Tariff Mechanisms

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Motivation

An agent with private information and quasilinear utility chooses an action (e.g., how much to consume) and the principal decides how much the agent has to pay.

The taxation principle states that every mechanism can be replaced with a *tariff*: a function that indicates for each action how much the agent has to pay. This principle assumes that *the principal can surely and perfectly observe the agent's action.*

In many settings, however, actions are observed only if they trigger specific outcomes, and imperfectly so. For instance, theft is punished only if it is detected. Tariffs may then suboptimal. For various reasons, a regulator may be still interested in tariff-like mechanisms, which are mechanism for which the agent's payment depends on some specific events and what the principal could observe about the agent's action.

We identify conditions that recover part of the taxation principle when actions are not observable. This conditions are useful in the design of liability rules with contingent actions.

Setting

The timing is as follows:

1. An agent has a private type and chooses an action.

2. This generates an *outcome*, whose distribution depends both on the type and action of the agent.

3. *Some* outcomes trigger an *intervention* and some do not.

4. If there is an intervention, the principal observes some *evidence* (including the outcome) and makes a transfer to the agent.

The principal has full commitment power and can contract with the agent ex ante. By the Revelation Principle, we consider without loss of generality direct mechanisms in which the agent reports his type at the beginning, receives some recommended action for his type, and receives an (report, evidence)-measurable transfer for any intervention-inducing outcome.[1]

A map f from types to actions is *implementable* if there exists a *penalty function*, mapping reports and evidence to transfers, such it is incentive compatible for the agent to report his type truthfully and take the prescribed action.

A map f from types to actions is *tariff-implementable* if it can be implemented without the need of the agent reporting his type. Formally, this means that there is a penalty function (that maps evidence to a transfer) such that it is incentive compatible for each type to take the prescribed action.

A map f from types to actions is *action-identifying* if there is a partition of the set of actions such that:

- The map picks only one action for each element of the partition.

- The set of intervention-inducing outcomes achieved by the implemented action in a given partition element is disjoint from any such set obtained for another partition element.

We show the following result:

THEOREM 1 *If f is implementable and action-identifying, then it is tariff-implementable.*

Relation to Esö and Szentes: ES show that under some general conditions communication after the initial point is irrelevant: the principal does not need to ask what the agent learned after the initial communication stage.

We provide conditions under which all communication is irrelevant for tariff-mechanisms to be wlog. Our result is different: it describes situations for which little is lost when interventions occur ex-post and communication is not feasible ex ante.

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[1] A version of the taxation principle can be applied here in the sense that without loss of optimality the principal can offer a menu of tariffs instead of asking the agent to report his type. Such a menu does constitute a tariff in the usual sense.

Application: Our project on liability design provides an application in which implementable policies are action-identifying.