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## The cost of equity for private firms

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## ABSTRACT

The paper presents a method for calculating the cost of equity capital for the non-marketable securities of private firms and its difference from the cost of equity capital of an all equal public firm (the private firm premium). The method is based on a theoretical framework that assumes the investor is undiversified due to her holdings in non-marketable securities. We implement the method for both unlevered and levered firms, and also consider the effect of taxes. The findings indicate that the private firm premium increases with the firm's asset risk, its leverage ratio, and the non-diversification of the private firm's owner, while taxes are negatively related to the private firm premium.

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## 1. Introduction

A substantial part of the economy is composed of privately-held firms.<sup>1</sup> Asker et al. (2015) report that nearly all of the 5.7 million firms in the US in 2010 are private, and only 0.06% are listed. While many private firms are small, 86.4% of the firms with 500 or more employees as of 2010 were listed as private. Nonetheless, the valuation of privately held businesses poses a challenge, because the owners of private companies are typically non-diversified (Bitler et al., 2005; Kartashova, 2014; Moskowitz and Vissing-Jørgensen, 2002; Mueller, 2011). These owners (or entrepreneurs) usually invest a substantial portion of their wealth in a single firm, exposing themselves to the firm's idiosyncratic risk.<sup>2</sup> In this paper, we adjust for this idiosyncratic risk and present a method for calculating the private firm's cost of equity capital.

According to asset pricing theory, non-diversified investors should require, all other factors being equal, a higher expected return on their investments than diversified investors (i.e., relative to the cost of capital they would have required as diversified investors), because they have a higher level of exposure to the firm's asset risk. From a discounted cash-flow perspective, it follows that the cost of capital for private firms should be higher than the cost of capital for public firms, ceteris paribus. We propose a method by which the additional risk faced by a non-diversified investor is reflected in the private firm's cost of capital and cost of equity. Since in

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our method the non-diversification is related to holdings in private firms lacking available market, we also use the term “non-marketability” to describe this increase in the cost of capital.<sup>3</sup>

The method in this paper relies on a theoretical framework developed by Benninga et al. (2005) and extended by Abudy and Benninga (2013). The framework uses state prices that are adjusted by an additional pricing factor (called the non-marketability discount factor) representing the lack of diversification.<sup>4</sup> These adjusted state prices, called *private state prices*, are the appropriate state prices for investors who are restricted in their diversification and therefore exposed to some of the idiosyncratic risk of the non-marketable security. The method transforms the state price representation to discount factors, and enables us to calculate the cost of equity capital for non-marketable securities and the *private firm premium*, which is the difference between the cost of equity capital of a non-marketable security and the cost of equity capital of an all else equal marketable security – for both unlevered and levered firms.

Our method shows that the cost of equity for a private firm and the private firm premium is an increasing function of the firm's asset risk and the non-diversification degree of the investor. We show that the cost of equity capital for an unlevered private firm exceeds the cost of equity capital for a matching unlevered public firm by between 2% and 15%, depending on volatility (which measures the firm's asset risk) and non-diversification. When considering levered firms, we also find that both the cost of equity for a private firm and the private firm's premium increase with leverage: the cost of equity for a private firm is higher, by up to 33%, than for a public firm (for leverage of up to 70%). While the increase of the private cost of equity is not surprising, the increase in the private firm premium implies that an increase in the firm's leverage exposes the non-diversified investor to an additional idiosyncratic risk. All else equal, leverage is more costly for shareholders of private firms than for shareholders of public firms. In this respect, Eckbo and Norli (2005) find that firms increased leverage after their initial public offering, with recently public firms being less levered than comparable firms that have been public for a long time. Hence, we provide a new testable hypothesis regarding the level of leverage of privately-held firms.

We also explore the influence of taxes on the private firm premium, and find that an increase in the tax rate has a negative effect on the private firm premium, and that this negative effect increases (in absolute terms) with the firm's leverage. This finding indicates that with the existence of taxes, an increase in leverage has an offsetting effect on the private firm premium.

Our paper contributes to the theoretical literature on non-marketability by introducing a method to compute the cost of equity of non-marketable securities. Existing models focus on the discount in value of such securities in complete markets (Finnerty, 2012; Longstaff, 1995), whereas this paper sheds light on another angle of non-marketability and its relation to non-diversification of private firm owners. Indeed, the empirical literature that estimates the price discount of private firms mostly relates to the characteristics of the security, while our method suggests that one should also consider the characteristics of the private firm owners. Second, our framework incorporates financial leverage and taxes, both overlooked by the literature on non-marketability, and demonstrates how these factors affect the private firm premium. Third, using our method, we demonstrate that the private firm premium can vary significantly, ranging from 4% to 33% according to our calculations. This result can reconcile the different findings of empirical studies exploring the discount of private firms as it presents additional factors that affect the private firm discount which have not been examined empirically (such as leverage, taxes and non-diversification). Summing up, the method presented here provides a useful tool for the evaluation of securities subject to marketability restrictions, such as those frequently imposed on entrepreneurs, venture capitalists, private equity holders, employees, and executives (Kahl et al., 2003).

The paper is organized as follows. Section 2 reviews the literature on non-diversification and non-marketability. Section 3 describes the theoretical background for our method. Section 4 describes the method for calculating the cost of equity capital for private firms for both unlevered and levered firms and incorporates corporate and personal taxes. Sections 5 and 6 explore the determinants of the method for unlevered and levered firms, respectively. Section 7 examines the influence of taxes on the cost of equity in private firms, and Section 8 summarizes.

## 2. Literature review

Empirical evidence documents that the owners of private companies typically have a high share of their personal net wealth invested in a single private company (Mueller, 2011). Moskowitz and Vissing-Jørgensen (2002) find that in the US, households that are private equity investors are dramatically less diversified than public equity investors are. Households with an investment in private equity have 41% of their net worth invested in private equity (on average), and 82% of this investment is invested in one company, in which the household has an active management interest. Kartashova (2014), using more recent data than Moskowitz and Vissing-Jørgensen (2002), finds a similar characterization of privately-held firms. In addition, she finds that own-company investments are significantly less liquid than publicly traded shares. Bitler et al. (2005) show that approximately 80% of the entrepreneurial households in their sample own at least 50% of the firm's equity, and that a vast majority own 100%. Summing up, the literature documents a strong association between the ownership of private firms and non-diversification related to the absence of an available market for the shares of private firms.

<sup>3</sup> By “non-marketability”, we mean securities that lack a designated marketplace. However, there are cases in which marketable securities are extremely illiquid, which may cause their holders to be non-diversified. For example, a controlling block-holder (who is usually non-diversified) of a tradable firm incurs the illiquidity of the block. This friction generates a non-marketability discount on the value of the block despite the fact that the firm's stocks are marketable (see Albuquerque and Schroth, 2015). In such extreme circumstances of illiquidity, an estimate calculated using our method can serve as an upper bound.

<sup>4</sup> State prices represent the state dependent present value of \$1 in the future.

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