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Assessing the performance of a vertically disintegrated chain by the DEA approach–a case study of Taiwanese semiconductor firms

Wen-Min Lu & Shiu-Wan Hung

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Abstract

The competitiveness of an individual firm depends upon the competitiveness of the value chain to which it belongs. The core constraint of virtually every chain is that chains are structured, measured and managed in parts, i.e. vertically disintegrated, rather than as a whole. Assessing the performance of vertically disintegrated firms can provide an insight of how each firm acts in such a value chain. This paper aims to study the operating performance of the vertically disintegrated chain in the integrated circuits (IC) industry. A performance evaluation was completed for 48 leading vertically disintegrated semiconductor companies in Taiwan, including 17 in design, 10 in fabrication and 21 in packaging/testing, using the data envelopment analysis (DEA) approach which inherently recognises tradeoffs among various measures. The empirical

results indicate that the IC design firms perform better than IC fabrication and IC packaging/testing firms. Overall, semiconductor firms in Taiwan still have room for performance improvement. In addition, the empirical results suggest that an IC company's scale of size does play an important role in influencing its operating efficiency. One can increase performance by consolidating with other smaller units to achieve an optimal size. In addition, an analysis of operating performance by DEA can provide a semiconductor firms' operations with insights into resource allocation competitive advantages, and help with strategic decision-making, especially regarding operational styles under an intense competitive environment.

Keywords:

performance measurement | data envelopment analysis | semiconductor firms | vertical disintegration