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The economic value of the R&D intangible asset

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Abstract

This study utilizes firm-specific time-series data to estimate the economic value of the research and development (R&D) expenditures that investors consider an asset to the firm. The study uses a modification of the Ohlson (1995) model to estimate the persistence of abnormal earnings, the proportion of current R&D expenditures that represents a source of future benefits to the firm and the amortization rate of that asset. The parameters are estimated from time-series data of market and book values of equity, earnings and R&D expenditures. The study further compares the firm-specific estimates with those resulting from an application of a cross-sectional estimation procedure based on all available companies in the sample and industry-specific sub-samples. Results indicate the existence of significant differences in some two-digit SIC code industries between the time-series and the cross-sectional estimates of the parameters and the economic value of the R&D asset. Differences in the capitalization

parameter are associated with the growth in R&D, the profitability of the firm, R&D intensity and the concentration of the industry. Differences in the persistence of earnings are related to the concentration ratio. Finally, differences in the estimated economic value of the R&D asset are associated with the profitability of the company as measured by its return on assets. We further compare the associations between the three different estimates of the R&D asset and subsequent stock returns, as well as the contemporaneous difference between the market and book value of companies. Results indicate that the time-series estimates of the R&D asset show stronger associations with both variables, followed by the intra-industry and the cross-industry cross-sectional estimates. Overall, our results provide evidence that market participants behave as if R&D expenditures have significant future economic benefits to the firm, and show that the cross-sectional and time-series approaches followed when assessing its economic value provide significantly different estimates.

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Notes

[1]The only exception in the US is software development costs.

[2]An exception is the study of Megna and Mueller (1991), where the firm-specific R&D stocks are estimated by regressing sales on previous advertising and R&D expenditures. However, they also include in the model the aggregate advertising and R&D outlays of the firm's competitors in the industry.

[3]The assumption about the constant rates α and β is made for simplification of estimation. In reality, both are likely to vary depending on the specific stage in the life

cycle of the firm. However, any non-constant series can be converted into a constant series as shown by certainty equivalent discount rates in finance.

[4]We thank an anonymous reviewer for drawing our attention to capital expenditures besides drilling expenses.

[5]The model in this paper assumes a world without taxes, just like the Ohlson (1995) model.

[6]In a prior version of this paper, we repeated the analysis with quarterly data. Parameter estimates and further analyses were very similar to those reported for the annual results.

[7]We also used market values three months after the fiscal year-end with very similar results to those reported in the text.

[8]One must bear in mind that the companies in Panel C are not representative of the entire Compustat population; they are selected to the sample if they disclose R&D expenditures for at least ten years between 1985 and 2001. Thus, R&D is likely to be an important concern for these firms which have also survived for a long time. Our sample selection criteria may have different implications for size and growth opportunities in these companies than in the rest of the population.

[9]A note of caution should be interjected here. The comparison above is necessarily based only on firms that have sufficient history data to estimate the time-series model. These firms may have been more successful at deploying their R&D expenditures, and more reliant on it. Thus, the impact of R&D on the difference between market and book value and future returns may be more closely estimated from the time-series model.

Source: Journal of Applied Corporate Finance

Uncertainty Resolution and the Theory of Depreciation Measurement

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