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Journal of Economic Theory 157 (2015) 1159–1187

JOURNAL OF Economic Theory

www.elsevier.com/locate/jet

Contract design and non-cooperative renegotiation

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Received 7 February 2013; final version received 1 December 2014; accepted 3 December 2014

Available online 18 December 2014

Abstract

We study a contract design setting in which the contracting parties cannot commit not to renegotiate previous contract agreements. In particular, we characterize the outcome functions that are implementable for an uninformed principal and an informed agent if, having observed the agent's contract choice, the principal can offer a new menu of contracts in its place. An outcome function can be implemented in this setting if and only if it is optimal for the principal for some belief over agent types which is more pessimistic, in the sense of the likelihood ratio order, than the prior. Furthermore, the outcome function cannot be too sensitive to variations in the agent's type. We show that the direct revelation mechanism which implements such a function when renegotiation can be prevented will also implement it in any equilibrium when it cannot, so the standard contract is robust to renegotiation.

JEL classification: D820; D860

Keywords: Renegotiation; Mechanism design; Contract; Commitment

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http://dx.doi.org/10.1016/j.jet.2014.12.001

1. Introduction

One of the main messages of the literature on contract renegotiation is that an inability of contracting parties to commit themselves not to renegotiate hurts those parties because it limits the use of ex ante contracts and prevents desirable outcomes from being implementable.

A leading example is the hold-up problem, in which investment that increases the expected benefit of a relationship is not undertaken because the investing party fears expropriation of the investment benefits by its partner. An ex ante contract specifying the division of ex post surplus between contracting parties can serve to alleviate this problem but its renegotiation will ultimately affect this division and hence damage investment incentives. This problem has been studied in various settings (for example, with symmetric information, asymmetric information, selfish investment, cooperative investment) and has been shown in most cases to limit the scope of contracting and decrease the level of investment; see for instance Segal [33], Maskin and Moore [24], Che and Hausch [7], Reiche [32] and Goltsman [15].

Renegotiation can also be harmful in situations in which a trading opportunity is repeated several times and in which parties cannot commit not to renegotiate future trade agreements; see for instance Dewatripont and Maskin [10], Hart and Tirole [18] and Laffont and Tirole [21,22]. In this context, the ratchet effect implies that parties tend to understate the value of trade in order to avoid more demanding schedules (for example, a higher price) in the future. Spot contracts or long-term contracts which are vulnerable to renegotiation tend to be less efficient in solving the asymmetric information problem between trading partners than long-term contracts which cannot be renegotiated.

We consider a standard contracting problem between an uninformed principal and a privately informed agent, and ask which outcome functions (mappings from the agent's private information into some action and transfer payment) can be implemented when parties cannot commit not to renegotiate their contract. More precisely, we suppose that after the agent has played the initial mechanism, determining a default outcome, the principal can offer a second-stage mechanism which, if the agent accepts it, determines the actual outcome. This second mechanism will of course depend on what the principal has learned from her interaction with the agent in the initial mechanism and we can consequently not assume that the agent's initial message fully reveals his type. That is, the standard revelation principle does not apply.

Most of the literature on contract renegotiation is concerned only with implementing the outcome function which is optimal for the principal at the stage when the mechanism is played (see, for example, Skreta [35] or Bester and Strausz [5]). In our setting this outcome function is simple to implement, as is the ex post efficient one. However, in many contexts (such as the hold-up context mentioned above) this is not the best outcome function to implement. Our aim is to characterize all outcome functions that can be implemented subject only to the agent's incentive and participation constraints and the constraint of subsequent renegotiation. What outcome functions are optimal will depend on the particular circumstances; for instance, it will depend on who designs the initial mechanism, whether the principal or an outside agency such as a social planner.

If the designer is the principal she might, as in the hold-up problem, want to propose ex ante a mechanism to improve investment incentives. This will not, in general, be the same as the one which is optimal for her once investment is undertaken and the state of the world is realized. At this point the initial purpose of the mechanism is served and the parties will have an incentive to renegotiate the existing contract. In the next section we outline our results in the context of a specific example of this kind. Alternatively, the principal might want to propose a mechanism to