ALTERNATIVE ASSET PRICING MODELS

- **Consumption CAPM**: relates asset's systematic risk to consumption (investors only care about consumption).
    - o Assets whose returns have a high negative covariance with consumption have a low risk premium.
    - o Such assets help smooth consumption as the provide *insurance* against bad times.
    - o Issue: consumption data is available infrequently and involves measurement error.
    - o Better at explaining returns that CAPM, based on Dec. quarter consumption (end of FY – tax).
    - o *Savov* (2011): garbage-based CCAPM. *Chen* and *Lu* (2013): growth in CO2 emissions CCAPM.
- **International CAPM**: prices assets as if there are no national or political boundaries.
    - o Assumes no investment restrictions or barriers to capital flows (completely integrated global market).
    - o National influences on assets become diversifiable. Only relevant factors in pricing are global ones.
    - o As global markets become more integrated, covariances and correlations between assets in different countries increase and the ICAPM becomes the preferred measure of systematic risk.
- **Arbitrage pricing theory** (APT): overcome shortcomings of CAPM; less restrictive assumptions.
- *Assumptions:*
    1. Large asset markets: sufficient securities to diversify away idiosyncratic risk.
    2. Asset returns have a linear factor structure: they can be described by a factor model.
    3. Market permits no arbitrage opportunities: do not permit the prolonged presence of mispricings.
    4. Does not require: quadratic preference functions or normally distributed returns.
- Returns are generated by *risk factors:* common, systematic, economy-wide sources of risk (similar to SIM).
- Sensitivity to factors (risk) measured by *beta* (β). Surprises in factor returns lead to surprises in stock returns.
- Arbitrage opportunities exist when: $[E(R_i) – R_f]/\beta_i \neq [E(R_j) – R_f]/\beta_j$. (Excess return per unit of beta).
- <u>Note</u>: For an arbitrage opportunity to exist, it must be self-financing (i.e. no capital is at-risk).
- *Advantages* of APT:
    - o Makes no strong assumptions about investors utility functions.
    - o Allows for many risk factors (the more factors, the higher the explanatory power of the model).
    - o Holds for any subset of risky assets: do not need to measure the 'entire universe' (CAPM).
    - o Do not need to know the market portfolio.
- *Limitations* of APT:
    - o Only applies to well-diversified portfolios (assumes no idiosyncratic risk).
    - o Thus, it may have limited application when the number of securities in the market is small.
    - o Mispricings (arbitrage opportunities) can be small and non-exploitable (with transaction costs).
    - o Does not identify *what* the risk factors are. Requires returns to be linear.
- *Selecting factors:* the ability of the APT to price assets depends on the factors that are selected.
    - o *Macroeconomic:* observable factors that are not as prevalent.
        - • 1. Estimate betas (time-series data). 2. Estimate factor premiums (cross-sectional data).
        - • E.g. industrial pollution, unexpected inflation, oil prices, market volatility, unemployment.
    - o *Fundamental:* firm characteristics that are proxies for risk.
        - • Assets sorted into different portfolios (e.g. ASX300 sorted into 5 portfolios of 60 stocks).
        - • E.g. SMB, HML, BAB, MOM, credit risk (rating), liquidity risk, staff turnover.
    - o *Statistical:* identified through quantitative analysis.

<u>MARKET EFFICIENCY I</u>: Covered in Essay.

- *Market efficiency* is made up of two components:
    1. *Information efficiency:* reflects the speed at which new information is incorporated into prices.
    2. *Market rationality:* new information is correctly incorporated into stock prices.
- Thus, in an efficient market, new information is incorporated in an *instantaneous* and *unbiased* manner.
- An inefficient market implies *predictability:* information can be used to consistently earn excess returns.
- M*arginal cost* of trading information (subscription to databases, hiring analysts = *Marginal benefit* (returns).
- If a market is inefficient, resources are systematically misallocated (i.e. toward firms that are overvalued).
- *Classes of information:*
    o *Weak form:* do current market prices fully reflect <u>past</u> information?
    o *Semi-strong form:* do prices incorporate <u>publically</u> available information (e.g. earnings, takeovers)?
    o *Strong form:* does the possession of <u>private</u> information lead to excess returns (i.e. insider trading)?
- *Joint test problem:* to define excess returns in order to test market efficiency, a model for expected return is required (e.g. CAPM). Thus, any test of market efficiency is subject to the limitations of the model.
- *Anomaly:* something that deviates from what is standard, normal or expected. All anomalies involve a *signal*.
    o Based on empirical results that are inconsistent with maintained theories of asset-pricing behaviour.
    o Use the signal based on a particular stock characteristic to rank stocks into portfolios.
    o Calculated by grouping stocks into portfolios (so the signal, not idiosyncratic risk, is the focus).
- ***Examples of anomalies****:*
- *Anomalies based on past information:* evidence supporting both strategies (implies weak form inefficiency).
    o *Momentum* (MOM): stocks with highest returns in the past 3-12 months have higher future returns.
        • *Jegadeesh* and *Titman* (1993): MOM strategy earned significant returns of 12.01%p.a.
        • Explanations: earnings momentum; short sales constraints restricting arbitrage in 'losers'.
    o *Long-term price reversals:* stocks with the lowest returns over past 3-5 years outperform 'winners'.
- *Firm size* (SMB): on average, small firms (market cap) outperform large firms.
    o *Banz* (1981): a size-based trading strategy can earn risk-adjusted profits of around 20% p.a.
    o Relationship between firm size and returns is *non-linear* and *concentrated* in the smallest decile.
- *Growth versus value* (HML): in the long-term, value (high book-to-market) outperforms growth (low) stocks.
- *Idiosyncratic volatility* (s. to BAB): stocks with higher idiosyncratic volatility have lower returns, on average.
    o Return difference between highest 20% ivol stocks and lowest 20% ivol stocks is -1.06% p.m.
    o Like *betting against beta*, this goes against theory and intuition (high risk = high reward).
- *Event studies:* involve the study of abnormal returns around announcements (earnings) or events (takeovers).
    o Detects semi-strong form efficiency based on the speed in which new information is reflected in price.
    o Surprise earnings announcement (SUE): relatively *symmetrical* (rationality), but *leakage* and *drift*.
    o *Leakage* indicates strong form inefficiency (insider trading); *drift* shows inefficiency (instantaneity).
- Returns from anomaly trading strategies have reduced over time. Why is this happening?
    o Improving market liquidity.
    o Declining transaction costs.
- Anomaly returns found to decline after publication (32% of this can be attributed to *publication effect*).

<u>MARKET EFFICIENCY II</u>

- Conventional finance *assumes* that:
    - o Investors: are risk-averse utility maximisers; are 'rational'; and incorporate all information.
    - o Resources are allocated efficiently; and prices are correct.
- *Behavioural finance* incorporates psychology. *Are anomalies found because investors are irrational?*
- There are two categories of irrationalities:
    1. Investors do not always *process information* correctly (processing errors).
    2. Investors make *incorrect, inconsistent* or *suboptimal* decisions (behavioural biases).
- *Errors in information processing:* lead to investors misestimating true probabilities.
    - o *Forecasting errors*: when too much weight is placed on recent experience (memory/availability bias).
    - o *Overconfidence*: when investors overestimate their abilities and the precision of their forecasts.
    - o *Conservatism*: when investors are slow to update their beliefs and underreact to new information.
    - o *Sample size neglect*: when a patterned is inferred from a small sample (e.g. 'tech stocks are winners').
- *Behavioural biases:* can occur even if the new information is processed correctly.
    - o *Framing:* how the risk is 'framed' or described can affect the decisions of investors.
        - Evidence shows that people prefer risk-free gains (risk-averse) and risky losses (risk-seeking).
    - o *Prospect theory:* risk preferences change depending on changes in current wealth (similar to framing).
        - Conventional view: utility depends on *level* of wealth.
        - Behavioural view: utility depends on *changes* in current wealth. (See back of page).
- *Limits to arbitrage:* why aren't all these arbitrage opportunities exploited? Very important.
    - o *Fundamental risk:* 'markets can remain irrational longer than you can remain solvent' (e.g. ivol).
    - o *Implementation costs:* transactions costs and restrictions on short selling can limit arbitrage activity.
    - o *Model risk:* what if you have a bad model and the market value is actually correct?
- *Ex-dividend day anomaly:*
    - o Many studies have found the price change from cum-div day to ex-div day is less than $1.
    - o In a frictionless market, a $1 dividend should be worth $1. The divided is not 'attached' to the stock.
    - o *Does this imply a potential trading strategy? Do arbitrage opportunities exist?*
    - o Explanations:
        - Differences in tax rates on dividends and capital gains. If the tax rate on dividends is higher, the price drop on ex-div will be less than $1. Dividend value is equal to CG in after-tax terms.
        - Transaction costs (bid-ask spread) can restrict arbitrage leading to a non-zero premium.
    - o *Ainsworth* (2013): average abnormal return on ex-div is 0.20% between 1995 and 2008.
    - o BUT trading costs increase significantly on ex-div. Reduction in liquidity poses a risk to investors.
    - o <u>Note</u>: The government loses (imputation tax credits), while certain investors are able to profit.