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MECHANISM DESIGN, BOUNDED RATIONALITY, AND ISLAMIC FINANCE

Research Profile of Suren Basov

Dr Suren Basov
Executive Editor of JSFT
Associate Professor
Department of Economics and Finance
La Trobe University
My areas of expertise

- Mechanism design with applications to asset pricing and corporate finance
- Bounded rationality and evolutionary game theory with application to behavioural finance
- Islamic banking and finance
Mechanism design with applications to asset pricing and corporate finance

- **Mechanism design** found numerous applications in the auction theory, theory of taxation and non-linear pricing, asset pricing, corporate finance and other areas.
- I contributed to the literature in the areas of non-linear pricing, auction theory, and asset pricing and am currently working on a corporate finance application.
Applications of mechanism design

- Mechanism design studies private information games.
- In a mechanism design problem, the objective is given, and the goal is to find the optimal mechanism to implement it.
- The two distinguishing features of mechanism design problems are:
  1. that the designer chooses the game structure rather than inheriting one
  2. that the designer is interested in the game's outcome
My Contributions to Mechanism Design and its Applications

• In my research I applied mechanism design techniques to:
  1. Theory of nonlinear pricing
  2. Auction theory
  3. Asset Pricing
Nonlinear Pricing

• In many industries the tariffs are not strictly proportional to the quantity purchased, i.e. they are nonlinear.

• Examples of nonlinear tariffs include railroad and electricity schedules and rental rates for durable goods and space.

• The major justification for the nonlinear pricing is the existence of private information on the side of consumers.

• Often the nonlinear tariffs specify the payment as a function of a variety of characteristics. For example, railroad tariffs specify charges based on weight, volume, and distance of each shipment.

• Different customers may value each of these characteristics differently.

• In such models the consumer's private information (her type) is captured by an \( m \)-dimensional vector, while the good produced by the monopolist has \( n \) quality dimensions, where both \( m \) and \( n \) are typically greater than one.
Nonlinear Pricing: One-dimensional Models

• Models with $m=1$ are known as one-dimensional models
• Such models are well studied and found numerous applications in auction theory, theory of industrial organisation, theory of optimal taxation, labour economics, and finance
• In finance such models can be used to study liquidity supply to traders with known degree of risk aversion and the optimal leverage of the firm
• My main contributions to this area are:
There is a growing empirical evidence that calls into question the utility maximization paradigm.

The models of boundedly rational behaviour can be divided into two classes: static and dynamic.

In static models choice is assumed to be probabilistic. It is typical in this type of models to impose some intuitive restrictions on the choice probabilities and study the probability distributions that satisfy these restrictions.

In dynamic models individuals are assumed to adjust their choices over time in directions that appear beneficial.

The distinctive feature of this type of models is an attempt to capture the fine-grain adjustments made by the individuals on the basis of their current experiences.

On a very general level, such adjustments produce a stochastic process on the choice set. The probability distribution of choices of a static model can be naturally viewed as the steady state distribution of the stochastic process arising from a dynamic model.
One advantage of the dynamic models of bounded rationality is their ability to account explicitly for the interaction between the economic agents. This ability can be of the utmost importance for the modelling of the financial markets. Research shows that around 20% of investors are attracted to the company simply by word of mouth communication. Highly relevant factors such as being a spinoff or having a similar company counted only for 2%. This means that social learning can be potentially important for the stock price behaviour. On the basis of this type of evidence I argued for a need of a complexity adjusted efficient market hypothesis in an editorial for this journal. Towards Complexity Adjusted Efficient Market Hypothesis, 2013, Journal of Stock and Forex Trading, 2(2) p. e119.
Static models of bounded rationality can also be useful in finance.
For example, they can be used to model behavioral biases and their effects on corporate policy.
A related area is known as behavioral finance.
For an introduction, see
Inefficient Markets: An Introduction to Behavioral Finance
By Andrei Shleifer, Oxford University Press, 2000
Bounded Rationality: My Contributions I

- My contributions to the literature on bounded rationality include papers that deal with both static and dynamic models

- The contributions are:
Though neither of my papers deals with applications to finance, the techniques developed in this paper, especially in 2003 reference, can be very useful when modelling financial markets.
Mechanism Design under Bounded Rationality: The Main Lesson

- Apart from contributing separately to the areas of bounded rationality and mechanism design, I made several contributions to the area of mechanism design under bounded rationality.
- The main lesson is that even slight deviation from full rationality may change the nature of optimal contract significantly.
- For example, a monopolist may choose to produce goods of different qualities in different flavors with more flavors for the high quality goods even when consumers care only about qualities.
- On the technical side, the cherished principal of the mechanism design literature, the Revelation Principle, will be cease to apply.
Mechanism Design under Bounded Rationality: My Contributions


Islamic Finance

- Recently Islamic Financial Institutions (IFI) experienced unprecedented growth.
- Sharia-compliant financial assets grew approximately 2.6 times during last 10 years.
- This growth is fuelled by petrodollar liquidity and worldwide growing Muslim population.
- The growing demand for Islamic Finance services has not been matched by adequate supply.
- Moreover, often IFI perform my poorer than their conventional counterparts.
- Theoretical understanding of the issues involved in modelling of performance IFI is in its infancy.
In an editorial written for this journal

- Islamic Finance as a Mechanism Design Problem, 2013, *Journal of Stock and Forex Trading*, 3(1), e124

I suggested that IF should be properly viewed as a mechanism design problem

I concluded that:

- Applying MD approach can help to better understand and improve Islamic financial products. Since well-designed contracts
- Allow a better matching of human resources to the economic needs and
- Provide proper performance incentives for economic agents
- Allow eliciting and putting to good use the private information of economic agents
Mechanism Design Approach to Islamic Finance: An Example I

1. An entrepreneur with no funds seeks financing for a project.
2. The profits from the project depend on the entrepreneur’s effort and ability.
3. Neither effort nor ability can be observed by the lender (bank).
4. The bank offers a financial contract and may specify desired effort.
5. If no effort level is recommended all entrepreneurs choose optimal effort in response to the financial contract.

6. If there is a recommended financial effort an entrepreneur will experience psychological disutility from deviating from the recommended level of effort.

7. The degree of disutility is private information of the entrepreneur and is not observable by the bank.

8. Bank offers a menu of contracts consisting from a fixed wage, a profit-loss sharing rule, and recommended effort (if it chooses to include it).
• Model in its generality falls into the class of multidimensional screening model discussed above

• To get some intuition we will assume that entrepreneurs fall into two classes with respect to the disutility of cheating:
  1. fully faithful (always exert the recommended effort)
  2. fully opportunistic (completely ignore the recommended effort)
If there are sufficiently many faithful productive entrepreneurs the bank will offer contracts of two types: fixed wage contracts, with a moderate recommended level of effort increasing in the average productivity of the faithful types; incentive contracts with very high level of recommended effort.

If there are few faithful entrepreneurs or they are not sufficiently productive the bank will offer only incentive contracts with very high level of recommended effort, i.e. it will find it optimal to completely exclude the faithful entrepreneurs.
Islamic Finance Institutions: Disadvantage Magnification Mechanism

- However, even with best mechanism design tools additional asset and contract limitations faced by IFIs may prove to be a significant handicap, especially when they are magnified by a matching mechanism.

- An example of effect of contract limitations is studied by me with co-authors in:

- This mechanism can result in IFIs to be matched to the less talented entrepreneurs.

- The mechanism is studied by me with co-authors in:
Journal of Stock & Forex Trading

Related Journals

- Industrial Engineering and Management
- Journal of Global Economics
- Journal of Accounting and Marketing
- 2nd International Conference on Business Economics and Management
- International Conference on Advertising and Marketing Expo
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