Empirical Test of Asymmetric Information in the Insurance Market

We will follow Chiappori (Handbook of Insurance).

Insurance markets are

- an important area of theoretical analysis in contract theory.
- an important area of empirical validation of contract theoretical predictions.

These contract theoretical predictions are generally stating a relation of

- contractual structure
  (profit sharing, coinsurance, ...),
- performance
  (output, profit, occurrence of a loss, ...) and
- a transfer (wage, insurance premium, ...).

Requirements for a test

To be able to test the predictions we need data on

- the contracts,
- the information available to both parties;
- the performance, and
- transfers.

For insurance contracts these conditions are met. Moreover we usually have large samples of standardized contracts.

Testable predictions from AS models

Note that we are only dealing with models on asymmetric information on the risk type, not about preferences (risk aversion, etc.)!

Non-exclusive contracts

$\Rightarrow$ no scope for convex price schedules / quantity constraints

$\rightarrow$ The market shrinks (standard AS phenomenon).

$\rightarrow$ HR types are over–represented amongst the insured.

$\rightarrow$ The higher a type's risk, the more insurance is bought.

$\rightarrow$ Prices are higher than in the absence of AS (testable e.g. with annuities where mortality data for the population is readily available).

Exclusive contracts

The exact prediction delicately depends on the equilibrium concept under consideration. This is problematic as subtle changes in the concept/game structure may change these predictions dramatically.

Fairly robust patterns are:

→ Agents are free to choose from a menu of contracts.

→ Convex price schedules (i.e. increasing marginal premium rate for higher coverage) are used.

→ HR types choose higher coverage.

Testable predictions from MH models

For MH models the following basic reasoning applies:

Agents are confronted with different contracts.

$\Rightarrow$

This implies that they are facing differing incentives.

$\Rightarrow$

This will lead to differing actions (e.g. levels of care).

$\Rightarrow$

Leading to differing accident frequencies.

Robust prediction

More comprehensive coverage will be associated with more accidents.

But it is hard to discriminate this against AS predictions !!

So we have to look for

- **natural experiments**, i.e. situations where through exogenous shocks (e.g. changes in regulation) there is a ceteris paribus change in the contractual environment,
- or **quasi–natural experiments** where the incentives differ across agents (and these agents are allocated randomly).

Dynamic Properties – optimal contracts

Repeated AS models

The predictions depend on the assumptions on the abilities to commit. Under fairly general assumptions we find

- (partial) pooling (in the sense that HR and LR types choose the contract with partial coverage).
- "highballing" (i.e. the insurance companies earn profits early on in a relation).

Repeated MH models

Crucial for the predictions are the assumptions on the access to financial markets (i.e. whether saving/borrowing is possible/observable).

$\Rightarrow$ basically no clear–cut and robust predictions

Dynamic Properties – sub–optimal contracts

Repeated AS models

We expect to find **positive contagion** (i.e. positive serial correlation. Many accidents today should be correlated with many accidents later on.

Repeated MH models

We expect to find **negative contagion** (i.e. negative serial correlation. Many accidents today should (via experience rating/bonus–malus–schemes) lead to higher marginal costs for an additional accident and therefore be correlated with less accidents later on.

To test these countervailing predictions against each other we need detailed data on an individual level.

Claims vs. accidents

An important problem for the econometrician is the fact that in general we only observe claims actually filed by the insuree and not accidents.

The observed distribution of claims is endogenously biased away from the true distribution of accidents. Consider the following example:

A contract specifying a deductible discourages filing small claims. Thus the **observed distribution** of claims is a **truncation of the true distribution** of accidents. This truncation is endogenous due to the contractual structure and may lead to a **spurious correlation**.

A high deductible discourages the filing of many small accidents. Thus we observe less claims when the deductible is high. That is in line with the prediction as from AS or MH models.

$\Rightarrow$ We need controls to tackle this problem.

E.g. we can focus only on accidents with bodily injuries where reporting is mandatory. But this comes at a cost as it reduces dramatically the number of observations.

Empirical Tests

AS with non–exclusive contracts

Life Insurance

So far no study has found evidence for AS in life insurance markets.

Annuities

Friedmann and Warshawski (1990) find that annuities yields are significantly below that of US government bonds. That corresponds to the price being above the "fair" price as calculated from mortality data for the US. This confirms the AS prediction.

Finkelstein and Poterba (2003) analyze the market for annuities in the UK. They make use of differently structured annuities and find some evidence for AS in this market.

- Purchasers of annuities with "backloading" (i.e. increasing payments over time) tend to be longer lived than purchasers of annuities with constant payments over time.
- Purchasers of higher priced annuities tend to be longer lived.
- Purchasers of annuities with guaranteed pay–out periods (even after death of insuree) tend to die younger.

But: They don't find evidence for a higher demand for annuities amongst HR (i.e. longer lived) types.

AS with exclusive contracts

Puelz and Snower (1994) analyze data from an automobile insurance in Georgia (US).

They **confirm the AS predictions** that

- higher premia are associated with a lower deductible and
- that a lower deductible is associated with a higher accident probability/frequency.

However there approach is plagued by several problems:

- They have to approximate the true accident probability by a dummy, the observed accident frequency.
- They do not have controls for the "claims vs. accidents" problem.
- There sample contains heterogeneous drivers (w.r.t. age, driving record). Due to experience rating or

the like these face different incentives which biases the estimation.

Chiappori and Salanie (2000) offer a more elaborate treatment of the data and **don't find evidence for AS.**

AS vs. MH

Natural experiments

The so called **“RAND” experiment** was conducted by the California-based RAND Corporation, one of the world’s eminent research institutes, or “think tanks”, over an 11-year period from 1971 to 1982.

About 2,000 (randomly selected and assigned) families were enrolled in a variety of different insurance plans. The insurance plans varied in two characteristics: their **coinsurance rates** and their **deductibles**.

The coinsurance rate - the fraction of expenses paid out-of-pocket by the families - varied from 0 percent to 95 percent. The deductible amounts - the level of annual health spending at which the insurance company pays all subsequent charges - were percentages of family income (5, 10, or 15 %), up to a maximum of $1,000.

Outcomes within the assigned plans for about 1,400 of the families were followed for 3 years; the other 600 were tracked for 5 years. Among other things the **effect of different contracts on health spending** was examined.

Those families who paid 25 % out-of-pocket (up to a total of $ 1,000 maximum per year) incurred annual health care costs, on average, of $ 826. By comparison, those with 0 % coinsurance incurred annual costs of $ 1,019. **I.e. a 25 % coinsurance rate led to a reduction in annual cost of $193, or 19 %.**

This drop seems to suggest that rather (ex–post) MH then AS plays a role in the health insurance market.

Dionne and Vanasse (1996) analyze another interesting case. In 1978 the state of Quebec introduced a “no–fault” insurance system for car accidents which was abolished again in 1992.

In a no–fault system victims of auto accidents have no access to the courts to obtain damages for economic and non-economic losses. Instead, all benefits are determined by a set of predetermined rules that are put in place by the government. Given the large amounts that are involved in North American law suits the change of legislation in 1992 led to increased incentives to avoid accidents.

As we would expect they find a drop in accident frequency after the 1992 change of legislation, again making MH the problem more likely being at hand.

But still this study only establishes simultaneity, not causality. The drop of accidents rates following the change of legislation may only be accidental or both events are driven by a third, not observed variable.

To check for that we would need a randomly assigned control group (like in the RAND study).

Quasi–natural experiments

Chiappori and Salanie (1997) analyze the case of French automobile insurance. In France children of parents with low accident rates can benefit from discounts on their own insurance premium.

This delivers two contradicting predictions.

1 If MH is the problem at hand the system leads to lower marginal costs of an additional accident for children of LR parents. Thus we would expect these to have **more** accidents.

2 If AS is the problem (and we believe that children's and parents' accident rates are correlated) we should expect these "LR children" to have **less** accidents.

Chiappori and Salanie (1997) find evidence in favor of hypotheses 2.

Dynamic properties of contracts

Optimal contracts

Dionne and Doherty (1994) find evidence for "highballing" in the automobile insurance market in California.

Sub–optimal contracts

Chiappori and Heckman (2000) develop a theoretical framework that enables us to test the negative contagion hypotheses.

The test with data is still to be done ...