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# Productivity Impact of IT Investment in Singapore

Poh-Kam Wong  
*National University of Singapore*

John Sharp  
*Canterbury Business School*

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# PRODUCTIVITY IMPACT OF IT INVESTMENT IN SINGAPORE

Poh-Kam Wong  
Faculty of Business Administration  
National University of Singapore

## ABSTRACT

While much empirical research has been done on the "productivity paradox" problem in the United States (for a recent survey, see Brynjolfsson 1993), there has been little comparable research among newly industrializing economies (NIEs). The recent work of Kraemer and Dedrick (1993) shows some correlation of IT investment-GDP ratio with GDP growth rate for a cross section of eleven Asia-Pacific economies, but since no attempt is made to control for other influencing factors (e.g., non-IT related investment), such correlations may be spurious. Whether NIEs face the productivity paradox therefore remains an open question.

Among NIEs, Singapore has one of the highest intensities of IT investment per capita. This paper investigates the impact of IT investment on overall productivity in the Singaporean economy by estimating an economy-wide Cobb-Douglas production function that separates capital stock into an IT-component and a non-IT component. Output of the production function is measured by real GDP, while labor, the other input in the production function, is measured by total employment adjusted for average work-hours per week.

Econometric estimation results for the period 1980-1992 show that, for reasonable range of IT and non-IT capital depreciation rates assumed, the production function model fits the data reasonably well in terms of the usual statistical tests. Moreover, the estimated coefficient for IT capital is significant at the .95 level for all cases. Even the lowest coefficient estimate implies a rate of return (ROI) estimate of IT investment exceeding 88%, which is significantly higher than the assumed capital depreciation rate plus interest rate. It is also higher than the estimated ROI of 68% for a sample of 380 large firms in the US over 1987-1991 as reported recently by Brynjolfsson and Hitt (1994).

The estimation results thus appear to refute the productivity paradox in the case of Singapore. This is in contrast to most other findings for the United States in the literature, but consistent with the recent findings of Brynjolfsson and Hitt. It would be interesting to see whether similar conclusions can be obtained in other NIEs using a similar estimation method, or that Singapore represents a special case.

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