

## To invest or screen efficiently: a potential conflict in relationships governed by incomplete contracts

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### Abstract

We consider a dynamic trade relationship where quality is not contractible and potential sellers retain quality-relevant private information. We show that the presence of an investment technology to improve the incumbent seller's innate quality may impair the efficiency of the screening process. If the conflict is effective, the buyer has to induce an inefficient screening process or reduce the productivity of the investment technology. This conflict suggests that the hold-up problem may be more severe than predicted by models of incomplete contracts that assume complete information. © 2001 Elsevier Science B.V. All rights reserved.

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### 1. Introduction

Virtually all real-life contracts are incomplete. Payoff-relevant aspects of exchange such as 'quality' can rarely be fully specified and made enforceable by courts. The consequence of contract incompleteness is opportunistic behavior, as for instance the sellers will have an incentive to withhold effort and expenditures,

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and manipulate the noncontractible aspect to their private benefit. Imperfect information about potential trading partners' types exacerbates the problem. The missing, private information, such as potential sellers' 'innate abilities' to provide a better (noncontractible) quality, may be quite relevant for the buyer. Another important feature of dynamic contractual relationships is that these abilities or the potential to provide a better quality may improve over time through bilateral investments which, often, are also noncontractible. Consider, for example, a manufacturer who needs to subcontract an item whose quality is noncontractible and potential subcontractors retain private information about their abilities and knowhow, which can be improved through bilateral investments. In such trade relationships, the objectives of the buyer (manufacturer) are to screen out sellers (subcontractors) of 'bad' innate quality as early as possible, build up a relationship with a 'good' seller and improve the quality of the customized item through bilateral investments.

This paper studies the interaction between these objectives in a dynamic game and identifies a new source of inefficiency, a potential conflict between the buyer's screening concerns and investment incentives. The game starts with the buyer's contract (price) offer to potential sellers who are privately informed about their innate qualities. Sellers make acceptance choices and the buyer chooses one among those who accept. During the contract, the incumbent seller decides on his temporary quality-improving effort and invests on his innate quality simultaneously with the buyer. If the contract is a short-term contract, the buyer decides on whether to extend the relationship and, in the affirmative, the parties negotiate the terms of the second (last) contract.

The main message of this paper is that in such bilateral trade relationships the presence of an investment technology to improve the incumbent seller's innate quality can impair the efficiency of the screening process.<sup>1</sup> Screening out 'bad' seller types efficiently by inducing the incumbent seller to exert effort and signal a 'good' type may stipulate a relatively high first-contract price. However, a 'bad' seller who foresees the buyer's equilibrium investment strategy may accept the contract and penetrate into the relationship, invest his part, improve his innate quality and lock the buyer in for the second contract. This potential penetration strategy upsets the screening equilibrium. The buyer should then either induce a nonscreening equilibrium (offer a contract accepted by all seller types) or an inefficient screening equilibrium where only the 'good' seller types accept but the incumbent seller exerts suboptimal effort. Alternatively, the buyer may replace the investment technology by a less productive one or make binding commitments

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<sup>1</sup> An efficient screening process consists of an outcome in which only the 'good' seller types accept the initial contract *and* the incumbent seller exerts the effort level maximizing the joint surplus from temporary quality improvement, while type information is transmitted to the buyer. In Section 3 we characterize briefly the overall efficiency in this relationship.

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