Industry and Innovation ›
Volume 24, 2017 - Issue 3

Articles

R&D and firm performance in the semiconductor industry

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Pages 280-297 | Published online: 28 Aug 2016

Cite this article https://doi.org/10.1080/13662716.2016.1224708 Check for updates

Abstract

While the semiconductor industry is still dominated by large vertically integrated firms, fabless f... re. Fabless firms are ... an focus their inn... process innovati... mpirical evidence ... ted firms. This ... inancial perfo... Our results show tha... er return on assets (... tegrated firms wh... This supports ... ocusing on one part of the innovation process. The relationship of R&D ratio to net margin is

negative for the whole sample, suggesting that the industry may be overinvesting in R&D. Notably, the negative relationship is greater for fabless firms, which spend a higher amount of their sales on R&D. The relationship of R&D ratio to ROA and Tobin's q is negative, and there is no significant difference between fabless and integrated firms. We conclude that fabless firms outperform integrated firms overall, but are somewhat worse in terms of increasing profits and creating value from their R&D investments.

Keywords: Innovation firm performance semiconductor industry vertical disintegration fabless firms vertically integrated firms

Notes

[1] The outsourcing of manufacturing is part of a much larger trend of vertical disintegration that occurred in other industries (e.g. electronics manufacturing, aerospace, apparel and footwear, automotive parts and pharmaceutical manufacturing).

[2] ODMs are a specific type of CM that is involved in both the design and manufacturing of a product for OEM.

[3] However, Feng and Lu (2012) conducted a theoretical analysis and found that as a manufacturer's bargaining power decreases, its profit under outsourcing may increase.

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semiconductor firms in the world is negligible, including about 100 small firms in Taiwan, our study on these 21 firms for 11 years provides some meaningful results. We compared these sample firms (187 observations) with other semiconductor firms in the EB300 data-set (418 observations – all the firms are operating in the industry of NAICS 3,344 except Sony Corporation operating in NAICS 3,343) in terms of total revenue, gross margin, net margin and ROA. By conducting the ANOVA, non-parametric χ^2 and median tests, we found that other semiconductor firms were not systematically different from the sample firms for most of the measures (total revenue and ROA for the ANOVA test, and total revenue, net margin and ROA for both non-parametric χ^2 and median tests).

[7] R&D ratios of fabless firms and integrated firms are 25.59 and 17.25%, respectively (Table 1).

[8] The visualisation of the regression model for other performance measures, such as net margin and ROA, shows similar illustrations.

[9] Since the variable of fabless firm is a dichotomous variable, we only use the two ends of the plots for interpretation (integrated firms are coded zero and fabless firms are coded one). It would be interesting if a continuous variable, for example, the outsourcing percentage of chip fabrication, is used instead of a dichotomous variable. However, such data are currently not available from any data sources we are aware of.

[10] Patent data used for the analysis are derived from the COMETS database release 1.0 (Zucker and Darby 2011).