

The effects of future financing constraints on capital accumulation: Some new results on the constrained investment problem

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Abstract

In this paper, we study the effects of future constraints on current investment decisions. Unlike the standard literature on this optimizing problem, we present a model in which firms are neither always constrained nor always unconstrained. We are concerned with those cases where a firm is free from constraints at the current time but expects to face an upper bound at some later date. Using the 'no arbitrage principle' in the constrained scenario, we show how to explicitly calculate the optimal investment path switching between regimes. The analytical result shows that the effects of future financing constraints are included in the market value of the firm, and thus are captured by marginal q .

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1. Introduction

Economic debate has had much to say about the relationship between financing constraints and investment decisions. Mainly, this literature has studied the binary case of constrained versus unconstrained firms. It has often produced ambiguous results: some economists point out the ability of the q model to capture the value of constraints; others stress its inadequacy. Given this ambiguity, it is surprising that recently there has been little *theoretical* effort aimed at focusing on the conditions under which this constrained behavior arises and still less at focusing on the effects of *future* constraints on *current* investment decisions.

The purpose of this paper is to study these latter effects. Unlike the previous literature on investments and financing constraints, we present a theoretical model in which firms are neither always constrained nor always unconstrained. We are primarily concerned with those cases where a firm is free from constraints at the current time but expects to face an upper bound on financing resources at some future date. The focus of attention is on the validity of the Euler equation which drives the optimal investment path through these two alternative regimes. We explain why the optimal investment path describing the switching between regimes cannot be obtained by simply pasting together the unconstrained and the constrained parts of the trajectories. Rather, it is the result of the firm's optimal behavior.

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This approach to the constrained optimization problem extends the idea of rational expectation to the case in which restrictions will become binding at some future date: with forward-looking behavior, the firm anticipates the final outcome, implying that its optimal policy will change at the outset. We show how to calculate explicitly the investment trajectory for a firm, which will become constrained at some later date. Our main result is that the marginal value of the firm captures the effects of present and future constraints.

The difficulties encountered in studying the correlation between investment and financing constraints have prompted researchers to develop different models. Many authors have used the q framework to investigate issues deriving from models of investment with constraints. But different are the strategies followed to study this relationship. The path-breaking paper by Fazzari et al. (1988) initiates this field exploring a constrained version of the q model. It shows that financing constraints do affect investment decisions, but concludes that ‘to the extent that managers control sufficient internal funds to finance all profitable investment projects, investment demand models based on a representative firm in a perfect capital market apply’ (p. 150). The drawback of this kind of investigation is that the analysis of the correlation between financial resources and investment is restricted exclusively to periods when the constraints are binding: there is no attempt to characterize the intermediate phases when constraints are slack.

The same critique applies to models which focus on the property of the Euler equation in presence of constraints (see for instance Whited (1992); Hubbard and Kashyap (1992); Bond and Meghir (1994), and Hubbard et al. (1995)). This kind of model assumes that so long as the firm does not come up against the constraint, it will be able to satisfy the Euler equation. In other words, constraints binding in future periods (or which have some probability of binding) have no effect on the intertemporal first order condition. Consequently, the Euler equation relating current and future marginal q value fails to hold in some periods.

This point of view has been recently challenged. Many scholars now agree that future constraints can affect current investment. Gomes (2001) argues that the value of the firm—as summarized by q —does not simply depend on the discounted value of real variables but also includes the impact of future financial constraints on current decisions. Further, Erickson and Whited (2000) using an innovative approach to the measurement error problem show that the marginal q value is a sufficient statistic to explain the investment decisions of firms even in presence of financing constraints. Unfortunately, this ‘new view’ is mainly to be found in empirical analyses where the optimization problem has not been solved explicitly. Indeed, very few efforts have been devoted to the investigation of these theoretical foundations.

As far as we know, few theoretical contributions have succeeded in explaining the relationship between current investment and future financing constraints. D’Autume and Michel (1985) show that if a firm expects a constraint on the quantity of capital goods it can buy at some future date, it will invest less in the intervening period than in the unconstrained case. However, they focus exclusively on the characteristics of the value function, without analyzing the formal conditions that guarantee the optimality of the constrained investment trajectories. To avoid these problems, Chirinko (1997) focuses on identifying a set of conditions which is sufficient to ensure that optimal behavior generates a q equation resembling the equation used in econometric work. He considers different types of financing problem, but only some of these problems imply a significant coefficient on cash flow. In several of the cases he studies, financial frictions are capitalized as part of the q value; in others, constraints affect the coefficient on cash flow. However, the paper provides few insights into the effects of future constraints on current decisions. Chatelain (1998) attempts to fill the gap between standard neoclassical investment behavior and credit constrained investment, by following a line of argument first suggested by Whited (1992). He constructs a formal model of the way switching between financing regimes affects current investment policy. The model assumes that the regime with rationing will never be the ‘final’ one. Hence, it is unable to describe the behavior of a firm, which faces rationing in the future but is currently unconstrained. Finally, Saltari and Travaglini (2001, 2003) have studied the behavior of a firm, which makes its investment decisions while facing a constraint that will become binding in the future. Saltari and Travaglini (2001) investigate the effects of constraints and (the output price) uncertainty on investment. They show that future liquidity constraints affect the equilibrium value of the firm, which becomes a non-monotonic functional form of the fundamental. However, the paper does not consider the consequences of these changes on current investment policy. Then, Saltari and Travaglini (2003) show that future constraints can affect a firm’s investment policy, even when constraints are currently slack. But the authors illustrate their point with a *parametric* example and do not provide an explicit analytical solution for the dynamic path of the potentially constrained firm: conditions under which the optimal policy leads the firm to anticipate his financing constraint have not been thoroughly explored. All this suggests a need for explicit modeling.

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