

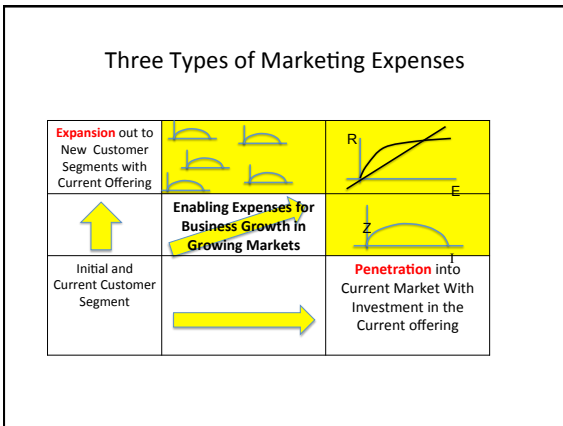
Two Rates of Return on Financial/Business Investments and Two Ways of Forecasting

Ted Mitchell

Last Week in Mkt 316

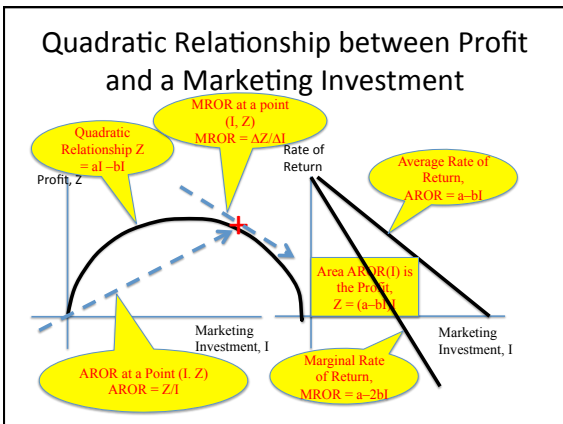
You learned that different marketing expenses could be treated in different ways

- 1) Some could be considered investments in the amount of customer value found in the seller's offering
- 2) Some could be considered expansion expenses into new markets with the current offering
- 3) Some could be considered enabling expenses necessary allowing for the business to grow when the market grows



You have proved on the Exam

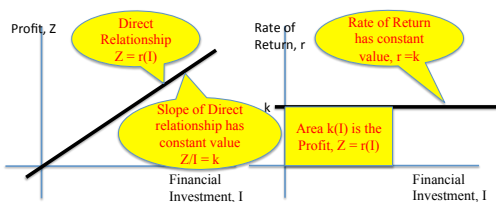
- You understand the complexity of marketing investments in terms as financial gains from a marketing investment in the seller's offering



Students must learn

- How different marketing investments are from traditional finance investments
- They have different functional forms: Marketing Investments have Quadratic Relationships and Financial Investments have Direct Relationships
- The AROR have different values from MROR

The Direct Relationship between Profit and a Financial Investment



Why the emphasis? The Reason Why

- 1) Finance managers and executives **NEVER** bother to define the type of rate being used to measure a financial return
- 2) when finance managers and executives wish to understand the return on a marketing investment, then they must be told the type of rate being used
- It is a major mistake to assume that a Marketing ROI has the same characteristics as a Financial ROI

ALL the Classic Rates of Return on Investment

- 1) ROA: the average rate of net profit return for a single performance as ratio of net profit on assets
- 2) ROE: the average rate of net profit return for a single performance as ratio of net profit on equity
- 3) ROI: the average rate of profit return for a single performance as ratio of net profit on the investment in inventory, I
- **Assume** a **DIRECT** relationship Between Profit and Investment

Why is the Theory Behind the

- Financial Rates of Return so simple?
- Why don't finance students learn that there are two major rates of return AROR and MROR ?

Rates of Return Come in Two Flavors

With Two different Approaches
 1) Using observed performances or
 2) Using functional relationships provided by market research

	Average Rate of Return AROR	Marginal Rate of Return MROR
Single Point Estimation for forecasting		
Functional estimation for forecasting, $Z = f(I)$		

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	Average Rate of Return AROR	Marginal Rate of Return MROR
Single Point Estimation for forecasting	Estimation of single point AROR by Single Observation, Z/I	
Functional estimation for forecasting, $Z = f(I)$		

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	Average Rate of Return AROR	Marginal Rate of Return MROR
Single Point Estimation for forecasting	Estimation of single point AROR by Single Observation, Z/I	Estimation of single point MROR from two Observations, $\Delta Z/\Delta I$
Functional estimation for forecasting, $Z = f(I)$		

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Single Point Estimation for forecasting	Estimation of single point AROR by Single Observation, Z/I	Estimation of single point MROR from two Observations, $\Delta Z/\Delta I$
Functional estimation for forecasting, $Z = f(I)$	Using functional format of the profit function to forecast the AROR at any point on the profit function, $AROR = f(I)/I$	

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Functional estimation for forecasting, $Z = f(I)$	Using functional format of the profit function to forecast the AROR at any point on the profit function, $AROR = f(I)/I$	Using functional format of the profit function to forecast the MROR at any point on the profit function, $MROR = dZ/dI$

A classic interpretation of ROI

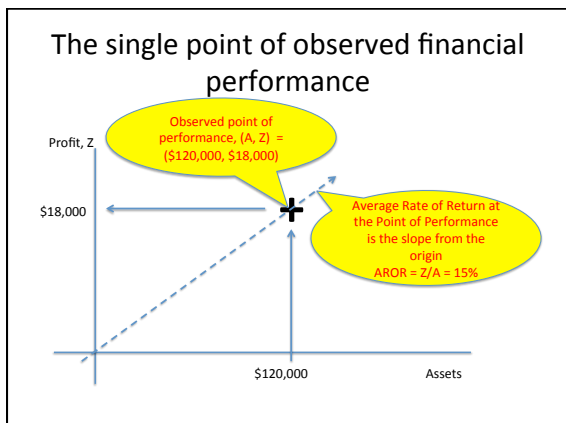
- Is the net profit, Z, the investors or owners are receiving as a return on the total assets, A, in the firm.
- A firm receives a financial gain of \$18,000 on the total investment or assets of \$120,000 which represents a $\$18,000/\$120,000 = 15\%$ return on investment on the firm's performance for that period
- Observe $Z = \$18,000$ and $A = \$120,000$, then calculate the return on investment as $Z/A = 15\%$

A single observed performance provides the Assets, A, and the Profit, Z

	Observed performance 1	Observed performance 2	Incremental rate of return, $\Delta P = P2 - P1$
Assets, A	$A1 = \$120,000$	$A2 = \$130,000$	$\Delta A = A2 - A1$ $\Delta A = \$10,000$
Return on Assets, FROA = Z/A		Calculated ROA = $19,500/120,000$ ROA = 15%	Incremental rate of return, $\Delta Z/\Delta A$ $\Delta Z/\Delta A = 1,500/10,000$ $\Delta Z/\Delta A = 0.15 = 15\%$
Profit, Z	$Z1 = \$18,000$	$Z = \$19,500$	$\Delta Z = Z2 - Z1 = \$1,500$

The Financial Rate of Return is calculated

	Observed performance 1	Observed performance 2	Incremental rate of return, $\Delta P = P2 - P1$
Assets, A	$A1 = \$120,000$	$A2 = \$130,000$	$\Delta A = A2 - A1$ $\Delta A = \$10,000$
Financial Return on Assets, FROA = Z/A	Calculated FROA = $18,000/120,000$ FROA = 15%	Calculated ROA = $19,500/120,000$ ROA = 15%	Incremental rate of return, $\Delta Z/\Delta A$ $\Delta Z/\Delta A = 1,500/10,000$ $\Delta Z/\Delta A = 0.15 = 15\%$
Profit, Z	$Z1 = \$18,000$	$Z = \$19,500$	$\Delta Z = Z2 - Z1 = \$1,500$



When you know that you are dealing with a Financial Investment

- Then it is common to use the slope, $Z/A = 15\%$, at observed point (A, Z) = (\$120,000, \$18,000) to forecast the profit generated for any proposed level of investment
- Example, It is proposed that the level of financial investment be increased to A = \$130,000. What is the forecasted level of profit?
- Answer: Forecasted Profit = FROA x Assets, A
- Forecasted Profit = $15\% \times \$130,000 = \$19,500$

Forecasting with the slope of an observed performance

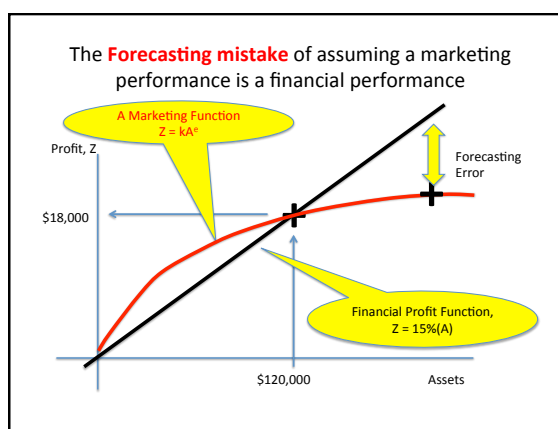
	Observed performance 1	Forecasted performance 2	
Assets, A	A1 = \$120,000	A2 = \$130,000	
Financial Return on Assets, FROA = Z/A	FROA = 18,000/120,000 FROA = 15%	FROA = 15%	
Profit, Z	Z1 = \$18,000		

Forecasting with the slope of an observed performance

	Observed performance 1	Forecasted performance 2	
Assets, A	A1 = \$120,000	A2 = \$130,000	
Financial Return on Assets, FROA = Z/A	FROA = 18,000/120,000 FROA = 15%	FROA = 15%	
Profit, Z	Z1 = \$18,000	Forecasted Z2 = FROA(A2) Z2 = \$19,500	

When you wrongly assume

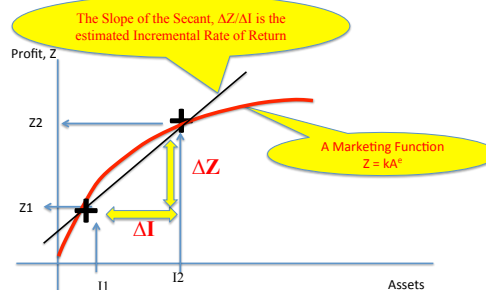
- A Marketing ROI has the same characteristics as a Financial ROI,
- Then you might forecast incorrectly



An Estimate of the

- Incremental Rate of Return helps managers identify investment functions that are not traditional Financial or Business investments

Estimating an Incremental rate of change



Estimating the Incremental Change

- In Profit From a change in the level of invested assets
- The incremental change in profit, $\Delta Z = (\Delta Z/\Delta A) \times \text{Change in Assets, } \Delta A$

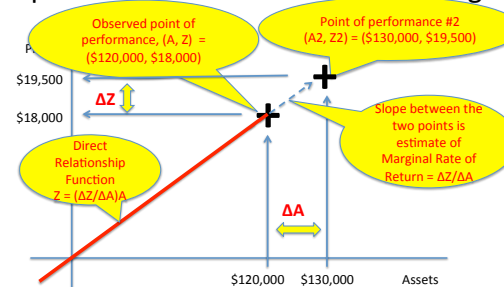
Two observed performances to estimate the marginal rate of return, MROR using incremental change, $\Delta Z/\Delta A$

	Observed performance 1	Observed performance 2	Incremental rate of return, $\Delta P = P2 - P1$
Assets, A	A1 = \$120,000	A2 = \$130,000	$\Delta A = A2 - A1$ $\Delta A = \$10,000$
Return on Assets, ROA = Z/A			
Profit, Z	Z = \$18,000	Z = \$19,500	$\Delta Z = Z2 - Z1 = \$1,500$

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Profit, Z	Z = \$18,000	Z = \$19,500	$\Delta Z = Z2 - Z1 = \$1,500$

Two points of observed financial performance for incremental change



A key learning point

- With a Financial Investment
- The estimated value of the single point FROI, Z/I , and the incremental rate of the FROI, $\Delta Z/\Delta I$, have the same percentage value!
- $Z/I = \Delta Z/\Delta I$
- With Marketing Investments this is **NOT** true
- With Marketing Investment the single point estimate of MROI is never equal to the incremental MROI

Using the Functional Form of a Financial Relationship

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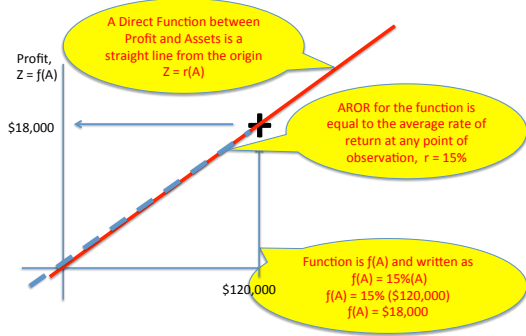
The most common way

- For managers to estimate the AROR and the MROR is to make simple one or two point observations of the firm's financial performance
- However, managers in large organizations with R&D staffs have access to the functional forms of the relationship between profit, Z, and assets, A, estimated from data bases
- $Z = f(A)$

With Financial Investments The Functional Relationship

- There is a **DIRECT** relationship between the profit, Z, and the investment, A
- The **DIRECT** function between profit, Z, and assets, A, is written as Profit, $Z = \text{ROA} \times (\text{Assets}, A)$
- The **definition** of **DIRECT** function is one in which the ratio of the two variables, Z, and A, has a **constant value, r**
- $Z/A = r$
- Where $r = \text{ROA}$

Profit as a DIRECT function of Assets



Unlike the single point estimate of AROR at a single observed point

- The Functional Relationship between Z and A
- Allows us to calculate the amount of profit, Z, to be earned at any level of proposed level of assets, A, as $Z = f(A)$
- When the value of the return, $r = 15\%$ with the Direct function is
- Profit, $f(A) = r \times (\text{Assets}, A)$
Profit, $Z = 15\%(A)$
- Average Rate Of Return at any point on the function is calculated as $\text{AROR} = f(A)/A$
- $\text{AROR} = 15\%(A)/A = 15\%$

A Key Learning Point

- With Financial Investments
The value of Average Rate of Return, AROR, for the profit function is equal to the single point estimate of the FROI and the estimated incremental rate $\Delta Z/\Delta I$

The Direct Relationship

- Between Profit, Z, and the Assets, A
- Allows for the marginal rate of return to be measured for any amount of investment
- When the function, $Z = f(A)$ is written as
- $Z = f(A) = 15\%(A)$
- The MROR at any point on the function is the first derivative of the function
- $df(A)/dA = d(15\%A)(A) = 15\%$

In finance it is **NOT** surprising

- That nobody wastes any time teaching finance students that there are Two different rates of return associated with a financial investment and a Functional form of a financial investment
- All financial rates have the same value, r, and the rate of return, r, has a constant value. k

In Finance,

- The assumption of a **DIRECT** relationship between the financial gain, Z, and the amount of investment, I, where $Z/I = k$ is the **KEY**
- Causes Average and Marginal rates of return to have the same constant value, k,

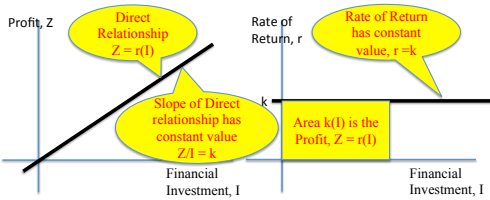
Rates of Profit being Returned on Financial Investments

- There are four rates of return to be aware of
- 1) Average Rate Of Return as the ratio, Z/I at a single point of observed performance, (I, Z)
 $AROR = Z/I = \$18,000/\$120,000 = 15\%$
- 2) Average Rate of Return as the ratio, $f(I)/I$, of the profit as a function of the investment size, f(I), and the size of the investment, I
- $AROR = f(I)/I = ((ROI) \times I)/I = ROI$
- $AROR = ((15\%) \times \$120,000)/\$120,000 = 15\%$

Four Rates of Return

- 3) The Marginal Rate Of Return as the ratio, $\Delta Z/\Delta I$, of the change in profit, ΔZ , for the last dollar invested, ΔI , at a single point of observed performance, (I, Z)
 $MROR = \Delta Z/\Delta I = \$1,500/\$10,000 = 15\%$
- 4) The Marginal Rate of Return as the first derivative of the profit as a function of the investment size, $Z = f(I) = k(I) = 15\%I$
 $MROR = dZ/dI$
 $MROR = d(15\%I)/dI = 15\%$

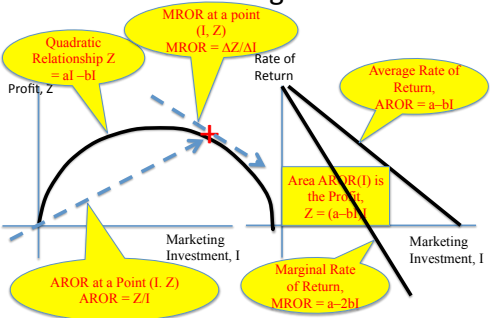
The Direct Relationship between Profit and a Business Investment



The **Direct** relationship

- Between profit, Z, and a financial investment is trivial
- **compared to**
- the concave functions between profit and the marketing investment in the amount of customer value created in the seller's offering

Quadratic Relationship between Profit and a Marketing Investment



With Financial Rates of Return

- There are AROR and MROR but they all have the same value!
- With Marketing Rates of Return the AROR and MROR have **different** values and different applications

You must learn

- To define a Rate of Return accurately, ROI
- Indicate
 - 1) The nature of the investment (business investment, marketing expenditure)
 - 2) What is it that is being returned (net profit, marketing profit, gross profit, revenue)
 - 3) What type of rate is being measured
 - single point performance average, Z/I ,
 - an estimated incremental, $\Delta Z/\Delta I$,
 - a AROR function $Z = f(I)$,
 - a MROR function, dZ/dI