



Are real options a missing piece in the diversification-value puzzle?



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ABSTRACT

This paper examines the impact of corporate diversification on a firm's market value in terms of changes in its mix of value sources between growth options and assets-in-place. We argue that the traditionally assumed replicability of corporate diversification benefits by individual investors might not be as feasible when diversification implies acquiring new growth options as when it only involves assets-in-place investments. We further explain why a different effect of diversification on a firm's mix of value sources can occur, therefore leading to a mediating role of growth options between diversification and market value. Using a panel sample of U.S. firms from 1998 to 2010, we find that a firm's growth options portfolio helps explain the effect of diversification strategy on its market value.

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1. Introduction

This paper focuses on analyzing the possible mediating role played by a firm's growth opportunities on the value of corporate diversification. Most prior literature has been concerned about the analysis of the impact of this corporate strategy on the firm's market value as a whole, without discerning the nature of such value effect. However, a firm's market value is primarily composed of two elements: the assets-in-place value and the growth options value (Myers, 1977). Separating these two components is worthwhile when analyzing value effects since while a firm's diversification in assets-in-place might be reproduced by stockholders within their own investment portfolios in perfect capital markets, as stated by Amihud and Lev (1981), growth options diversification is not so easily replicable. Should growth options be a component of a firm's value and should corporate diversification impact on a firm's growth options, analysis of the diversification-value linkage will not be complete without considering the relation between these three variables: diversification, growth options and value.

A few papers, such as Berger and Ofek (1995) and Mansi and Reeb (2002), have added growth opportunities as a control variable when

testing for the effect of diversification on value. Ferris, Sen, Lim, and Yeo (2002) analyze diversification for a sample of international joint ventures and show that diversification is only value-destroying in enterprises that have a poor set of growth opportunities. More specifically, Stowe and Xing (2006) analyze whether the diversification discount is attributable to differing growth opportunities between each business segment within a diversified firm and its single-segment industry counterpart. They find that a firm's excess value becomes significantly lower after firms diversify and that this diversification discount is not driven by a firm's future growth opportunities. Yet, their results depend critically on how growth opportunities are measured. Following Lang, Ofek, and Stulz (1996), Stowe and Xing select the ratio of capital expenditures to total assets as a measure of growth opportunities. Such a ratio may not be the best forward looking proxy for growth opportunities in all cases, the main reason being that it captures their exercise (of these growth options) to a greater extent than their possession.¹

¹ Stowe and Xing (2006) assume that the higher the capital expenditures to total assets, the more relevant the growth opportunities are. However, a firm which has exhausted its growth opportunities will report a high value in the ratio of capital expenditures to total assets, whereas a firm with a large amount of growth options optimally unexercised will be assigned a low value. This problem has been noted in earlier works such as Dhaliwal, Heninger, and Hughes (1999).

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Selecting an accurate variable to proxy an unobservable variable such as a firm's growth opportunities clearly poses a major challenge. Market-to-book ratios and Tobin's Qs are widely used in the literature as proxies for growth opportunities but are influenced by the same market values on which usual measures of diversification excess value (such as Berger and Ofek's) are based. Instead, two alternative variables can easily be used to alleviate these concerns: return skewness (Andrés, Azofra, & Fuente, 2006; Haanappel & Smit, 2007) and growth opportunities residuals (Brown & Perry, 1994; Servaes & Tamayo, 2013). Such estimates are related to growth opportunities while remaining free of the influence of excess value.

Apart from analyzing the empirical evidence through the lens of these alternative proxies, our study also contributes to the diversification literature by offering further insights into the trinomium involving diversification, growth opportunities and firm value. According to the real options (RO) approach, corporate diversification involves replacing the option to diversify, which is exercised, with both assets-in-place and further growth options. As a consequence, the net effect of a diversification decision on the relevance of growth opportunities within a firm's total assets portfolio (growth opportunities relevance, hereinafter GOR) will depend on the sign of the acquired assets-in-place's Net Present Value (hereinafter NPV). Should this be positive, diversification would imply lower GOR, as a result of replacing the higher value of the exercised growth option by the lower value of new growth options. The opposite effect would appear in the case of a negative assets-in-place NPV, such that greater diversification would imply higher GOR.

We further argue that the degree of diversification may exhibit a U-form relationship with GOR. The logic underlying this relation is based on managers' widespread preference for positive NPV projects as shown by the more frequent use of NPV models vis-à-vis real options models (Graham & Harvey, 2001). Such a preference suggests that managers would be more likely to first exploit their most profitable options in terms of their assets-in-place's NPV. As a result, within these low diversifiers, greater diversification would display a lower GOR. At the opposite extreme, highly diversified firms would be those investing simultaneously in multiple options, many with negative assets-in-place NPV. In these latter cases, greater diversification would show higher GOR. Moreover, insofar as growth options and their optimal joint exercise policy are unique and cannot be replicated by investors in their individual portfolios, this relationship between diversification and growth options may be transmitted to the firm value. As a consequence, a mediating role of growth opportunities in the diversification-value relationship should be expected.

Using a final panel sample of 4053 U.S. firm-year observations from 1998 to 2010, our findings support the quadratic relationship between the degree of diversification and GOR. At low levels of diversification, the higher the degree of diversification, the less relevant growth opportunities prove to be. However, we find a diversification level after which this strategy materializes into new growth options to a greater extent and therefore into an increase in GOR. Secondly, we report evidence about the partial mediating role of GOR in the diversification-value relationship. In addition to the direct linkage of this strategy to corporate value, part of the impact of diversification on firm value goes through GOR, turning this strategy into less value-destroying insofar as it increases GOR.

The remainder of the paper is organized in four sections. Section 2 sets out our hypotheses. The following section focuses on the research design. In Section 4, our empirical findings are explained. The paper closes with a discussion of our main conclusions, intended contributions, as well as limitations and proposals for future research.

2. A real options thinking of corporate diversification

2.1. Diversification as a trade-off between exercising and creating growth options

Under the RO logic, a firm's expansion is conceived as the gradual replacement of growth options by assets-in-place (Bowman, Hurry, &

Miller, 1992). Such a conception of the investment process requires the previous existence of a growth option and involves materializing this option by assets-in-place. In the case of diversification, the growth option corresponds to the opportunity to invest in a new/different business and effective participation therein matching the underlying assets-in-place. This simple replacing process is considered by Bernardo and Chowdhry (2002) when they argue that diversified firms hold fewer unexercised growth options than their undiversified counterparts, thus suggesting a negative effect of diversification on GOR.

However, exercising an option to diversify not only implies a stake in a new assets-in-place, but also additional growth options. By exploring and expanding a firm's activity into new businesses, diversification may give rise to new tangible and intangible assets which are the seeds for new investment opportunities (Kasanen, 1993; Kogut, 1991; Kogut & Kulatilaka, 2001; Williamson, 2001). In such instances, exercising growth options translates into new growth opportunities. Moreover, a positive effect on GOR is expected, should this diversification generate additional growth options whose value exceeds that of the already-exercised option to diversify.

This two-fold impact on a firm's sources of value is captured by the concept of the Expanded Net Present Value (ENPV). On the RO basis, the value created (ENPV) by exercising an option to invest in business "i" (C_i^*) is defined by the sum of the NPV of cash-flows from operating in business i (NPV_i), and the value of new emerging options to invest in businesses "j" (C_j), with $j = 1...k$:

$$ENPV_i = C_i^* = NPV_i + \sum C_j$$

A positive ENPV is obtained through either a negative or a positive NPV of cash-flows from assets-in-place. Should the NPV be positive, the value of the exercised option "i" would exceed the value of future growth options "j" ($C_i^* > C_j$), diversification thus reducing GOR. On the other hand, if NPV is negative, the value of future growth options "j" will exceed that of the exercised option "i" ($C_i^* < C_j$), diversification thus increasing GOR.

We further hypothesize that firms would start investing predominantly in exploiting growth options which have a positive NPV, leading to a negative association between diversification and GOR at low levels of diversification. Prior evidence on capital budgeting practices reveals that most managers rely on NPV models, whereas the use of the real options models is limited.² This evidence suggests that managers might generally prefer projects that generate cash flows over those providing options for future growth. Likewise, should managers have to select a business in which to diversify from among several offering of similar value to shareholders, they would firstly invest in those with the highest NPV.

At higher levels of diversification, firms may have partly exploited their high NPV investments and would be more likely to invest in negative NPV in exchange for a higher value of emerging options to expand. As a result, in this latter kind of exploring diversifiers, greater diversification will imply higher GOR. Moreover, as the company becomes increasingly diversified, the value of resources and skills is leveraged as these may be redeployed in multiple and different growth options embedded to each of its diversified businesses (Vassolo, Anand, & Folta, 2004). Participating in multiple businesses may be the seed of a wider range of investment opportunities by spreading a firm's capabilities across alternative industries (Bowman & Hurry, 1993) and creating a diversified knowledge

² Graham and Harvey (2001) investigated the capital budgeting practices of a sample of North American companies and found that 74.9% of respondents used NPV models, although only 26.6% of them reported using real options. In Block's (2007), real options models were used by 14.3% of surveyed U.S. companies. For the case of Canadian firms, Baker, Dutta, and Saadi (2011) report that 74.6% of the respondents used DCF models often or always, but that only 10.4% of used real options as often. More recently, Horn, Kjørland, Molnár, and Steen (2015) surveyed CFOs of Scandinavian companies and found that NPV models are used by 74% of respondents whereas real options models are used by only 6%.

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