Alternative Asset Pricing Models (Partington & Satchell): Some Key Points

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Use of Multiple Models

- Use of multiple models is not necessarily better.
  - Using more information does not necessarily mean less uncertainty or greater precision.
- Averaging a better estimate (model) with a poorer estimate (model) is not helpful.
  - The more so with gaming.
- Main contenders in the multiple model stakes: CAPM and DCF/DGM.
- So which Is better?
  - Test of time and use in estimating the cost of capital:
    - CAPM has dominated use by companies and regulators (for decades).
    - DGM fell from favour post CAPM, now little used to estimate the cost of capital.

Forward Looking Models and Data

- All asset pricing models are forward looking:
  - "expected return models."
- The issue is the inputs:
  - The CAPM requires current risk free rate, current beta and the current expected market risk premium.
    - Beta and the market risk premium are the challenges.
- The DCF/DGM model is not an asset pricing model. It gives an implied cost of capital based on forecast cash flows.
  - The model is the current price equals the present value of expected future cash flows to infinity, commonly implemented as expected cash flows to time t and a subsequent perpetual growth rate.
    - The expected cash flow is the challenge, particularly because of upward biased forecasts and sluggish updating by analysts.
  - DGM results are quite variable.

DGM and Variability

- DGM estimates can vary a great deal, both across comparator companies and for the same company (by applying different DGM's/inputs).
  - For example, the Brattle report to the AER gives details of the DGM analysis for Order 569-A of the US FERC.
    - The sample estimates range from 3.92% to 11.37%. (Table 12)
    - Are such variable estimates helpful to a regulator?
    - The FERC truncates the range to a "zone of reasonableness" 7.37% to 11.37%.
    - Would wide ranges of estimates and the process of trimming them be an incentive to gaming?

Key Results from Recent Research

- An explosion of factors supposedly determining the cost of capital (priced factors): Over 400!
  - Following the expansionary trend the Fama and French model 3 factor model now has four, five, and six factor versions.
- Increasing concern about research methods: the quality of evidence, particularly data mining and a lack of underlying theory:
  - To quote Fama and French (2017)

We worry, however, that opening the game to factors that seem empirically robust but lack theoretical motivation has a destructive downside – the end of discipline that produces parsimonious models and the beginning of a dark age of data dredging that produces a long list of factors with little hope of sifting through them in a statistically reliable way.

Key Results from Recent Research Continued: What Factors Really Matter?

- Recently, tests have been developed to deal with data mining and to order factors in a reliable way:
  - Tend to show the market factor as a consistently important factor, or the only significant factor.
  - Other factors tend to lose importance and the bulk of claimed factors lose statistical significance entirely.
  - A comprehensive Australian study, Hoang, et al. (2019) finds: ***…the market factor is the only true risk factor.***

Key Results from Recent Research Continued: Results about Beta

- Beta is a function of the holding period used to measure returns.
  - Alpha ("low beta bias") shrinks to insignificance with longer holding periods.
  - Short holding periods give a poor measure of fundamental risk exposure.
  - Regulators should use longer holding periods (a month or more) in estimating. beta.
    - Gregory et al. (2016): *Our conclusions are unequivocal and have important policy implications for regulatory use of the CAPM, as they imply that low frequency beta estimates should always be preferred to high frequency beta estimates.*

Key Results from Recent Research Continued: No Theory and Out of Sample Robustness

- Fama and French (2017) emphasise the limitations of out of sample robustness saying: *Thorny issues arise for factors that have no theoretical motivation but are robust in out-of-sample tests. Without a model that identifies the forces responsible for a meaningful pattern in observed returns, it's hard to assess the likelihood that the pattern will persist.*

SL-CAPM

- $E[r_i]=r_f+\beta_i(E[r_m]-r_f)$, $\beta_i=Cov(r_i,r_m)/\mathrm{Var}(r_m)$
- Pro:
  - Clear theoretical foundation with relatively simple and transparent implementation.
  - Plenty of supporters on theoretical and empirical grounds (and critics).
  - Empirically supported by triangulation:
    - Mutual funds flows
      - Berk and van Binsbergen (2016): *We find that the CAPM outperforms all extensions to the original model, which implies, given our current level of knowledge, that it is still the best method to use to compute the cost of capital of an investment opportunity.*
    - Experimental markets
  - Robustness
    - To obituaries: continued use in education and practice.
    - To relaxing assumptions
      - Brealey et al. (2000): *It turns out that many of the assumptions are not crucial, and with a little pushing and pulling it is possible to modify the capital asset pricing model to handle variation in the assumptions.*
  - Passes test of time and use: Surveys show it is the dominant asset pricing model for CoC estimates in practice, used by corporates, large investment banks, and regulators.

SL-CAPM continued

- Con
  - Many papers find the actual returns to low beta portfolios are higher than the CAPM predicts and there are lower actual returns than predicted for high beta portfolios ("low beta bias").
  - In the CAPM only one factor is priced, but many papers find additional priced factors (see Key Results above).
  - Whether the foregoing is evidence against the CAPM is debated.

SL-CAPM Continued

- Conclusions on CAPM
  - Report to the UK regulators, Wright et al. (2018): *Recommendation 1 (CAPM): The Capital Asset Pricing Model remains (despite numerous caveats) the best available model.*
  - Smith and Walsh (2013) … *the CAPM is still the only game in town.*
  - We agree.

DCF/DGMs and the Implied Cost of Capital (equity)

- Requires solving for the cost of equity in:
  - $P_0 = \sum_1^\infty \frac{Expected\ cash\ flow\ to\ equity\ at\ time\ t}{(1+cost\ of\ equity)^t}$
  - One simple version is: $P_0 = \sum_1^\infty \frac{Expected\ dividend\ at\ time\ 1}{cost\ of\ equity - expected\ perpetual\ growth\ rate}$
- Pro
  - Well developed theoretical model.
  - Has had past use in practical estimation of the cost of equity.
  - Has some current use in estimating the market risk premium.
  - There are simple versions of the DGM and applications can be transparent.

DCF/DGMs and the Implied Cost of Capital (equity) Continued.

- Con
  - Multiple possible models, divergent results, which estimate to use?
  - Fallen from favour for CoC estimates in practice.
  - Net cash flow to shareholders is affected by capital contributions and withdrawals and adjustment for this is problematic.
    - These are substantial relative to the dividend.
  - Particular need to allow for capital contributions via dividend reinvestment plans.
  - Difficulty in separating cash flow news from discount rate news when prices change, particularly with sticky dividends.
  - Research reports significant measurement errors in the implied cost of capital.
  - The forecast input is problematic since analysts' forecast are upward biased and it is not clear what the best alternative is.

DCF/DGMs and the Implied Cost of Capital (equity)

- An Australian study provides a compact summary of the bias issue, Patton et al. (2019): *There is a wealth of literature that confirms the existence of analyst forecast bias in the US market. For instance, analysts have been shown to produce overly optimistic forecasts (De Bondt and Thaler, 1990), and under-react to certain information (Abarbanell and Bernard, 1992). This has been attributed to a variety of causes, from attempts to curry favour with firm management (Francis and Philbrick, 1993) to cognitive processing constraints (Lin and McNichols, 1998). Irrespective of the exact causes, such biases have been shown to result in measurement errors for ICC estimates when analyst forecasts are used as a proxy for market expectations (Easton and Sommers, 2007; Guay et al., 2011).*
- Patton et al. confirm that there are the same problems in the Australian market. They suggest using forecasts from cross-sectional models instead of analysts' forecasts.

DCF/DGMs and the Implied Cost of Capital (equity)

- Conclusions on DCF/DGMs
  - Substantial issues in implementation.
  - Substantial variation in estimates.
  - Upward biased estimates if analysts' forecasts are used as input.
  - Choice of long term growth rate would be contentious.
  - Estimates are least reliable when the market moves sharply
    - When you are most likely to want to track changes in the market risk premium.
  - DCF/DGM is not recommended.

Models with a fixed risk margin

- In general the fixed margin model is:
  - Cost of equity = base rate + risk premium.
- The base rate could be the cost of debt, but there are substantial arguments for the base rate being the risk free rate.
  - Consistent with asset pricing models.
  - Gives an expected rather than promised return.
- Key issue is the how to set the magnitude of the risk premium.
  - Using the CAM risk premium plus the risk free rate is the current AER approach.
- Pro
  - Simple model.
  - Some use in practice and in regulation.

Models with a fixed risk margin

- Con
  - Theory is undefined.
  - Procedure for determining the base rate and the risk premium is undefined.
- Conclusion
  - Without a strong case for the benefit of this method and a clear and appropriate procedure for determining the risk margin the method is difficult to recommend.

Other Models

- Not recommended because of failings in relation reliability, simplicity, suitability, and practical use. In particular:
  - Little, or no, use in practice for estimating the cost of capital.
  - And some of:
    - No theory
    - Very mixed evidence for and against, or poor empirical performance.
    - Increased complexity of implementation and/or econometrics.
      - For little, or no, clear benefit.
    - Increasing opportunities for gaming.

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