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Designing Mechanisms for Policy

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As part of its efforts to revive the economy, the Government of India recently announced a major cut in corporate taxes – from 30% to 22% for older companies, and from 25% to 15% for new manufacturers. A motivating factor for the lower bracket for new manufacturers was presumably the desire to court supply chains forced to relocate under the heat of the US-China trade war; most of the east Asian countries have tax rates below 20%. The broad cuts were welcomed widely; however, an unintended consequence in the short term seems to be a pause in big capital expenditure projects from older companies. It might after all be more lucrative for such older companies to incorporate new units to take advantage of the 22% versus 15% arbitrage opportunity, if the rules could provide wiggle room for it, and firms are not ready to take the leap until they are sure. The unequivocal winners seem to be the tax lawyers who have been employed in their hordes to pore over the fine-prints of the announcements.

Economists have been troubled by the law of unintended consequences for a long time. In fact, such concerns figure prominently in the writings of the forefathers of modern economics like John Locke and Adam Smith in the 17th and 18th centuries. Yet, it was only with the inauguration of the modern field of mechanism design and implementation theory in the latter half of the 20th century that we finally managed to get a technical glimpse at how this law operates. Even then, our understanding remains limited at best, and many of the best minds in economics in recent years have been working on pushing the frontiers of this field.

1. The 2007 Nobel

The citation for the 2007 Nobel memorial prize in economics, awarded to Leonid Hurwicz, Eric Maskin and Roger Myerson, read:

[...] Many transactions do not take place in open markets but within firms, in bargaining between individuals or interest groups and under a host of other institutional arrangements. How well do different such institutions, or allocation mechanisms, perform? What is the optimal mechanism to reach a certain goal, such as social welfare or private profit? Is government regulation called for, and if so, how is it best designed? [Press Release, Royal Swedish Academy, 15 October 2007]

This Nobel was an award celebrating the founders of modern mechanism design theory – also called the theory of design of economic institutions. Hurwicz was 90 when he got the award, the oldest laureate in economics, and such recognition and adulation was a far cry from his early days, when as a young Polish mathematician in the 1940s, he had to wander from institution to institution trying to find a safe haven from Nazi man-handlers. Part of the reason for the wandering was also because he had started to work on a mathematical theory of incentives, based on game theory, that few people at the time could fully appreciate. In the intervening decades, economists gradually came around to acknowledging the power of Hurwicz's vision. A number of missing links were later clarified by Roger Myerson, as he developed his theory of optimal mechanisms, and Eric Maskin, as he pioneered the area of implementation theory, and today, the concepts these researchers invented – like incentive compatibility or individual rationality – are part of the lexicon of any serious economist.

2. Mechanism Design

It is easy to see the basic idea behind mechanisms through an example. In the Hebrew Bible, King Solomon is presented with a dilemma when two women approach him, each claiming to be the mother of an infant. Who is the real mother, courtiers wonder, as the wise king ruminates on what to do. A similar story is popular in the Birbal fables, where the two women beseech emperor Akbar, who in turn enlists Birbal's help. In modern terms, Solomon or Akbar were assigned mechanism design problems: they must create rules of a game such that the mother gets her baby while the impostor gets punished. At a certain level, all economic interaction can be interpreted as gameplay between economic agents. Mechanism design is then the study of rule-making such that the objectives of the designer are met. In the case of Solomon or Akbar, the objective is to give the baby to the mother and punish the deceiver. In case of the government of India, the objective is to revive investments in the economy.

Mechanism design is hard because the rule designer does not have all the information that the agents playing the game have and wants to avoid unintended consequences. Solomon does not know who the real mother is, and if he were to simply ask the two women, both would claim to be mother (one is lying). Thus, the rules that a designer puts into place need to subtly embed a way of eliciting the truth from agents. Roughly, this corresponds to what economists call incentive compatibility. The government's tax slabs do not appear to be incentive compatible because older firms have an incentive to lie their age (in other words, incorporate new firms for capex) to take

advantage of the difference in tax rates. Solomon and Akbar, on the other hand, came up with incentive compatible solutions. They declared that the baby would be cut into two – one half for each mother. At this, one of the women cried out in horror, giving up her claim and begging that the child not be hurt. The kings immediately declared this woman as the true mother, and the impostor was put into jail. The intention to cut up the child into two was the subtle ruse that the kings used to elicit the truth from the women.

3. Implementing Mechanisms

Over the years, economists have developed several tools to solve various kinds of mechanism design questions. Many of these techniques work in specially constructed, abstract mathematical spaces (all the three laureates were doctorates in mathematics). So, the way one goes about solving these mechanism design questions is by first translating the actual problem into the appropriate abstract setting that holds most promise, and then applying already available tools in that abstract space to simplify and solve the problem. One of the most famous translation tools goes by the name “Revelation Principle,” discovered by Roger Myerson, which gives a workaround to the complications that arise from agents lying in the game.

Once one has a solution in the abstract space, it needs to be converted back to its original, actual setting. This is the problem of implementation, a hard problem in its own right. The foundations of implementation theory were laid by Eric Maskin in the late 1970s as he followed up on Hurwicz’s early ideas. The key insight goes by the name of “Maskin monotonicity,” and defines a property that social rules need to have if they are to be implementable. King Solomon and Akbar found clean, implementable solutions to their problem: the two women reacted differently, and the impostor was punished. The government’s revised tax policy, however, requires a lot of extra actors for implementation: legal consultants and enforcers who will need to verify age of firms, and punish those that exploit loopholes. The more the number of actors that need to be involved, the higher the likelihood of slippage in implementation.

4. Mechanism Design for Policy

Mechanism design questions crop up in all areas of economic life on a regular basis. How do we allocate limited resources like mobile bandwidth? How do we design support prices for agricultural produce? How do we create rules for foreign firms operating in a country? How do we design tax policies to support welfare? The list goes on. In many advanced economies like the US or European Union, at first brush, research active economists are called upon to work on the thorny mechanism design questions implicit in these problems. For example, one of the most complicated auction mechanisms in recent times – where the US government bought back unused bandwidth from television operators and sold it off to internet operators within the same auction – was designed

by Paul Milgrom, a highly respected auction theorist, and his team at Stanford University. Often, such original research solutions go on to establish new paradigms of thinking in economic theory.

As India advances in economic strength, it is likely that the country will face many new and unprecedented questions in economic design. The traditional approach in India has been to rely on a cadre of generalists – the Indian Administrative or allied services – to come up with solutions. Yet, as the economy gets more developed and specialized, such problems will go beyond the ken of the all-purpose generalists. For economic policies to be successful, they will need the imprimatur of brilliant, thinking economists. Such a cadre needs to be developed in India's policy benches sooner rather than later.
