Module 2

Alternative Approaches to Valuation and Investment

Empirical Evidence of the Capital Asset Pricing Model (Testing the untestable by observing the unobservable)

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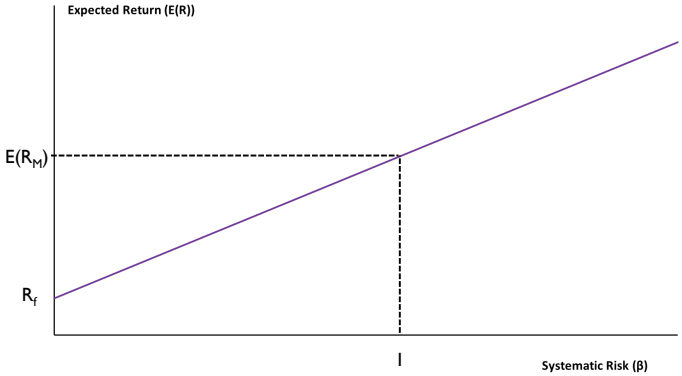
Motivation

The Capital Asset Pricing Model (CAPM) provides an intuitively appealing and straightforward relationship between risk and expected return.

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



Motivation

But does it work? Does the CAPM provide an accurate measure of the expected return of a risky asset?

If it does – then we have solved one half of almost every valuation problem…

$$PV = \frac{E(CF_t)}{(1+r)^t}$$

Challenge

To test the CAPM you need to do the following:

$$E(R_i^{Actual}) = E(R_i^{CAPM})$$

Compare this…

…with this!

Problem

1. Measurement

Problems

2. Specification
3. Estimation period
4. Return interval

Challenge 1: Measurement of expectations

$$E(R_i^{Actual}) = E(R_i^{CAPM})$$

The CAPM is a model of **expectations.**

Even if you could measure every investor's expectations of the future return from all risky assets… *How do you collapse these estimates down to a single **comparable** number?*

Challenge 2: Specification

$$E(R_i^{Actual}) = E(R_i^{CAPM})$$

The CAPM model requires us to specify **the** risk-free rate of return and **the** expected market risk premium.

- *Which risk-free rate do we use?*
  Treasury bills…
- Fine… *Which country's bills?*
  Ah… our country?

Challenge 2: Specification continued

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

The CAPM model also requires us to estimate the asset's beta but to do so we need to observe the returns on the market portfolio… which the CAPM dictates should include ALL risky assets…

How do I identify ALL risky assets?

Even if I could do so, *how do I estimate the returns on these assets?*

Challenges 3 & 4: Estimation period and return interval

Okay – let's pretend that you can identify the returns from a portfolio consisting of all risky assets… You still need to answer the following questions:

1. *Over what time period will you estimate the beta for an asset? 1 year, 2 years, 3 days…?*
2. *Over what time period will you measure returns? Daily, weekly, monthly, minute by minute?*

5 years of monthly returns!!

A work-around to the problem of testing

To get around the problems of observing expectations, we can make the assumption that whatever expectations are – they are **unbiased.**

If that is the case, and if the CAPM did explain expected returns, then we would predict that, on average, the cross-section of asset returns could be explained by beta.

That is; high beta stocks should earn higher returns, on average, than low-beta stocks.

If the CAPM is correct, then no other variable **but beta** should explain variability in returns.

Fama and French (1992)

In 1992, in one of the most widely cited papers in finance – Eugene Fama and Kenneth French, published a paper titled "The Cross-Section of Expected Stock Returns".

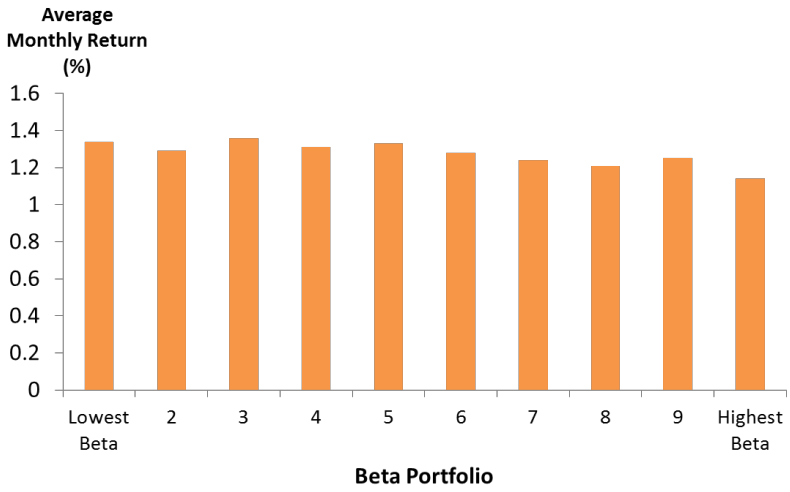
In it they tested whether the variability in stock returns between 1963 and 1990 could be explained by a mix of variables including:

i. Beta
ii. Size – market capitalization
iii. Ratio of Book Value to Market Value of Equity – high implies a **value** firm, **low** implies a **growth** firm.

Fama and French (1992): Findings (1)

First:

Consider the average monthly returns observed for stocks pre-sorted on beta at the beginning of each year.



Fama and French (1992): Findings (2)

Second:

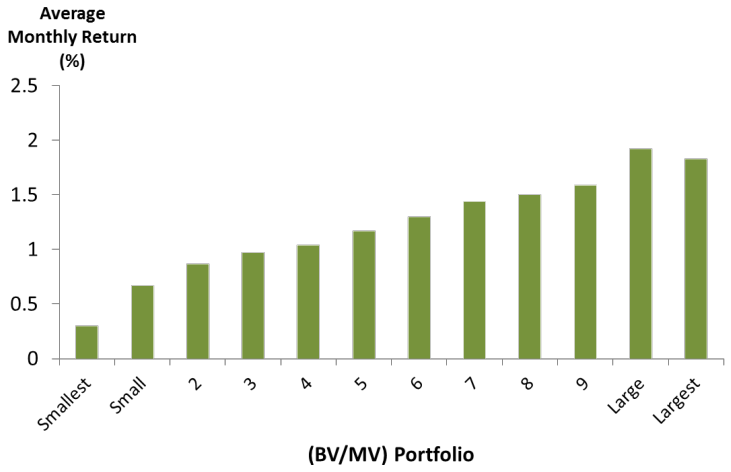
Consider the average monthly returns observed for stocks pre-sorted on market capitalization at the beginning of each year.

Fama and French (1992): Findings (3)

Third:

Consider the average monthly returns observed for stocks pre-sorted on the ratio:
(Book Value of Equity/ Market Value of Equity)

[high (low) implies **value** (**growth**) stock].



Fama and French (1992): Findings (4) and conclusion

They then ran a series of statistical models testing for the explanatory power of a range of characteristics with respect to realized returns. They state:

> *"In a nutshell, market β seems to have no role in explaining the average returns on NYSE, AMEX and NASDAQ stocks for 1963-1990, while size and book-to-market equity capture the cross-sectional variation in average stock returns …"* (pg. 445).

They also highlight that the lack of support for β suggests that the CAPM is not the right way of thinking about the risk-return relationship – but that instead maybe the size and BV/MV factors might be relevant:

> *"Thus, if there is a role for β in average returns, it is likely to be found in a multifactor model …"* (pg. 449).

Summary

In this session we:

- Highlighted how you would test the CAPM in a perfect world
- Acknowledged the problems in testing the CAPM in reality
- Looked at the key findings of Fama and French (1992) which documented no relationship between returns and beta, but strong relationships between returns and size and BV/MV.

Have multi-factor models been developed?

Forget the academics, what do managers actually use?

Source list

Slide 8:

Image of Sean Pinder – 2002. © The University of Melbourne.

Slides 11, 12 and 13:

Graphs created by Sean Pinder using data published in Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *The Journal of Finance*, vol. 47, no. 2, 427-465. © 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.