



Investments and bargaining in a model with positive consumption externalities[☆]



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ARTICLE INFO

Article history:

Received 19 November 2012

Received in revised form 18 June 2014

Accepted 27 July 2014

Available online 23 August 2014

JEL classification:

C78

J24

D62

Keywords:

Investments

Hold-up

Multilateral bargaining

Pareto efficiency

Externalities

ABSTRACT

This paper analyzes the investment decisions of the members of a committee when a subsequent bargaining process determines the distribution of a divisible good among them. The shares allocated to investing agents generate positive consumption externalities. We show that agents' investments improve their bargaining position. This induces rent-seeking behavior that generates a negative external effect on other investing agents. In this setting, the effects of rent-seeking counterbalance the effects of positive consumption externalities so that equilibria may be efficient or display either over- or under-investment.

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1. Introduction

Consider a research center comprising different units that must negotiate how a fixed budget should be distributed among these units. Before entering into negotiations, each research unit strategically decides whether to increase its competence by investing in human or physical capital. The share of the budget assigned to the investing units benefits the rest of the units as the reputation of the whole research center – and possibly, future funding – is enhanced as a result of better quality research. Thus, a unit can improve its bargaining outcome by investing, since the other research units will be more willing to allocate a larger share of the budget to these investing units. This example illustrates the strategic environment considered in this study: a dynamic game in which the members of a committee may invest to generate positive consumption externalities for the rest before engaging in a multilateral bargaining game to distribute a divisible good among them.

Our study stands within the hold-up problem literature. According to Che and Sákovics (2008), such a problem arises when “part of the return on an agent’s relationship-specific investment is *ex post* expropriable by his trading partner”. Generally,

[☆] We acknowledge financial support from the Generalitat de Catalunya through grant SGR2009-1051 and Ministerio de Ciencia y Tecnología through grants ECO2009-06953, ECO2011-23934 and ECO2012-34046.

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this leads to under-investment because the returns on an individual investment cannot be fully appropriated by the agent that invested. For example, Grout (1984), Hart and Moore (1988), and Schmitz (2001) show that this occurs when investments unconditionally increase the surplus generated by a particular group, which is then shared among all its members. The literature contains different mechanisms that show how agents can circumvent the hold-up problem and make efficient relationship-specific investments. For example, this can happen when the agents' disagreement points in the bargaining process are affected by their investment decisions, as in Chung (1991), Rogerson (1992), Aghion et al. (1994), Noldeke and Schmidt (1995), Edlin and Reichelstein (1996), and Che and Hausch (1999).¹ These papers study situations in which parties may write (incomplete) pre-contracts, allowing agents to appropriately fix their bargaining disagreement points through the investment decisions they take. In such cases, although investment is relationship-specific, *ex post* negotiations do not necessarily lead to under-investment and efficient levels of investment may be obtained because investing agents appropriate their marginal contribution. Che and Hausch (1999) point out that these conclusions crucially depend on the nature of the specific investments. In particular, when a pre-specified contract is settled, efficiency might be obtained when investment only increases the disagreement point of the agent who invested (selfish investment). However, if investment also increases the disagreement point of the counterpart (cooperative investment) then equilibrium outcomes may display under-investment. Remarkably, in these models in which agents write pre-contracts and make selfish investments, rent-seeking behavior to obtain advantageous disagreement points never leads to over-investment. This is because the disagreement points induced require the consent of all players. Rather, over-investment would reasonably appear in a model in which they are settled non-cooperatively (see, e.g. de Meza and Lockwood, 2010).

In line with this literature, our model provides a new setting with the particularity that investments do not affect the agents' bargaining disagreement points but they create a strong dependence between the distribution of the budget and the available surplus, because only the shares allocated to investing agents generate positive consumption externalities. Our results show that this dependence grants investing agents a better bargaining position and this causes a rent-seeking behavior whose effects counterbalance the underlying forces leading to under-investment. Specifically, our baseline model studies a committee of *ex ante* identical impatient agents who participate in the following dynamic game: First, they decide whether to invest and second, they participate in a standard bargaining game to distribute a commonly owned divisible good among them. In each stage of this bargaining game, one agent is randomly selected to propose a distribution of the good whereas the rest of the agents must respond to this proposal by either accepting or rejecting it. When acceptance is unanimous the distribution is implemented; if not, the negotiation moves to the next period and the process re-starts. Only the shares obtained by those agents that invested in the first stage generate positive consumption externalities.² Thus, a typical agent's utility depends positively on both her own share of the good and the share allocated to investing agents.³ Therefore, a larger share allocated to investing agents increases the aggregate surplus due to consumption externalities. If the allocation of the budget was exogenously given, the investment game would generally result in equilibria where the agents' level of investment is below the efficient level, as in the classic public good problem. However, the subsequent negotiation gives rise to an interaction between two effects that may alter this result: (i) positive consumption externalities can be internalized, at least partially, because those who invested are able to appropriate (part of) these positive effects on others by means of a higher equilibrium bargaining share; and (ii) an additional investing agent reduces the equilibrium bargaining share of others who also invested, so investment may generate negative externalities for others. Our results show that equilibrium outcomes might be efficient or they may display either over- or under-investment, so the negative externalities derived from rent-seeking may offset the inherent positive consumption externalities of the model or *vice versa*.

Let us return to our example of the research center to interpret our main results. In the extreme case, where investment is too costly, none of the research units invests, so there are no positive consumption externalities. Then, the budget would be split equally among all the units. Alternatively, when investments are not that costly, some of the research units decide to invest and increase their competence bringing two external effects into play: On the one hand, the consumption externality mentioned above leads to under-investment because the investing units do not take into account the benefits that their investment brings to all the other units. On the other hand, there is a negative externality that leads to over-investment. This negative externality arises because at the investment stage, the investing units do not internalize the fact that their choice would reduce the fraction of the budget assigned to other investing units in the equilibrium of the ensuing negotiation. The size of the consumption externalities and investment costs determine which of the two externalities is dominant: The negative externality dominates when investment costs are so low that two or more units invest, so equilibria (generally) display over-investment. By contrast, under-investment arises when investing costs are moderate and consumption externalities are so high that a single investing unit cannot appropriate all the marginal benefits of its investment, as in a hold-up problem, even if this unit retains the whole budget for itself in the ensuing negotiation (as actually happens). In the remaining cases, these two opposing effects simply cancel each other out, so the equilibrium investment is efficient.

¹ Other papers, including Evans (2008) and Che and Sákovic (2004), discuss the possibility of obtaining efficiency, basing their arguments on the existence of multiple equilibria in the negotiations.

² Equivalently, it could be assumed that the positive consumption externalities generated by investing agents' shares are higher than those generated by the others.

³ These preferences are similar in Volden and Wiseman (2007). In this model, the members of a legislature must distribute a budget among private and public goods. The share of the budget allocated to the public good benefits all legislators whereas that allocated to private goods only benefits a particular legislator.

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