

**Timo Salmi / Professor / University of Vaasa**  
**Ilkka Virtanen / Professor / University of Vaasa**

## **A Simulation Assessment of Three Methods for Deriving the Long-run Profitability of the Firm as its Internal Rate of Return**

A central task in accounting theory and practice is measuring the firm's profitability for both the short-run and the long-run decision making of the firm's stakeholders. There is a long-standing debate in accounting literature whether the firm's internal rate of return, consistent with the well-accepted concept of the economist's income, can be derived from the firm's published financial statements, and from the accountant's rate of return in particular. Several methods for deriving the firm's internal rate of return have been put forward in accounting literature.

There is a long-standing debate in literature on the usefulness of the long-run profitability estimation methods. In this paper we evaluate Kay's, Ijiri's and the average accountant's rate of return methods using simulated financial statements. The earlier evaluations using actual financial data from business enterprises have the drawback of missing an objective profitability benchmark. On the other hand, the results of the papers with solely an analytic deduction have arrived at conflicting conclusions. Using simulated data will allow us to know the true internal rate of return in advance to provide the objective benchmark for the evaluation of the three methods.

Our investigation adds capital investment cycles. It is observed that none of the three methods is sensitive to cyclical fluctuations. This is an important result because it confirms the applicability of the methods beyond the usual steady state assumptions.

In accordance to our simulation results the discrepancy between the true growth and profitability is the dominating source of the error in the internal rate of return estimates in all the three methods. Furthermore, the other sources of errors in the internal rate of return estimates interact with and can be aggravated by the growth-profitability discrepancy.

It is observed that the contribution distribution of the firm's capital investments can have an effect of the quality of the internal rate of returns given by the three long-run profitability estimation methods. The depreciation method applied by the firm in its financial statements affects the internal rate of return estimation result in interaction with the contribution distribution of the capital investments. Both the effects are strongly related to the growth-profitability discrepancy.

The numerical performance of the methods is found to be roughly at par, but Ijiri's method is more unpredictable than the theoretically better founded Kay's method. Contrary to the critical views in some of the earlier literature, the average accountant's rate of return method fares as well in the internal rate of return estimation as the more complicated estimation models. The average accountant's rate of return method can be recommended for financial analysis because it has the advantage of being based on well-established accounting practice.