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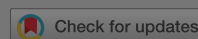
Articles

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>



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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 responsible for the design and development of a product, while the manufacturer is responsible for the production of the product.
- ³ However, the outsourcing of manufacturing may not be a panacea for all firms. For example, firms that as a result of outsourcing may increase their R&D ratio, but may not see a corresponding increase in profits.
- ⁴ Core silicon IP is a critical component of a firm's competitive advantage. Firms that own core silicon IP can develop a strong relationship with manufacturers and can potentially capture a larger share of the value chain.
- ⁵ Shin, J. (2011). The Impact of Vertical Disintegration on Firm Performance: Evidence from the Semiconductor Industry. *Journal of Management Studies*, 48(1), 1-25.
- ⁶ These firms include Intel, AMD, NVIDIA, and ARM. These firms are all vertically integrated, meaning they own both the design and the manufacturing of their products. In contrast, fabless firms like Qualcomm and MediaTek only own the design of their products and outsource the manufacturing to third parties.

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