Economics of Information and Contracts

Empirical Evidence

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Empirical Evidence

Surveys:
▶ General: Chiappori and Salanie (2003)
▶ Incentives in Firms: Prendergast (1999)
   • Theory and evidence
▶ Finance: Harris and Raviv (2006)
   • Theory and evidence

Empirical work on contracts is still young

Two main types of work:
1. Effects of contracts on behavior: Do Incentives matter?
2. Observed contractual forms: Are contracts optimal?

It is a fruitful research area

Testing Contract Theory

Main problem: Controlling for unobserved heterogeneity

Example: Choice between share-cropping and fixed-rent contracts in tenant-landlord relationships
   ▶ Ackberg and Botticini (2002)

Standard moral hazard models: Trade-off between incentives and risk-sharing
   ▶ Fixed-rent contracts: efficient in incentives but inefficient in risk-sharing
   ▶ Share-cropping: less efficient in incentives but more in risk-sharing

Prediction:
   ▶ Less uncertainty ⇒ fixed-rent
   ▶ More uncertainty ⇒ share-cropping

More risky crops are more likely to be associated with share-cropping contracts

Obvious methodology: Regress contract choice on crop riskiness

Testing Contract Theory

This method disregards individual heterogeneity that may play a role in matching agents with contracts

Risk neutral tenants are more likely to specialize on risky crops
But they are also more likely to be matched with fixed-rent contracts
Standard prediction is reversed
   ▶ Fixed-rent contracts associated with risky crops

Standard prediction holds conditional on risk-aversion
Need to control for risk-aversion
Contracts and Behavior

- Simple correlation between contracts and behavior is not an adequate test of theory
- Unobserved heterogeneity may cause both behavior and contractual choice
- Automobile insurance:
  - More comprehensive coverage $\leftrightarrow$ larger accident probability
- Could be due to:
  1. Adverse selection: high-risk agents choose contracts with more coverage
  2. Moral hazard: more coverage induces riskier behavior

Ackberg and Botticini (2002)

- Usual methodology: regress contract choice on observed principal, agent, and task characteristics
- Tenancy contracts
  - Risk-sharing $\Rightarrow$ risky crops more likely to be associated with share contracts than fixed-rent
- Matching equilibrium: risk-neutral agents matched with risky crops
- Optimal contract for risk-neutral agents: fixed-rent
- Outcome: fixed-rent contracts for risky-crops
- Coefficients of a naive regression will be biased
- Need to control for risk aversion of tenant
  - Problem: It is unobserved
  - Solution: Use a proxy (such as wealth)?
- It does not solve the problem as long as there is an unobserved component of risk aversion
- Solution: Estimate a matching equation

Ackberg and Botticini (2002)

- Standard contract choice equation
  $$y = \beta_0 + \beta_1 p + \beta_2 a + \varepsilon$$
  - $y$: contract type (fixed-rent, sharecropping)
  - $p$: principal/task (crop riskiness, monitoring ability, etc.)
  - $a$: agent (risk aversion, productivity, etc.)
  - $\varepsilon$: error term (uncorrelated with $p$ and $a$)
- Suppose $p$ is perfectly observed but only a proxy $w$ is observed for $a$
  $$a = \theta w + \eta$$
- Then,
  $$y = \beta_0 + \beta_1 p + \beta_2 \theta w + \beta_2 \eta + \varepsilon$$
- Suppose matching occurs according to
  $$p = \gamma_0 + \gamma_1 a + \nu = \gamma_0 + \gamma_1 \theta w + \gamma_1 \eta + \nu$$
- Then, $p$ is correlated with unobserved component of $a$, given by $\eta$
  - If one regresses $y$ on $p$ and $w$, coefficient estimates will be biased
Solution: Instrumental variables estimation

- Find instruments $z$ correlated with $p$, but not with $\beta_2 \eta + \epsilon$

Two stage least squares:
1. Regress $p$ on $z$ to obtain fitted values $\hat{p}$
2. Regress $y$ on $\hat{p}$ and all the exogenous variables ($w$)

The paper studies Renaissance Tuscany tenancy contracts

They use market dummies as instruments

Endogenous matching is indeed a problem and controlling for it makes a difference
  - There is evidence of risk-sharing
  - Multi-tasking considerations play a role in contract choice

Testing for Asymmetric Information

- Chiappori and Salanie (2000): Automobile insurance
  - Both adverse selection and moral hazard predict positive correlation between coverage and risk
  - Proposes parametric and nonparametric tests
  - Cannot reject the null hypothesis of no correlation

  - Theoretical models are usually over-simplified
  - Does the positive correlation property hold in more realistic situations?
  - Perfect competition: positive correlation property extends to
    - heterogeneous preferences (e.g., risk aversion)
    - multiple levels of losses
    - multidimensional adverse selection plus moral hazard
    - non-expected utility
  - Imperfect competition: positive correlation property holds
    - if risk aversion is public
    - not necessarily if it is private (Jullien, Salanie, Salanie (2007))
  - Finds evidence of positive correlation in French car insurance data

- Testing for Asymmetric Information
  - Mostly in insurance markets
  - Conditional on all information available to insurer, is contract choice correlated with risk?
  - Automobile insurance with two types of coverage: full versus partial
  - Can estimate two probit equations
    \[
    y_i = I[X_i \beta + \varepsilon_i > 0] \\
    z_i = I[X_i \gamma + \eta_i > 0]
    \]
    where $y_i = 1$ if full coverage ($0$ if not) at the beginning; $z_i = 1$ if there was an accident ($0$ if not) during the contract period; $X_i$ are exogenous variables
  - Asymmetric information $\Rightarrow y_i$ and $z_i$ positively correlated conditional on $X_i$
  - Equivalently, $\varepsilon_i$ and $\eta_i$ are positively correlated

- Finkelstein and Poterba (2004): UK annuity market
  - Annuity: an insurance contract that pay a pre-specified payment stream to the beneficiary for as long as he is alive
  - It provides insurance against the risk of outliving one’s resources.
  - Moral hazard not likely to be an issue
  - Back-loading: When greater share of payments occur later
    - Selected by longer-lived (high-risk) individuals? Yes
    - Priced higher? Yes
  - Payment to estate (or capital protection)
    - Selected by shorter-lived (low-risk) individuals? Yes
    - Priced lower? Yes
  - Important to include various dimensions of contracts

- Finkelstein and Poterba (2006) utilizes “unused observables” (place of residence) to test for adverse selection in UK annuity market
**Field Experiments**

- Allocation of individuals to contracts is random
- Best example: Rand Health Insurance Experiment
  - See Manning et al. (1987)
- Families randomly assigned to different insurance plans
- Usage of medical services responds to amount paid by the insuree
  - Incentives matter

**Field Experiments: Shearer (2004)**

- Tree-planting firm in British Columbia
- Randomly assigned piece-rate or fixed-wage contracts to workers
- Measured productivity
- There is significant incentive effect of piece-rate contracts:
  - 20% increase
- Also estimates a structural model in which risk-neutral workers differ in effort cost
- Contract terms are chosen optimally
- Piece-rate:
  - Worker chooses effort optimally given piece-rate
  - Firm chooses piece-rate so that worker earns reservation utility
- Fixed wage: A shirking model
  - Worker is monitored with a certain probability
  - If caught shirking (effort less than agreed upon level), he is fired
  - Agreed upon effort level is the max such that worker does not shirk

**Field Experiments: Ausubel (1999)**

- Credit card market
- Card issuer mailed pre-approved solicitations differing in introductory rates, duration of introductory period, and post-introductory rate
- Individuals are randomly assigned to offers
- Adverse selection ⇒ high-risk agents more willing to accept less favorable offers
- Provides strong supporting evidence
  1. Respondents are higher-risk than non-respondents
  2. Customers who accept inferior offers have inferior observables and are more likely to default
  3. Even after controlling for all information available to issuer, those who accept inferior offers are more likely to default
- Excludes moral hazard as a possible explanation

**Field Experiments: Karlan and Zinman (2008)**

- South African consumer credit market
- Lender offered credit (via direct mail solicitation) that differ along three dimensions
  1. initial offer rate $r^o$: rate on the solicitation
  2. contract rate $r^c$: rate determined after client applies and is reviewed
  3. future rate $r^f$: rate if borrower remains in good standing
- Identification strategy: Differences in default rates between cells
- Evidence of significant moral hazard, weak evidence of adverse selection
Natural Experiments

- Due to some exogenous factors same people face different contracts
- Selection is not a problem
- Lazear (2000): Auto glass company
- In 1994 the company moved from hourly wage to piece-rate pay, with a guaranteed minimum of $11 an hour

Theory | Evidence
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Incentive effect: Average output per worker will increase | 44% increase in average output per worker
Variance of output per worker will increase | 12% increase in standard deviation
Screening effect: New hires will be more productive | They are and half the increase can be attributed to this effect

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- Tenancy reform in West Bengal in 1977: Once registered
  1. Sharecroppers have permanent and inheritable tenure on land
  2. Landlord cannot demand more that 25% as rent
- Theory: Moral hazard with limited liability - with and without possibility of eviction
- Two channels of impact on productivity
  1. Bargaining power of tenant increases ⇒ higher share for tenant ⇒ stronger incentives
     * Positive effect
  2. Security of tenure:
     * Eviction threat provides incentives: Negative effect
     * Security of tenure provides incentives for investment: Positive effect
- Used two methods to measure impact
  1. Bangladesh as control
  2. Compare changes in productivity across districts with different registration rates
- Found that reform significantly increased productivity

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Natural Experiments: Chiappori, Durand, and Geoffard (1998)

- 1993: French public health insurance decreased payment for some services
- Private supplementary health insurance companies modified coverage non-uniformly
  - Some compensated for the change: kept co-payment rate at zero
  - Some introduced co-payment of 10%
- Panel data of clients in different companies
  - Faces different coverage
  - Use of health services observed before and after
- Number of home visits significantly decreased for treatment group (who experienced change in coverage) but not for control group (no change in coverage)
- Unlikely to be due to selection
  - Two populations employed by similar firms and display similar characteristics
  - Health insurance is mandatory

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Explicit Modeling: Paarsch and Shearer (2000)

- Incentive effects in tree planting in British Columbia
- Firm chooses fixed-wage or piece-rates
  - Piece-rates provides better incentives to plant more trees
- Quality of planting is important as well
  - Firm pays a fine for poorly planted trees
- Productivity depends on effort and planting conditions
- It is more difficult to plant well under difficult conditions
  - Under piece-rates and difficult conditions worker may choose to plant poorly
- Firm is more likely to choose fixed-wages when conditions are poor

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Explicit Modeling: Paarsch and Shearer (2000)

- Observed productivity differences under two compensation systems is a combination of:
  1. Incentives: piece-rates increases productivity
  2. Selection: piece-rates more likely under better planting conditions and therefore provides an upper bound for the incentive effect
- They estimate a structural model:
  ▶ workers choose effort and quality
  ▶ firms choose compensation system
- Incentive effect: piece-rates increase productivity by 22.6%


- Share-cropping in Tunisia
  - Tenants: risk-neutral but face financial constraints
  - Landlords: cannot observe effort and choose contract
    ▶ Rental
    ▶ Wage
    ▶ Share
- Estimates production functions, adding contract dummies
  - Rental contract increases production by 50 percent relative to sharecropping
  - But financial constraints make these often impossible
  - Another prediction: tenants with less working capital tend to work under sharecropping or wage contracts
    ▶ Supported by data

Signaling: Bedard (2001)

- Tests signaling model of education against the human capital model
- Uses ease of access to university (presence of a local university) as an instrument
- Human capital model:
  ▶ Education enhances productivity and increases earnings
  ▶ Individuals decide comparing marginal benefit and cost of additional education
  ▶ Easier access to university ⇒ More high-school graduates go to university
- Signaling model
  ▶ Easier access to university ⇒ High ability high-school graduates go to university
  ▶ Average ability of high-school graduates becomes lower
  ▶ Incentives to pool with them become weaker
  ▶ Low ability students drop out of high school
- The paper finds that easier university access
  1. increases the probability to dropout from high school
  2. increases the average skill of dropouts
- Rejects human capital model in favor of the signaling model

Signaling: Lang and Kropp (1986)

- Tests signaling model of education against human capital model
- Uses compulsory school attendance law (CAL) as an instrument
- Signaling model:
  ▶ Suppose CAL increases minimum education from $s - 1$ to $s$ years
  ▶ Lower ability workers who would have left school after $s - 1$ will now remain in school through $s$
  ▶ Average ability and therefore wage of workers with $s$ years of education decrease
  ▶ For the more able workers who previously stopped at $s$ years, obtaining $s + 1$ years of education becomes more attractive, and so on
  ▶ Prediction: CAL increases educational attainment of high-ability individuals who are not directly affected by the law
- Human capital model:
  ▶ Prediction: No change in educational attainment of those who are not directly affected by the law
- They find CAL indeed increases the education received by those who are not directly affected by the law and hence reject human capital model in favor of the signaling model