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Growth options and acquisition likelihood in high tech

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ABSTRACT

With high tech firms now representing the majority of acquisitions among all pubic, non-regulated firms, we attempt to determine how a tech firm's growth options influence its likelihood of being acquired. In particular, we develop a new growth options proxy called Gamma (Γ) to represent the return relative to investment in research and development. We find that Γ is inversely related to the likelihood of being acquired. Robustness tests show that this relationship holds regardless of the subperiod assessed, the size category assessed, whether tech firms are engaged in friendly or hostile acquisitions, the method used to identify tech firms, and whether the R&D definition includes capital expenditures. The relationship is even more pronounced when tech targets have a relatively low valuation (based on the market-book ratio). Furthermore, we find that tech firms with a high Γ are less likely to acquire targets. In general, tech firms with a high Γ appear to prefer organic growth rather than expansion by combinations with other tech firms.

1. Introduction

Tech firms represent about one third of all non-regulated, publicly traded firms, but increasingly dominate the market for corporate control, with tech acquisitions now representing over 60 percent of all deals. Yet, research is limited in identifying the profile of a tech firm that makes it an appealing target. Our objective is to identify the characteristics that increase a tech company's likelihood of being acquired.

Tech firms are characterized by their high level of research and development and their continual need to grow and expand in the face of rapid product obsolescence. They rely heavily on mergers as a means of expediting shifts in their strategies and operations, and exercising their growth options. Research and development expenditures are those that management undertakes to create growth opportunities within the firm. R&D can help extend the life of existing projects or technologies in use by the firm or create new projects or technologies. They can be patentable or not. They can be put in use right away, shelved for future use, or abandoned. They help create options for management to expand, contract, or switch the use of assets in the firm – part of the classic "financial flexibility" outlined by Trigeorgis (1993). Because of the unusually high levels of research and development in tech firms, and the unique operating characteristics surrounding those high R&D expenditures, the results of general studies on mergers cannot be directly applied to provide inferences about the likelihood of acquisition for high-technology firms. The unique characteristics of tech firms, high R&D and how R&D interacts with other firm level characteristics may significantly affect the desirability of a target, therefore affect the likelihood of acquisition.

While much research has attempted to identify characteristics of firms that attract takeovers, the inferences from these studies are not directly applicable to the technology industry. Previous literature suggests that undervalued firms (based on market to book ratios) are more likely to be acquired. However, over 40 percent of tech mergers represent glamour firms with a high market to

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book ratio. This suggests that while undervalued firms may represent the typical merger target, a large proportion of tech firms may attract takeover bids based on significantly different characteristics. Since tech firms are often viewed as growth firms with unique growth opportunities and characteristics, we apply a growth options analysis to facilitate our investigation. High research and development expenditures differentiate tech firms from non-tech firms. Therefore, we focus our analysis within the tech sectors, with the goal of examining whether and how growth options characteristics influence the appeal of firms as takeover candidates.

We develop a new proxy for managerial effectiveness that estimates its returns relative to its investment in R&D. We hypothesize that since tech firms with a higher Gamma (Γ) are more efficient and priced higher, they are less desirable takeover targets. Conversely, tech firms that are inefficient in utilizing their R&D (low Γ firms) should be cheaper, and have more potential for improvement if they are acquired. Thus, low Γ firms should be more appealing within the market for corporate control. To our knowledge, this growth options construct has not been given attention in the literature on mergers. We find that Γ is inversely related to the likelihood of being acquired. Robustness tests show that this relationship holds regardless of the subperiod assessed, the size category assessed, whether tech firms are engaged in friendly or competitive acquisitions, the method used to identify tech firms, and whether the R&D definition includes capital expenditures. The relationship is even more pronounced when tech targets have a relatively low valuation (based on the market-book ratio). Furthermore, we find that Γ significantly affects the likelihood that tech firms will acquire other firms. In general, tech firms with a high Γ appear to prefer organic growth rather than expansion by combinations with other tech firms.

Our study offers relevant implications for tech firm managers and board members, who may position themselves to attract bids, or may attempt to discourage bidders in order to remain independent. Our study also offers relevant implications for investors in tech companies who benefit from the large premium that is typically received by tech targets.

2. Review of the literature

We rely on academic literature concerning growth options and the probability of being acquired to inform the research questions of our analysis. We view the terms growth options and real options as synonymous, but we use the term "growth options" since it is more commonly used in empirical studies.

2.1. Review of literature on growth options and research and development

Berk, Green, and Naik (1999) develop a general equilibrium model for growth options and assets in place, and while they focus more on the evolution of risk, they find that "firms that perform well tend to be those that have discovered particularly valuable investment opportunities." The portion of firm value that is derived from growth options can be considered a "portfolio of options." They emphasize that the exercise of a firm's investment policy involves the exercise of growth options by management, and this helps motivate a growth options analysis of technology mergers. The Berk et al. (1999) model (hereafter "BGN model") serves as the foundation from which our growth options analysis is based. The BGN model states that the value of a firm is made up of the firm's present value of its assets in place (AIP) and the present value of its growth options. The AIP are the cumulative value of the projects currently "alive," and are represented by the book value of capital invested in these projects. The value of a firm's growth options are therefore represented in the present value of growth opportunities (PVGO) in the following formulas:

$$V_i = AIP_i + PVGO_i \tag{1}$$

$$PVGO_i = V_i - AIP_i \tag{2}$$

Many studies have used this model to examine growth options, but the methods used to create a proxy for PVGO varies. For example, Andres-Alonso, Azofra-Palenzuela, and Fuente-Herrero (2006) measure AIP as a perpetuity of free cash flow discounted by cost of capital. Bernardo, Chowdhry, and Goyal (2007) use a book value measure of AIP based on debt and equity. Cao, Simin, and Zhao (2008) examine five proxies for growth options, including a proxy for PVGO based on trailing ROE, and find that the market to book ratio has the highest significance and explanatory power.

Using a market-based measure of growth options value captures information (including market sentiment, perceived industry opportunities, and exposure to economic conditions) about the firm and its future prospects that is not observable on financial statements or in other non-market measures. Those tech industries with the highest R&D intensities have the most technological products, or utilize the most technology in the creation of their products. How R&D is used within the firm, where and when resources are allocated, which projects are deferred, delayed or expanded are all real options for management. The range of choices available to managers is described by Trigeorgis (1993) as part of the "financial flexibility" available to management in the exercise of their options. Thus, we suggest R&D expenditures are a proxy for the unobservable assets within the firm, specifically related to its growth opportunities.

Ho, Tjahjapranata, and Yap (2006), Andres-Alonso et al. (2006) found that R&D investment had a positive impact on the growth opportunities of a firm. Oriani and Sobrero (2008) found that R&D was positively related to the market value of the firm. Coad and Rao (2008) found that R&D is positively related to sales growth. These studies support the theory that R&D leads to the creation of growth opportunities in a firm. However, the impact of R&D on growth options or firm value may vary among technology firms. Ho et al. (2006) found that R&D interacts with the size and leverage of the firm to change the direction and intensity of the effects. Coad and Rao (2008) found a similar directional shift in the coefficient for R&D as a predictor of sales growth for tech firms. These findings motivate an examination of the unique characteristics of tech firms that cause some tech firms to be more attractive takeover