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Average Internal Rate of Return and Investment Decisions: A New Perspective

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Abstract

The internal rate of return (IRR) is often used by managers and practitioners for investment decisions. Unfortunately, it has serious flaws: (1) multiple real-valued IRRs may arise; (2) complex-valued IRRs may arise; (3) the IRR is, in general, incompatible with the net present value (NPV) in accept/reject decisions; (4) the IRR ranking is, in general, different from the NPV ranking; (5) the IRR criterion is not applicable with variable costs of capital. The efforts of economists and management scientists in providing a reliable project rate of return have generated over the decades an immense bulk of contributions aiming to solve these shortcomings. This article offers a complete solution to this long-standing unresolved issue by changing the usual perspective: the IRR equation is dismissed and the evaluator is allowed to describe the project as an investment or a borrowing at his discretion. This permits showing that any arithmetic mean of the one-period return rates implicit in a project reliably informs about a

project's profitability and correctly ranks competing projects. With such a measure, which we call average internal rate of return, complex-valued numbers disappear and all the above-mentioned problems are wiped out. The economic meaning is compelling: it is the project return rate implicitly determined by the market. The traditional IRR notion may be found as a particular case.

Notes

For example, the cash flow stream (−4,12,−9) has a unique IRR equal to 50%. According to the IRR criterion, the project must be accepted if the market rate is smaller than 50%, but the NPV is negative for any rate different from 50%, so the project is not worth undertaking. (Note that this example implicitly introduces a further class of problems: if a project is not unambiguously individuated as either an investment or a borrowing, the IRR profitability rule is ambiguous.)

The approach is compatible with a bounded-rationality perspective: in this case r is a subjective threshold (Magni, 2009b).

The IRR rule is semantically not satisfactory because it is not associated with a univocal definition of investment/borrowing, so that in some situations one does not know whether the IRR acts as a rate of return or a rate of cost (see footnote 1).

Note that the theorem includes those cases where $x_0 = 0$ (i.e., the project starts at time $t > 0$).

The real options approach is but a sophisticated version of the traditional NPV model, where the set of alternatives is inclusive of the options implicit in the project: ‘‘one can always redefine NPV by subtracting from the conventional calculation the opportunity cost of exercising the option to invest, and then say that the rule ‘invest if NPV is positive’ holds once this correction has been made’’ (Dixit and Pindyck 1994, p. 7).

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