The diversification puzzle revisited: The real options perspective

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Despite numerous attempts from both finance and strategic management literature, we are yet to reach a controversy-free explanation for the diversification puzzle. Previous management literature has focused on the analysis of the motives and benefits of diversification for a generic-undefined firm. According to this approach, diversified firms are seen to benefit from economies of scale (Chandler, 1977); economies of scope and synergies (Penrose, 1959; Fluck and Lynch, 1999); transaction cost diminishing (Harrrigan, 1985); financing-cost savings (Lewellen, 1971; Stulz, 1990; Stein, 1997) or reduction of the adverse-selection problem (Hadlock, Ryngaert, and Thomas; 2001). Evidence favouring the value creation of diversification is provided in Schipper and Thompson (1983), Matsusaka (1993), and Hubbard and Palia (1998), among others.

From a financial perspective, Amihud and Lev (1981) suggested that the critical question is what kind of risk is reduced by diversification. If diversification reduces specific risk which stockholders can eliminate on their own, then diversification reduces not only a firm's risk, but also its value. This inefficient diversification is consistent with the interests of managers who, through this action subsequently reduce their own risk. This inefficient diversification is more likely in non-perfectly monitored firms. The conclusion of this reasoning is that a firm's corporate ownership affects its diversification strategy. Evidence supporting this hypothesis includes Amihud and Lev (1981) and Lloyd, Hand and Modani (1987).

In "efficient" capital markets this "inefficient" diversification destroys market value. This effect of diversification is known as the conglomerate or diversification discount and implies that diversified firms trade at a discount relative to non-diversified firms in their industries. In other words, diversification discount states that the market value of a multiple-segment firm is below the sum of the imputed market values of its segments. Evidence in favour of this hypothesis is provided in Lang and Stulz (1994), Berger and Ofek (1995), Servaes (1996), or Lins and Servaes (1999).[1]

Lane, Cannella and Lubatkin (1999) judge that the puzzle of diversification stems from the finance-strategy controversy. It is the gap between the finance approach and the strategic management perspective which is at the core of the diversification problem.[2] According to Lane, Cannella and Lubatkin, financial scholars view firms as portfolios of investments whose performance depends primarily on market forces. On the other hand,

[1] Some exceptions to this evidence are in Montgomery and Wernerfelt (1988), and Matsusaka (1993) for the United States or Lins and Servaes (1999) for Germany.
[2] Some recent studies have demonstrated that part of the misunderstanding is due to biases in the Compustat Industry Segment file and measurement problems. See Villalonga (2004).

strategic management views firms as portfolios of resources and capabilities linked by the people who create and utilize them. However, this traditional gap between finance and strategy has closed recently, and the real options approach is one of the forces which have contributed significantly.[3] In fact, the real options definition of a firm does not differ greatly from the resources and capabilities concept.

These resources and capabilities, or firm-specific characteristics are considered by Campa and Kedia (2002) as a main variable in the explanation of the diversification discount.[4] That is, the evaluation of the effect of diversification on firm value should take into account the firm-specific characteristics, since some resources and capabilities lead some firms to create more value from diversification than others. Campa and Kedia's evidence shows that controlling for endogeneity reduces the diversification discount, in some cases turning into a premium.

Interestingly, Morck and Yeung (2003) provide some evidence in line with Campa and Kedia's argument, which indicates that the link between diversification and value depends on a firm's intangible investments. In particular, Morck and Yeung find that diversification increases a firm's market value in the presence of substantial investments in R&D and advertising. These intangible investments in Morck and Yeung's paper, or specific-firm characteristics in Campa and Kedia's study, are an important source of a firm's growth opportunities and flexibility options, according to the real options approach. Logically, a firm with some unique capability will search for activities with a match to its organizational capital. In an incomplete information context, this exploration may imply investments in different industries. Such a "costly search" through diversification (Campa and Kedia, 2002) consists of a number of "options to invest" or "growth options" acquisitions.

A firm's decision to diversify or specialize depends on the ensuing costs and benefits, which, in turn, depend on its previous competitive advantages (Matsusaka, 2001; Maksimovic and Phillips, 2002). A firm decides to diversify when its portfolio of resources and capabilities makes the benefits of this strategy greater than its costs. However, the decision to diversify, as well as the decision to refocus, carries sunk and irreversible investments that lead to hysteresis. Again, this hysteresis problem requires a dynamic approach that can be provided by real options.[5]

One of the problems in previous literature is that diversification characteristics of firms are taken as given. This differs from the observed dynamic nature of firms, which sequentially invest and disinvest in related and unrelated businesses in response to changes in market, technological and regulatory conditions. This chain of decisions constantly alters the degree and nature of a firm's diversification, and thus questions many of the results which emerge from static studies.

Companies become increasingly diversified in their product mix and client base as they grow. Bernardo et al (2000) describe the growth of a firm as the logical process of substituting its options to expand with assets-in-place. This process of substitution implies different degrees of diversification, although not only this. Apart from deciding whether to

[3] The potential of real options in linking the management and financial islands was first proposed by Myers (1984).
[4] These characteristics affect both a firm's decision to diversify and its market value.
[5] In referring to this issue, Campa and Kedia (2002) propose using the real options approach to develop a dynamic theory of a firm's diversification strategy.

diversify or not, as well as the type of diversification (related, vertically integrated or unrelated), managers must select one of multiple paths to diversification. These diversification paths range between two opposed procedures: from an options-based strategy to an assets-in-place-based strategy.

In an option-based diversification the firm participates at a low scale in several businesses. In fact, this underdeveloped participation is the mechanism that is employed to acquire the option to invest successfully in new businesses, would it be ultimately convenient to expand. As conditions to invest evolve, firms will maintain, amplify, exercise or abandon these options, while acquiring new options to diversify. By contrast, in asset-in-place diversification a firm's total investment is similarly distributed in different businesses. In this case, growth options are immediately exercised or abandoned.[6]

As Raynor (2002) states, option-based diversification has deep implications on a firm's operating performance and risk profile. Investing in real options directly reduces operating performance and increases total systematic risk, as shown by the diversification discount evidence. However, diversification also creates value for shareholders by providing a "strategic insurance" against firm-specific risk that investors cannot replicate. As new markets develop firms will re-focus their operations by exercising or abandoning their diversified options.[7]

At this point, the persuasive argument against diversification stated by Amihud and Lev loses weight. Investors cannot always replicate the diversification investments of a firm. This is the case of the options-based diversification. When a firm diversifies to create or acquire the option to invest in a new business, it creates a new asset that is not available to investors. Investors cannot replicate the growth option of a diversified firm by buying stocks of the corresponding focussed firm. Firstly, because in many cases this focussed firm does not exist, and secondly, because if the focused firm does exist, replicating dynamically the value of the option is not economically feasible as it implies a huge amount of transaction costs to continuously rebalance the suitable combination of stocks and the risk-free asset.

According to this analysis, we posit that the value creation effect of a firm's diversification strategy depends on its real options portfolio. Specifically, we propose that the diversification discount depends on the proportion of the market value that is accounted for by real options (real options ratio or ROR). On the one hand, option-based diversification provides growth options that are not available to focused firms, and so the ROR for diversified firms will exceed the ROR of the equivalent portfolio of focused firms (imputed ROR). On the other hand, the larger risk of growth options compared to their underlying assets explains the increase in equity beta of option-base diversified firms and therefore provides an alternative explanation to the diversification discount as commonly estimated.

[6] Likewise, Raynor (2002) considers four types of diversification: related, vertically integrated, unrelated and options-based.

[7] Note that although real options provide this strategic insurance to the diversified firms, their direct effect is the increase of equity risk, as a consequence of increasing the risk of the portfolio of total assets (assets-in-place plus real options).

Our empirical analysis uses the Compustat files (both Industry Segment and annual company-level) as principal source of data. To make results comparable to previous literature, we use the Berger and Ofek (1995) sample selection criteria.

Following prior research, diversification is measured in three different ways. Firstly, it is measured by a multisegment dummy. Secondly, it is computed by the number of segment units in the firm. And thirdly, we estimate the Herfindal index following the Hirschman adaptation:

$$HERF = 1 - \sum_{i}^{n} P_i^2$$

where P_i is the proportion of a firm's assets in industry *i*.

As a measure of excess value we use the Berger and Ofek (1995) diversification discount. The excess value measure developed by Berger and Ofek is the log of the ratio of firm market value to its imputed value. A firm's imputed value is the sum of each of its segments operated as single-segment firms. In turn, a segment's imputed value is computed by multiplying its segment sales (assets) and the median sales (assets) multiplier of all single-segment firms in the same SIC group. Finally, a focus-firm's market value is the sum of the market value of equity and total assets minus the book value of equity.

The real options ratio (*ROR*) is defined as that proportion of a firm's total market value not arising from its assets-in-place (*VAIP*).[8] The market value of assets is calculated as the difference between the market value of equity and the book value of equity added to the book value of assets.

The value of a firm's assets-in-place (*VAIP*) is estimated by the present value of its current free cash flow (FCF_{AIP}) treated as perpetuity with an annual expected rate (g), and discounted at its cost of capital (K_{AIP}):

$$VAIP = \frac{FCF_{AIP} \cdot (1+g)}{K_{AIP} - g}$$

To approximate FCF_{AIP}, we assume that replacement investments in current assets are equivalent to accounting depreciation. Thus, we estimate FCF_{AIP} by subtracting adjusted tax payments from current earnings before interest and tax (*EBIT*):

The annual expected rate (*g*) is computed by the median analyst's estimate for long-term growth in I/B/E/S. K_{AIP} is estimated by using the CAPM and accounting betas. We calculate the accounting beta of a firm's assets-in-place by the regression of changes in a firm's EBIT against changes in EBIT for the market. We use the S&P 500 as a proxy for the market portfolio, and changes in quarterly earnings for previous six years.

[8] Kester (1984) was a pioneer in attributing the portion of a firm's capitalisation not explained by assets-in-place to the present value of its growth options. See Danbolt, Hirst, and Jones (2002) for a critical analysis of the empirical validity of Kester's model.

References

Amihud, Y. and B. Lev (1981): "Risk reduction as a managerial motive for conglomerate mergers", *Bell Journal of Economics* 12: 605-617.

Amihud, Y. and B. Lev (1999): "Does corporate ownership structure affect its strategy towards diversification?", *Strategic Management Journal* 20: 1063-1069.

Berger, P.G. and E. Ofek (1995): "Diversification's effect on firm value", *Journal of Financial Economics* 37: 39-65.

Bernardo, A.; B. Chowdhry; D. Palia and E. Sernova (2000): "Real Options and the Diversification Discount". 4th Annual International Conference on Real Options: Theory Meets Practice, U. Cambridge, UK.

Campa, J. M. y S. Kedia (2002): "Explaining the diversification discount", *Journal of Finance* 57: 1731-62.

Chandler, A. (1977): *The visible hand*. Belknap Press, Cambridge.

Danbolt, J., I. Hirst and E. Jones (2002): "Measuring Growth Opportunities", *Applied Financial Economics* 12: 203–12.

Denis, D. J., D. K. Denis, and A. Sarin (1997): "Agency problems, equity ownership, and corporate diversification", *Journal of Finance* 52: 135-60.

Fluck, Z. and A. Lynch (1999): "Why do firms merge and then divest? A theory of financial synergies", *Journal of Business* 72: 319-46.

Hadlock, C., M. Ryngaert and S. Thomas (2001): "Corporate structure and equity offerings: Are there benefits to diversification?", *Journal of Business* 74: 613-35.

Harrigan (1985), K.R. "Vertical Integration and Corporate Strategy", *Academy of Management Journal* 28: 397-25.

Hubbard, R.G. and D. Palia (1998): "A re-examination of the conglomerate merger wave in the 1960s: An internal capital markets view", *NBER Working Papers* 6539.

Kester, W.C. (1984): "Today's Options for Tomorrow's Growth", *Harvard Business Review* (March-April): 153–60.

Lane, P.J., A.A. Cannella and M.H. Lubatkin (1998): "Agency problems as antecedents to unrelated diversification: Amihud and Lev reconsidered", *Strategic Management Journal* 19: 555-78.

Lane, P.J., A.A. Cannella and M.H. Lubatkin (1999): "Ownership structure and corporate strategy: one question viewed from two different worlds", *Strategic Management Journal* 20: 1077-86.

Lang, L. and R. Stulz (1994): "Tobin's q, corporate diversification and firm performance", *Journal of Political Economy* 102: 1248-80.

Lewellen, W. (1971): "A pure financial rationale for the conglomerate merger", *Journal of Finance* 26: 521-37.

Lins, K. and H. Servaes (1999): "International evidence on the value of corporate diversification", *Journal of Finance* 54: 2215-39.

Lloyd, W. P., J. H. Hand and N. K. Modani (1987): "The effect of the degree of ownership control on firm diversification, market value and merger activity", *Journal of Business Research* 15: 303-12.

Maksimovic, V. and G. Phillips (2002): "Do conglomerate firms allocate resources inefficiently across industries?", *Journal of Finance* 57: 721-67.

Matsusaka, J. (1993): "Takeover motives during the conglomerate merger wave", *Rand Journal of Economics* 24: 357-379.

Matsusaka, J. (2001): "Corporate diversification, value maximization, and organizational capabilities", *Journal of Business* 74: 409-31.

Montgomery, C.A. and B. Wernerfelt (1988): "Diversification, Ricardian rents, and Tobin's q", *Rand Journal of Economics* 19: 623-32.

Morck, R. and B. Yeung (2003): "Why firms diversify: Internalization vs agency behaviour". In J.M. Haud and B. Lev (eds.): *Intangible assets. Values, measures, and risks*, Oxford University Press, New York: 269-302.

Penrose, E.T. (1959): *The theory of the growth of the firm*, Basil Blackwell, London.

Raynor, M.E. (2002): "Diversification as Real Options and the Implications on Firm-Specific Risk and Performance", *Engineering Economist* 47: 371-89.

Schipper, K. and R. Thompson (1983): "Evidence on the capitalized value of merger activity for acquiring firms", *Journal of Financial Economics* 11: 85-119.

Servaes, H. (1996): "The value of diversification during the conglomerate merger wave", *Journal of Finance*, 51, pp. 1201-1225.

Stein, J. (1997): "Internal capital markets and the competition for corporate resources", *Journal of Finance* 52: 111-33.

Stulz, R. (1990): "Managerial discretion and optimal financial policies", *Journal of Financial Economics* 26: 3-27.