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

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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

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

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

<sup>3</sup> 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 relevant in psychology and sociology research.

<sup>4</sup> It should be noted that the economic literature on R&D investment (e.g., [Mueller, 1978](#); [Hitt, 1997](#)) has differing views on the importance of R&D investment.

<sup>5</sup> Although the results in this study are consistent with the two hypotheses, the authors upon request.

<sup>6</sup> Details of the data are available from the first author upon request.



<sup>7</sup> Full details of the analysis are suppressed to conserve space, but are available from the first author upon request.

<sup>8</sup> 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.

<sup>9</sup> Insignificantly different from zero.

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