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Home ▶ All Journals ▶ Applied Economics ▶ List of Issues ▶ Volume 45, Issue 5 ▶ Diminishing marginal returns from R&D in

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Original Articles

Diminishing marginal returns from R&D investment: evidence from manufacturing firms

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This study

opportunity

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growth of

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RDI on growth

effect of

Instead,

complementary

asset investment

across firms with different R&D intensity level

accounts for the diminishing marginal returns to R&D investment. We specifically observe that the greatest indirect effect is via the financial leverage of the firm. This study shows the importance of accounting for the interdependencies in R&D investment.

Keywords: R&D investment systematic risk leverage complementary assets structural equation model

JEL Classification: C33 G14 O32

Notes

¹ This multiplicative formulation derives from the use of SEM, which will be explained in the subsequent section.

² We use the AMOS (Arbuckle, [2005](#)) software to run the SEM tests.

³ Our study uses objective financial data sourced from the COMPUSTAT and CRSP databases. Thus, each variable is measured by a single item, in contrast to multiple items required for each subjective variable typically used in psychology and sociology research that employ SEM.

⁴ It should be noted that the economic significance of the results is not as strong as that reported in [Mueller, 1978](#); [Hirsch, 1985](#); and [Hirsch, 1985](#), which are based on data differing from the current study. The results in this study are consistent with those reported in [Mueller, 1978](#); [Hirsch, 1985](#); and [Hirsch, 1985](#).

⁵ Although the results in this study are consistent with those reported in [Mueller, 1978](#); [Hirsch, 1985](#); and [Hirsch, 1985](#), the results are not as strong as those reported in [Mueller, 1978](#); [Hirsch, 1985](#); and [Hirsch, 1985](#).

⁶ Details of the first stage of the study are available from the authors upon request.

⁷ Full details of the first stage of the study are available from the authors upon request.



⁸ The kurtosis of 101.5, 58.4 and 44.03 for Portfolios A, B and C, respectively, lead us to reject the null hypothesis of multivariate normality ($p < 0.01$). Multivariate nonnormality may cause the SEs of the path estimates to be underestimated. The remedy is to use the bootstrap approach where multiple samples, each containing the same number of observations as our dataset, are drawn with replacement from our original sample. The sampling distribution from the bootstrap procedure provides the data for empirical estimation of the variability of parameter estimates (Byrne, [2004](#), pp. 268–9). We ran the bootstrap procedure provided in AMOS for 500 bootstrap samples to obtain estimates of the SEs and the significance levels of the path coefficients.

⁹ Insignificantly different from zero.

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