



Corporate investment and financing under asymmetric information[☆]

Erwan Morellec^{a,*}, Norman Schürhoff^{b,1}

^a Ecole Polytechnique Fédérale de Lausanne (EPFL), Swiss Finance Institute, and CEPR

^b Faculty of Business and Economics at University of Lausanne, Swiss Finance Institute, and CEPR

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ABSTRACT

We develop a dynamic model of corporate investment and financing decisions in which corporate insiders have superior information about the firm's growth prospects. We show that firms with positive private information can credibly signal their type to outside investors using the timing of corporate actions and their debt–equity mix. Using this result, we show that asymmetric information induces firms with good prospects to speed up investment, leading to a significant erosion of the option value of waiting to invest. Additionally, we demonstrate that informational asymmetries may not translate into a financing hierarchy or pecking order over securities. Finally, we generate a rich set of testable implications relating firms' investment and financing strategies, abnormal announcement returns, and external financing costs to a number of managerial, firm, and industry characteristics.

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1. Introduction

Ever since Myers and Majluf (1984) showed that adverse selection could induce firms to bypass profitable projects and lead to a pecking order among securities,

distortions in investment and financing policies resulting from informational asymmetries have been the subject of considerable research in corporate finance. Although we have learned much from this work, virtually all of the existing models are static and focus either on investment or on financing decisions. This has made it difficult to develop tests of the connection between investment and finance and, to date, empiricists have struggled identifying the effects of asymmetric information on corporate policy choices. In this paper, we advance the literature by developing a *dynamic* model of investment and financing with *endogenous* financing constraints arising from adverse selection. We then use this dynamic model to shed light on existing empirical results, generate a rich set of testable predictions, and offer insights and implications as to why the pecking order is not strictly observed empirically.

A prerequisite for our study is a model that captures in a simple fashion the effects of asymmetric information on

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* Corresponding author. Postal: Swiss Finance Institute at EPFL, Extranef 210, Quartier UNIL-Dorigny, CH-1015 Lausanne, Switzerland. Tel.: +41 21 693 0116.

E-mail addresses: erwan.morellec@epfl.ch (E. Morellec), norman.schuerhoff@unil.ch (N. Schürhoff).

¹ Postal: Université de Lausanne, Ecole des HEC, Extranef 239, CH-1015 Lausanne, Switzerland. Tel.: +41 21 692 3447.

firms' policy choices. In this paper, we base our analysis on a dynamic real options model in which firms' investment and financing strategies are jointly and endogenously determined. While standard real options models assume that firms have enough resources to fund investment or that the capital market has unlimited access to information, we consider instead an environment in which firms need to raise outside funds from uninformed investors to finance capital expenditures. Our paper addresses a set of key questions in corporate finance. First, how does investment policy reflect the informational advantage of corporate insiders? Second, how does asymmetric information affect financing decisions, i.e., the debt–equity mix and the cost of external funds? Third, how do investment and financing decisions interact and what are the factors that drive these interactions?

We consider, as in McDonald and Siegel (1986), a firm that has a valuable real investment opportunity. In order to undertake the investment project, the firm needs to raise outside funds by issuing securities. The firm has flexibility in the timing of its investment and financing decisions and can choose to issue debt or equity. The investment project, once completed, produces a stochastic stream of cash flows that depend on firm type. There are two types of firms in the economy: good type (high cash flow) firms and bad type (low cash flow) firms. Firm types are private information, so that insiders know more about the value of the firm's investment opportunities than potential investors. When making investment and financing decisions, management acts in the best interests of the incumbent stockholders.

The model demonstrates that while under perfect information different types of firms choose different investment policies and issue fairly priced claims, this need not be the case when outside investors are imperfectly informed about the firms' growth prospects. With asymmetric information, the low type has incentives to mimic the high type and sell overpriced securities. Hence, in a pooling equilibrium in which all firms raise funds and invest at the same time, asymmetric information reduces (increases) the value of high-type (low-type) firms and increases (reduces) their cost of investment. This forces good firms to delay investment and bad firms to speed up investment compared to the perfect information benchmark. Because asymmetric information raises the cost of external funds for good firms, these firms may try to separate by imposing mimicking costs on bad firms.

We show in the paper that good firms can separate from bad firms by changing their investment and financing policy. Notably, we are the first to show that by accelerating investment (i.e. by reducing the value of the project at the time of investment) firms with good prospects can eliminate the benefits of mimicking for other firms and signal their positive information to outside investors. Although these distortions in investment policy have a cost, they allow good firms to obtain better terms for the claims they issue. We show that when the cost of distorting investment is lower than the underpricing cost due to adverse selection, firms with positive private information will choose to invest early to

signal their type. That is, a central message from our analysis is that informational asymmetries imply investment behavior that differs substantially from that of standard real options models with perfect information.

The possibility for firms to signal their type through the timing of investment also has important implications for capital structure decisions. Static signaling models usually predict that when outside funds are necessary, firms prefer debt to equity because of the lower information costs associated with debt issues. While this pecking order hypothesis should perform best among firms that face particularly severe adverse selection problems, Frank and Goyal (2003) find that small high-growth firms often issue equity in lieu of issuing debt (see also Helwege and Liang, 1996; Leary and Roberts, 2010). Our model reveals that firms can signal their private information to investors using the timing of corporate actions and, thus, that they can find ways to issue equity that avoid adverse selection costs, as conjectured by Fama and French (2005). As a result, asymmetric information may not translate into a preference ranking over securities. In particular, one implication of our analysis is that equity issues can be more attractive than debt issues even for firms with ample debt capacity, consistent with the evidence in Leary and Roberts (2010).

Our theory of corporate investment and financing differs from existing contributions in three important respects. First, unlike most dynamic models of investment and costly external finance, financing constraints are endogenous in our framework, arising from adverse selection. Second, unlike most asymmetric information models, we consider dynamics. Third, we endogenize both investment and financing decisions. These unique features allow us to generate a rich set of testable predictions about firms' investment rates, abnormal announcement returns, the probability of project failure after investment, and external financing costs.

We highlight the main empirical implications. First, our model predicts that adverse selection should lead firms to accelerate investment. Additionally, we find that firms with a higher market-to-book ratio or growth-potential should invest more readily. By contrast, cash flow volatility and operating leverage should diminish investment propensities. Another specific prediction of our model is that the dispersion in industry investment rates should be lower in industries that are more heavily debt financed and higher in industries with higher cash flow volatility or operating leverage.

Second, our theory predicts that the information released at the time of investment should trigger a positive jump in the value of the good type, consistent with the finding of McConnell and Muscarella (1985) that unexpected increases in investment lead to increases in stock prices. Another prediction of the model is that abnormal returns should be higher with debt financing than with equity financing, consistent with Masulis (1983). We also show that positive abnormal announcement returns following increases in capital expenditures should be limited to firms with good investment opportunities, as documented by Chan, Gau, and Wang (1995). A novel testable implication of the model is that,

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