Centre for Market and
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Measuring the Rate of Return for Competition Law

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Definitions

$$NPV_t = \sum_{n=t}^{N} \frac{R_n}{(1+IRR)^{n-t}} - \sum_{n=0}^{N} \frac{C_n}{(1+IRR)^{n-t}},$$

$$NPV_t = \frac{R_t - C_t}{1+r} + \frac{NPV_{t+1}}{1+r},$$

$$\sum_{n=0}^{N} \frac{R_n}{(1+IRR)^n} - \sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n} = 0$$

$$ARR_t = \frac{(R_t - C_t) + (A_{t+1} - A_t)}{A_t}.$$

Deprival value is the minimum of { Replacement Cost (RC) ; the maximum of { Net Present Value (NPV) ; Net Realizable Value (NRV) }}

Proposition 1

If assets are defined by deprival value and if the ARR is greater than the cost of capital, then the NPV of the assets is greater than their replacement cost, i.e., there is an excess return.

What are we trying to measure?

- Perfectly Competitive Market:
  - There is an extremely large number of sellers, all producing homogeneous products
  - There is an extremely large number of buyers
  - Consumers have perfect information about products, prices and market conditions
  - Resources can flow freely from one area of economic activity to another
  - There are no barriers to entry
  - Firms can lend and borrow in perfect capital markets
  - There are no barriers to exit
- Unrealistic benchmark for competition law

  (More useful for regulation?)
- DoJ's Merger Guidelines

- Whole life of project
- “Missing” assets problem
- Real options
- Errors in measurement
  - e.g., equity risk premium 6.7%

    standard error 21.4%

Conclusions

- There should be “clear water” between a notion of excessive profitability and the cost of capital.

- A test that shows only that profitability is such that return is above the cost of capital is not particularly helpful.

Quote

- “There is no *per se* reason why profits in excess of the cost of capital represent anything other than the effective working of a competitive market.”

Is this Difference Material?

Company level data

	All companies, %	Monopoly pricing cases only, %
Average ROCE	39.4	65.5
Average ROCE where adverse finding	51.0	102.6
Average ROCE where no adverse finding	30.5	28.3
Average addition to ROCE for adverse finding	20.5	74.3
Correlation between ROCE and adverse finding	49	18

Case level data

	All companies, %	Monopoly pricing cases only, %
Average ROCE	54.2	93.0
Average ROCE where adverse finding	62.8	119.7
Average ROCE where no adverse finding	39.9	50.4
Average addition to ROCE for adverse finding	22.9	69.3
Correlation between ROCE and adverse finding	18	37

Problems with IRR

Outsourcing problem

1. Invest $1m today

   $1.09 m in one year's time

   8% - cost of capital

   IRR = ARR = 9%

2. Invest 1/3 of above and outsource the rest with payment of $683,475 in six month's time to deliver output at end of year.

   IRR = 11.5% ARR = 22.9%

   But pricing policy and shareholder returns identical.

Rental Problem

Contract life	“Outsourced” IRR	“Non-outsourced” IRR
2	14.1%	15.2%
3	27.3%	62.5%
4	30.0%	79.4%
5	29.3%	86.9%
7	28.0%	91.9%
10	25.1%	93.3%
15	21.8%	93.5%

Sensitivity to Errors

- Cost $100m – decline at 1%
- Cost of capital is 10%
- Revenue $90.9m per annum

IRR = 10%

- Imagine error by competition authority who think cost is $93m not $100m, i.e., 7% error in measurement of cost.

IRR = 43%

Three results

- Proposition 2

  Moving revenues and/or costs (NPV constant) through time has larger impact on IRR the greater the difference between IRR and the cost of capital.

- Proposition 3

  The “zero-coupon” equivalent has the lowest IRR amongst the set of present value equivalent projects.

- Proposition 4

  The ranking of projects by the “zero-coupon” equivalent is identical to the present value ranking.

Conclusions

- Can relate IRR, NPV and ROCE.
- But not the relevant “test”
- Relevant “test” causes problems for measure of profitability
- Calculate the “zero-coupon” equivalent
- Use as many measures as possible.
- Measuring profitability is an “art-form”.