are pure "cheap talk" messages (conflicts of interests between buyers and sellers of information may affect truthfulness of reporting)

Results:

- In equilibrium information is acquired by some trader who then sells it in the market
- Market for information is typically a monopoly
- Some, though not all the information available to the seller of information is transmitted to buyers: if seller of information is seller of the good, will hype declared quality, if buyer will depress it.
- Monopolist sets a low price for information so that all the uninformed buyers (except at most one) purchase it.
- Inefficiency, due to underinvestment in information acquisition.
- Restricting access to the market for the sale of information only to "disinterested traders" makes inefficiency worse.

- Cabrales, Gottardi (2009)

4) Information and Contracts

(i) Fresh Start and Personal Bankruptcy

- In many countries, lenders are not permitted to use information about past defaults after a specified period of time has elapsed.
- Observe that differences in information-sharing regimes across countries are associated with differences in the provision of credit.
- Also, evidence on effects of such provisions on borrowers' behavior

- Optimal contracts dictate use of all available information on agents' past behavior. How can we rationalize institutions that impose limits on the availability of information on past failures by credit bureaus (also motor vehicle records, ...) ?

- How can we understand evidence above?

- Consider a model in which entrepreneurs must repeatedly seek external funds to finance a sequence of risky projects under conditions of both adverse selection and moral hazard;
- contracts optimally chosen by lenders
- Reputation based on a borrower's past history of defaults

Erasing record of past defaults generates a tradeoff:

- weakens incentives, ex ante, by reducing the punishment for default.
- improves reputation, hence continued access to credit and incentives, ex post, to retain such reputation

Find:

- If (i) borrowers' gains from misbehavior are not too large, and (ii) average quality of borrowers is not too low, some limited amount of 'forgetting' is optimal, and increases credit
- Regulatory intervention needed for this
 - Elul, Gottardi (2008)

(ii) Flexible contracts/Delegation

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- Consider a standard contracting environment between a principal and an agent, where agent's action not observable by the principal:
 - before choosing the action, agent receives a private signal over profitability of various actions
 - the principal can predefine/limit the set of actions/tasks available to the agent (extent of delegation).

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- Benefits of flexibility: agent can adjust choice of action on the basis of his privately acquired information
- Cost of flexibility: agency costs in delegating choice

- Determine the optimal flexible contract/organization and compare it to the optimal non discretionary one.
- Investigate how trade-off varies with agents' attitude towards risk, nature of future events, ambiguity aversion (with multiple common priors)

• Gottardi, Tallon, Ghirardato (2009)