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# Holdups and overinvestment in capital markets

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**Abstract**

This paper considers a decentralized capital market characterized by trading frictions in which firms and suppliers need to make investment decisions before meeting with each other and bargaining over the price of capital. The resulting holdup problem provides firms with a strategic incentive to overaccumulate capital so as to reduce their marginal productivity and thus the bargained price. In equilibrium, this strategic incentive can outweigh the usual distortionary effects of holdup problems that on their own would lead to underinvestment, thus resulting in the economy to overinvest. In a setting with both capital and labor, the holdup problem in capital markets interacts with holdup problems in labor markets. This presents firms with a trade-off that has non-trivial equilibrium effects and that – depending on the substitutability of capital and labor and the firm's bargaining power in each market – can mitigate or exacerbate the overinvestment result.


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*Keywords:* Holdup problems; Trading frictions; Bargaining; Investment

## 1. Introduction

Factor specificity and contract incompleteness are pervasive phenomena in economic transactions and considered to be a major source of inefficiency. Whenever one party expends resources that increase the value of a productive relationship relative to outside options (i.e. specificity) and other parties can appropriate some of the rents arising from the investment (i.e. contract

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incompleteness), a holdup problem arises. Holdup problems typically reduce the incentive to invest (e.g. Simons [50], Grout [30]) and, in equilibrium, lead to underutilization of resources, missing technology adoption, and excessive destruction (e.g. Caballero and Hammour [7]).

The present paper examines the consequences of holdup problems in decentralized capital markets characterized by trading frictions and shows that the forces usually associated with underinvestment – factor specificity and contract incompleteness – can lead to exactly the opposite equilibrium outcome: overinvestment. The result arises naturally in an environment in which firms and suppliers need to make investment decisions before meeting with each other and bargaining over the price. The trading frictions imply that the match between firms and suppliers generates surplus. Ex-post price negotiation implies that each party can appropriate part of this surplus. The resulting holdup problem distorts ex-ante investment decisions and provides firms with a strategic incentive to overaccumulate capital so as to reduce marginal productivity and thus the price of capital. In equilibrium, this strategic incentive can outweigh the usual distortionary effects of holdup problems that on their own would lead to underinvestment, thus resulting in the economy to overinvest.

The forces behind overinvestment are, from a mechanical point of view, the same as the ones leading to overhiring in labor markets with employment-at-will contracts, as analyzed originally by Stole and Zwiebel [52,53] and extended to a modern general equilibrium labor search context by Smith [51], Cahuc and Wasmer [9,10], and Cahuc, Marque and Wasmer [11].[1] The novelty of the present paper is to argue that similar frictions are relevant for capital markets and provide firms with a strategic incentive to overaccumulate capital. The paper then extends the analysis to a multifactor setting with holdup problems in different input markets and shows that the strategic reaction of firms has non-trivial equilibrium effects.

The notion that the allocation of capital from suppliers to firms is subject to trading frictions and ex-post bargaining contrasts with much of the investment literature in macroeconomics and finance, which focuses on different types of adjustment costs and credit constraints but maintains that the price of capital is determined competitively. Yet, a wide variety of capital – ranging from real assets such as structures and equipment to financial assets such as bank loans, fixed-income debt and derivatives – trade in decentralized or so-called 'over-the-counter' markets. Since much of this capital is specific in terms of quality, task or location, matching between firms and suppliers is likely to involve both material and opportunity costs. These costs give rise to match surplus that needs to be split somehow, thus opening the door to bargaining.[2]

Recent empirical work suggests that for many decentralized capital markets, trading frictions and bargaining are not just a theoretical curiosity but quantitatively relevant.[3] As a result, a burgeoning literature has emerged that attempts to explain the different phenomena with search-

[1] Also see Wolinsky [59] for a dynamic extension of Stole and Zwiebel's [52] partial equilibrium analysis.

[2] See Duffie, Garleanu and Pedersen [19,20] for examples of decentralized financial asset markets that are subject to trading frictions and bargaining. See Rauch [48] and Nunn [44] for a list of real asset markets without organized exchange nor reference prices in trade publications.

[3] See Pulvino [45] and Gavazza [25] for the quantitative relevance of trading frictions and bargaining in commercial aircraft markets – presumably one of the most homogenous and frictionless real asset markets – as well as Ramey and Shapiro [46,47], Maksimovic and Phillips [42], Eisfeldt and Rampini [23] or Kurmann and Petrosky-Nadeau [36] for evidence on trading frictions and bargaining in real asset markets in general. For quantitative evidence of trading frictions and bargaining in over-the-counter financial markets, see Dell'Ariccia and Garibaldi [14], Green, Li and Schuerhoff [28] or Afonso and Lagos [2] among others.