Module 2

Alternative Approaches to Valuation and Investment

Capital Asset Pricing Model
(It's all about the discount rate)

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Motivation

We have spent time:

- Defining attitudes towards risk – settling on **risk aversion** as the default position of investors
- Measuring total risk using standard deviation
- Differentiating between total risk, diversifiable risk and systematic risk
- Developing a measure – β – that measures systematic risk – relative to the market.

But why does any of this matter?

Motivation

Recall when we dealt with a firm's investment decision that the dominant methods were **Discounted Cash Flow** (DCF) techniques such as **NPV** and **IRR.**

$$PV = \frac{Cash\ Flow_t}{(1+r)^t}$$

where; r reflects the time value of money, more specifically: **risk**, **opportunity cost** and **expected inflation.**

The risk we were incorporating in the DCF calculations was **systematic** risk.

We need a model – that specifically provides estimates of r for a given level of systematic risk (β).

The Capital Asset Pricing Model

A very intuitively appealing model that states:

$$E(R_i) = R_f + \beta_i \left[E(R_M) - R_f \right]$$

- $E(R_i)$: Expected return for asset *i*
- R_f: Risk-free rate of return
- β_i: Beta for asset *i*
- $E(R_M) - R_f$: Market risk premium

The Capital Asset Pricing Model: Components

$$E(R_i) = R_f + \beta_i \left[E(R_M) - R_f \right]$$

$E(R_i)$: Expected or Required rate of return

- This can be used as the discount rate in NPV and the hurdle rate in IRR analysis
- Like all the rates here – typically measured on a per annum basis.

R_f: Risk-free rate of return

- This is the rate of return that can be earned in the absence of any risk at all
- Common proxies that are used include Treasury bill yields.

The Capital Asset Pricing Model: Components

$$E(R_i) = R_f + \beta_i \left[E(R_M) - R_f \right]$$

$E(R_M)$: Expected return on market portfolio

- What we expect the value-weighted market portfolio to generate in the next year
- Instead of estimating this specifically, we tend to estimate...

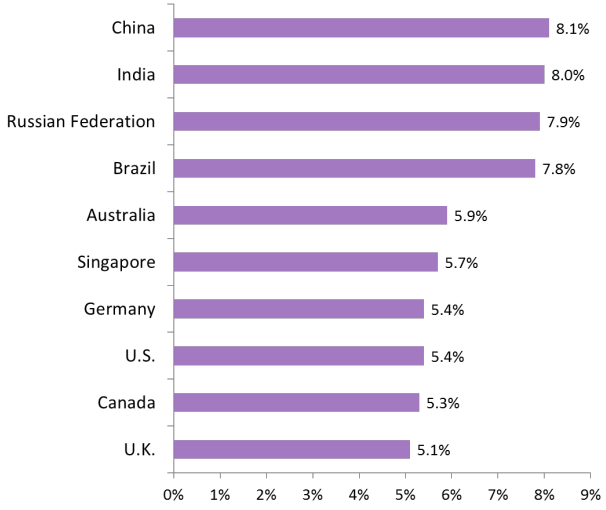
$E(R_M)-R_f$: Market risk premium

- The amount by which we expect the market portfolio of risky assets to outperform the risk free asset on a per annum basis
- International survey evidence by Fernandez, Linares and Acin (2014) suggests a wide range of estimates are used in practice.

The Capital Asset Pricing Model: Components

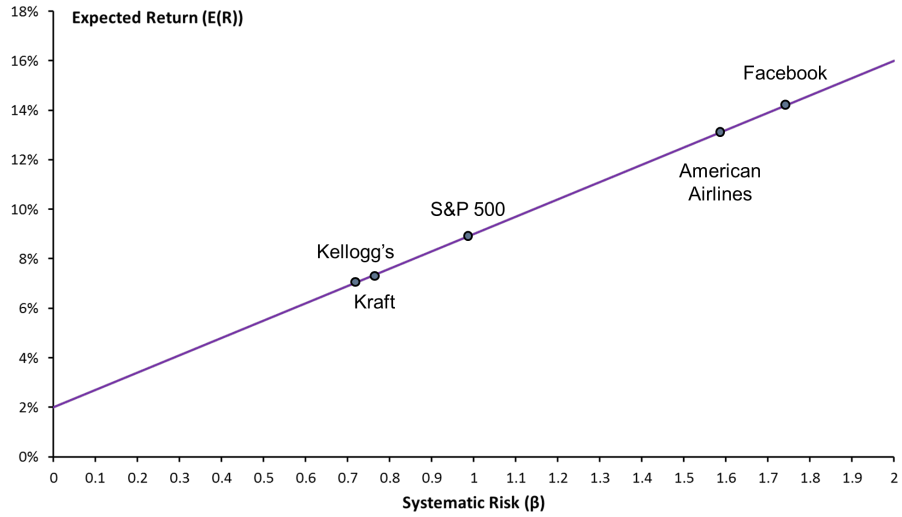
$E(R_M)-R_f$: Market risk premium

- Fernandez, Linares and Acin (2014) asked more than 29,000 academics, managers and analysts for their estimate of the market risk premium.



Graphing the CAPM: The Security Market Line

When we graph CAPM we end up with the **Security Market Line** (SML):



Using the CAPM: An illustration

What is the expected return from a share of Facebook - where the company has a beta of 1.75, the yield on 10 year Treasury bonds is 2% and the expected market risk premium is 7%?

$$E(R_i) = R_f + \beta_i \left[E(R_M) - R_f \right]$$
$$E(R_i) = 2\% + 1.75\left[7\%\right]$$
$$E(R_i) = 14.25\%$$

Using the CAPM: An illustration continued

You decide to combine the investment in Facebook with an investment in Kellogg's Ltd – dedicating half of the value of your portfolio to each asset.

What is the systematic risk and expected return of your portfolio?

$$\beta_{Portfolio} = (0.5)(1.75) + (0.5)(0.773) = 1.262$$

$$E(R_P) = 2\% + 1.262\left[7\%\right] = 10.83\%$$

or

$$E(R_P) = (0.5)(14.25\%) + (0.5)(7.41\%) = 10.83\%$$

Summary

We described the Capital Asset Pricing Model:

$$E(R_i) = R_f + \beta_i \left[E(R_M) - R_f \right]$$

We demonstrated how it provided us with an explicit link between systematic risk and expected return.

The takeaway from this session is that – if the CAPM correctly describes the risk/expected return trade-off – then β should be all that is necessary to describe the cross-section of expected returns of different assets.

Is this the reality?

Source list

Slide 7:

Graph created by Sean Pinder using data published in Fernandez, Pablo and Linares, Pablo and Fernández Acín, Isabel, Market Risk Premium Used in 88 Countries in 2014: A Survey with 8,228 Answers (June 20, 2014). Available at SSRN: http://ssrn.com/abstract=2450452 © The University of Melbourne.

Slides 8, 9 and 10:

Examples and figure created by Sean Pinder using data downloaded from Yahoo Finance in June 2015 at https://au.finance.yahoo.com. © The University of Melbourne.