Financial Markets & Risk

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Session 2

Equity Markets

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Equity Market

The market in which shares are issued and traded,

Also known as the stock market, it is one of the most vital areas of a market economy because it gives companies access to capital and investors a slice of ownership in a company with the potential to realize gains based on its future performance.

This market can be split into two main sectors: the primary and secondary market.

The primary market is where new issues are first offered. Any subsequent trading takes place in the secondary market.

http://www.youtube.com/watch?v=_2Kt4moES0U&feature=related

Risk-Adjusted Performance Measures

Widely number used and accepted measures

- Treynor ratio
- Sharpe ratio
- Sortino Ratio
- Jensen’s Alpha

Factors to be considered when evaluating portfolios

Differential risk levels

Mutual fund which provides a 10% return. Is this performance good or bad?

Not possible to answer without knowing the level of risk involved in such investment.

Benchmarks

Is the return of 10% enough compared to some alternative portfolio which accurately reflects the objectives of portfolio owners?

A good benchmark has to be clearly stated, should be replicable and should reflect the risk preferences of clients.

Some companies in asset management industry tend to use peer group benchmarks where the benchmark is performance of peers.

Constraints in Portfolio Managers

Some mutual funds (unit trusts) or investment trusts have set constraints (prohibition of short-selling, investing in small stocks, emerging markets, restricted options/futures trading, etc).

Diversification issues

Needs to know the level of diversification of the portfolio, to know which performance measure would be appropriated to use.

Risk-Adjusted Measures of Portfolio Performance

Incorporates return and risk in the evaluation.

Two risks to be estimated: Portfolio's market risk (measured by Beta) and the total risk (measured by standard deviation).

Relevant measure of risk: Depends on the level of risk of the portfolio

Treynor ratio, Sharpe ratio, Sortino Ratio and Jensen's Alpha

Treynor ratio

Measure the portfolio's return relative to its systematic risk.

The measure shows the excess return of a portfolio by unit of the systematic risk. Also called Reward-to-Volatility ratio.

The Treynor index for the market portfolio will be:

$$T_m = \frac{\bar{r}_m - \bar{r}_f}{\beta_m} = \bar{r}_m - \bar{r}_f \text{ since } \beta_{\mathrm{m}} = 1$$

Portfolio q will outperform the market if:

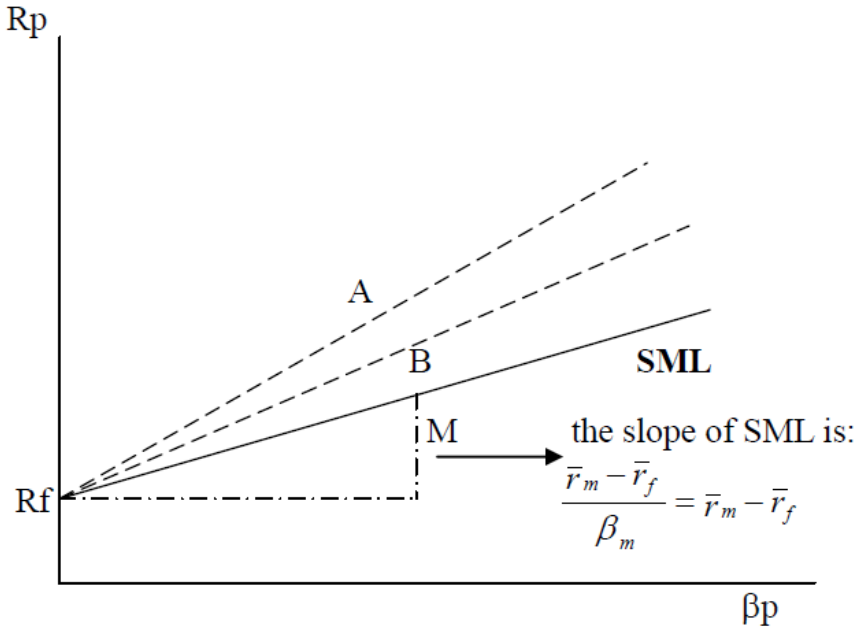
$$T_q = \frac{\bar{r}_q - \bar{r}_f}{\beta_q} > \bar{r}_m - \bar{r}_f$$

Portfolios can be ranked according to the Treynor ratio.

Example

	Return	Std Deviation	Beta	Treynor
Market	4.798%	7.318%	1.00	0.016
Portfolio A	7.93%	8.315%	0.8223	0.057
Portfolio B	6.388%	7.498%	0.9322	0.034
Risk-free	3.2%			

SML is the benchmark for the Treynor ratio



Sharpe ratio

Sharpe measure evaluates portfolios that are adjusted for their total risk (measured by the standard deviation of the returns).

It can be used as a performance measure for less diversified portfolios.

The measure shows excess return per unit of total risk. Also known as Reward-t-Variability Ratio.

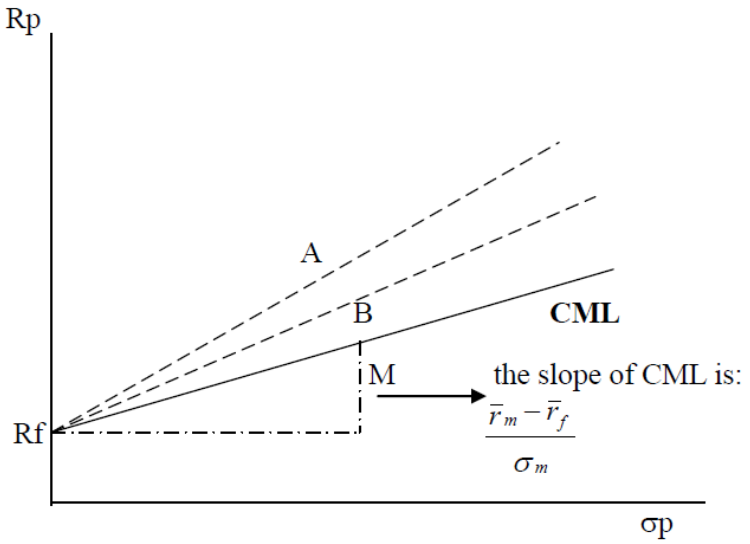
$$S_m = \frac{\bar{r}_m - \bar{r}_f}{\hat{\sigma}_m}$$ Sharpe ratio for the market portfolio

$$S_p = \frac{\bar{r}_p - \bar{r}_f}{\hat{\sigma}_p}$$ Sharpe ratio for any portfolio p

Example

	Return	Std Deviation	Sharpe
Market	4.798%	7.318%	0.22
Portfolio A	7.93%	8.315%	0.57
Portfolio B	6.388%	7.498%	0.42
Risk-free	3.2%		

CML is the benchmark for the Treynor ratio



Notes:

The ranking resulting from the Treynor and Sharpe ratio is the same.

If portfolios are well diversified then the unsystematic risk is eliminated and the total risk is equal to the systematic risk.

Sortino Ratio

Measures the risk adjusted return of an investment asset, portfolio or strategy.

Similar to the Sharpe ratio, except it uses downside deviation (measured by target semi-variation, square root of target semi-variance) for the denominator instead of standard deviation.

This measure penalizes only returns that follow bellow a required rate of return (mean return or expected return).

Measure preferred by investors interested in downside risk only.

$$S_p = \frac{\bar{r}_p - \bar{r}_f}{\sigma_D}, \text{where } \sigma_D \text{ is the downside risk}$$

The downside risk is the target semi-deviation (i.e. the square root of the target semi-variance).
Semi-variance is calculated as:

$$SV_i = \frac{1}{n}\sum_{t=1}^{n}[R_{it} - E(R_i)]^2 \text{, where: } R_{it} - E(R_i) = \begin{cases} 0 & \text{if } R_{it} - E(R_i) > 0 \\ R_{it} - E(R_i) & \text{if } R_{it} - E(R_i) < 0 \end{cases}$$

where,

n – number of observations,

R_{it} – rate of return on asset i for the t-th observation,

$E(R_i)$ – mean return on asset i.

The ratio is the actual rate of return in excess of the risk free rate, per unit of downside risk

Jensen's Alpha

Based in the CAPM

$$E(R_p) = r_f + \beta[E(r_m - r_f)]$$

If portfolio return is above the equilibrium one then the difference can be written as:

$$\alpha = E(R_p) - r_f - \beta[E(r_m - r_f)]$$

If CAPM holds. The value of alpha should be zero.
Using the definition of regression the above alpha term ca be recognized as the intercept in the regression of :

$$r_p - r_f \text{ on } r_m - r_f$$

Example

Consider portfolio A and B. The estimates of α's and β's along with the t-statistics given in parenthesis are:

$$r_A - rf = 0.0398 + 0.8223\,(r_m - rf)$$
$$(2.496) \quad (37.82)$$
$$R^2 = 0.523$$

$$r_B - rf = 0.0191 + 0.9322\,(r_m - rf)$$
$$(2.216) \quad (79.10)$$
$$R^2 = 0.827$$

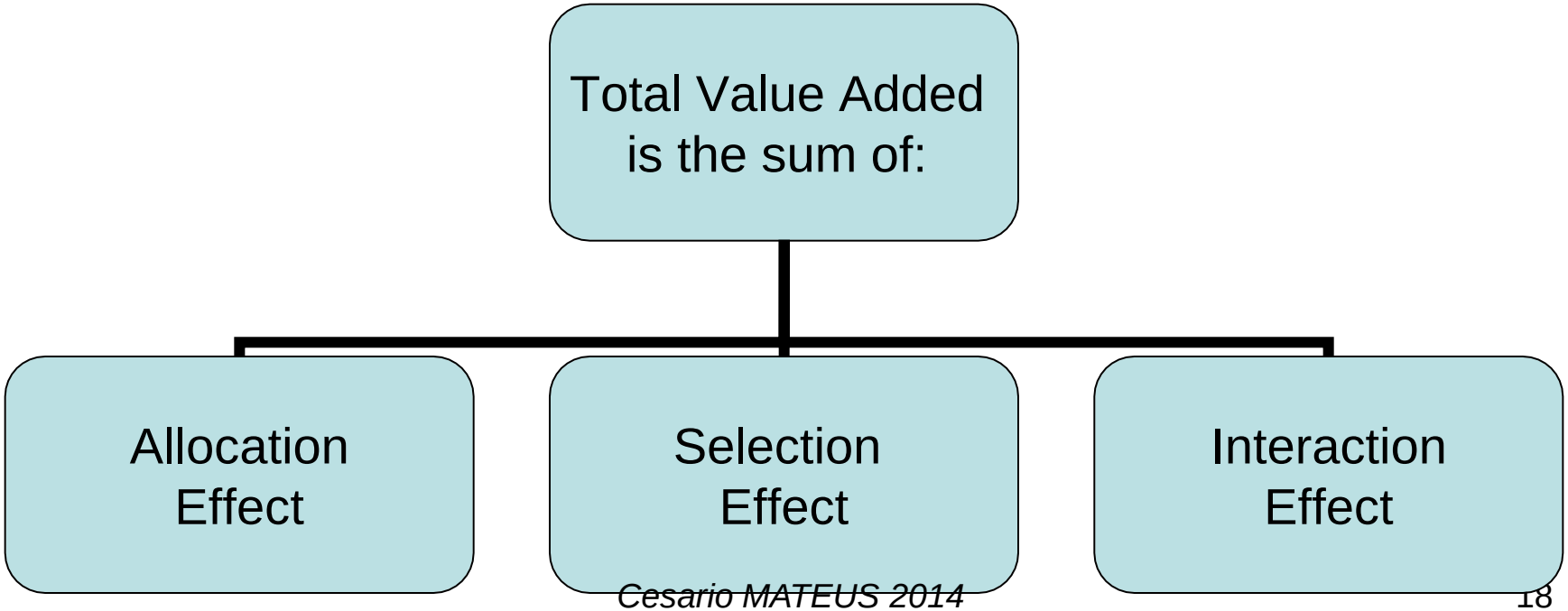
Comment on the significance of the values of alphas and betas for portfolio A and B.

Performance Attribution – Return Decomposition Analysis

- Attributes performance vs. Benchmarks
- Can focus on asset allocation (top/down approach) or selection (bottom up approach)
- Easy to calculate (requires benchmark and portfolio returns and weights)
- Easy to understand and explain
- Widely accepted in industry

Active Management Effect

Active management effect is the total value added to a portfolio return. It is the difference between the total portfolio return and total benchmark return. Total value added is obtained as the sum of the following investment decisions or effects: asset allocation, selection and interaction.



Asset Allocation Effect

Measures portfolio manager's ability to effectively allocate the assets to various market segments

- Positive allocation effect: portfolio is overweighted in a segment that outperforms the benchmark and underweighted in a segment that underperforms the benchmark

- Negative allocation effect: portfolio is overweighted in a segment that underperforms the benchmark and underweighted in a segment that outperforms the benchmark

Selection effect

The selection effect measures the investment manager's ability to select securities within a given asset class relative to a benchmark.

The over or underperformance of the portfolio is weighted by the benchmark weight, therefore, selection is not affected by the manager's allocation to the asset class.

The weight of the asset class in the portfolio determines the size of the effect (the larger the segment, the larger the effect is, positive or negative).

Interaction Effect

The interaction effect measures the combined impact of an investment manager's selection and allocation decisions within an asset class.

- For example, if an investment manager had superior selection and overweighted that particular asset class, the interaction effect is positive.
- If an investment manager had superior selection, but underweighted that segment, the interaction effect is negative. In this case, the investment manager did not take advantage of the superior selection by allocating more assets to that segment.

Calculating Performance Attribution, Brinson et. al (1986)

		Security Selection	
		Actual Portfolio	Passive (benchmark)
Asset Allocation	Actual Portfolio	Quadrant IV: Actual Portfolio Return $\sum w_{a,i} R_{a,i}$	Quadrant II: Policy and Active Asset Allocation Return $\sum w_{a,i} R_{b,i}$
	Passive (bench-mark)	Quadrant III: Policy and Security Selection Return $\sum w_{b,i} R_{a,i}$	Quadrant I: Policy Return (Passive Portfolio Benchmark) $\sum w_{b,i} R_{b,i}$

Where:

Wa,i = actual portfolio weight for asset class i,

Wb,i = benchmark weight for asset class i;

Rb,i = passive benchmark return for asset class i and

Ra,i = actual portfolio return for asset class i

Calculating Performance Attribution, Brinson et. al (1986)

Return contributed to	Calculated as
Active Asset Allocation effect	Quadrant II-I: $\sum(w_{a,i}R_{b,i} - w_{b.i}R_{b,i})$
Security Selection effect	Quadrant III-I: $\sum(w_{b,i}R_{a,i} - w_{b,i}R_{b,i})$
Interaction effect	Quadrant IV-II-III+I $\sum[(w_{a,i} - w_{b.i})(R_{a,i} - R_{b,i})]$
Total value added	Quadrant IV – I: $\sum(w_{a,i}R_{a,i} - w_{b,i}R_{b,i})$

Note: attribution effects in this model are defined as total on a fund/portfolio level and breakdown of those totals into segments (equity, bonds etc.) in this model is not possible

Calculating Performance Attribution, the example

Step 1: Establish the benchmark level of performance against which actual portfolio performance is compared. Benchmark portfolio is passive (meaning: 1)allocation of funds across asset classes in the benchmark is set as 'usual' allocation and 2) within each asset class manager invests in an index portfolio). Any departure from actual portfolio returns from this passive benchmark is due to allocation effect, security selection effect or both. If we know that the return of the active managed portfolio is 5.34%, then we have:

Table 1: Benchmark Performance

Component Asset Class	Benchmark weight	Return of Index (%)
Equity Index	0.60	5.81
Bond Index	0.30	1.45
Cash	0.10	0.48

Benchmark return = 0.6 × 5.81+0.3 × 1.45+0.1 × 0.48 = 3.97%

Excess Return of active managed portfolio =

=Return of active managed portfolio – Return of the benchmark = 5.34 - 3.97

= 1.37%

Calculating Performance Attribution, the example

Step 2: Composition of the active managed portfolio is different from the benchmark (70/7/23 vs. 60/30/10), which can lead to superior/inferior performance due to 1) Asset allocation or 2) Security Selection

Table 2: Asset Allocation Effect

Asset Class	Active weight (1)	Benchmark weight (2)	Excess weight (3)	Benchmark Return (%) (4)	Allocation Effect (3) x (4)
Equity	0.70	0.60	0.10	5.81	0.5810
Bond	0.07	0.30	-0.23	1.45	-0.3335
Cash	0.23	0.10	0.13	0.48	0.0624

Total contribution of asset allocation effect: 0.3099%

Calculating Performance Attribution, the example

If return of equity and bonds in our active managed portfolio are 7.28% and 1.89%, then security selection effect can be computed as:

Table 3: Security Selection Effect

Asset Class	Active performance (1)	Benchmark performance (2)	Excess performance (3)	Benchmark weight (4)	Selection Effect (3) x (4)
Equity	7.28	5.81	1.47	0.60	0.882
Bond	1.89	1.45	0.44	0.30	0.132
Cash	0.48	0.48	0.00	0.10	0.000

Total contribution of Security Selection Effect: 1.014%

Calculating Performance Attribution, the example

Step 3: Interaction effect

Table 4: Interaction Effect

Asset Class	Excess portfolio performance (1)	Excess portfolio weight (2)	Interaction Effect (1) x (2)
Equity	1.47	0.10	0.147
Bond	0.44	-0.23	-0.101
Cash	0.00	0.13	0.00

Total contribution of Interaction Effect: 0.0458%

Step 4: Active management effect = Allocation + Selection + Interaction =

= 0.3099 + 1.014 + 0.0458 = 1.3697% ~ 1.37%

We can calculate the source of performance within each asset class. Let us look at allocation of funds within equity for example:

Table 5: Sector Allocation Contribution

Sector	Beginning of period weights: Active portfolio (1)	Benchmark portfolio (2)	Weights difference (3)	Sector return(%) (4)	Sector Allocation effect (3) x (4)
Banks	0.0196	0.083	-0.0634	6.9	-0.437
Energy	0.0784	0.041	0.0374	7.0	0.262
IT	0.0187	0.078	-0.0593	4.1	-0.243
Utilities	0.0847	0.125	-0.0403	8.8	-0.355
Auto	0.4037	0.204	0.1997	10.0	1.997
Pharma	0.2401	0.218	0.0221	5.0	0.111
Beverages	0.1353	0.142	-0.0067	2.6	-0.017
Travel	0.0195	0.109	-0.0895	0.3	- 0.027
Total	1.0000	1.000	0.0000		1.290%

Calculating Performance Attribution

(a little bit extra….summing up all component effects)

1. Asset Allocation (from Table 2): = 0.3099
2. Security Selection (from Table 3&5):
   a) Equity Excess return:
      i) Sector Allocation 1.29%
      ii) Security Selection in sector 0.18% (=1.47%-1.29%)
      1.47% x 0.6 (benchmark weight)
      = 0.882
   b) Bond Excess Return: 0.44% x 0.3
      (benchmark weight) = 0.132
3. Interaction (from Table 4): = 0.0458

Total excess return of active portfolio(1+2+3) = 1.37%

Investment Strategy

Passive Versus Active

Investment Strategy

- Value Investing
- Growth Investing

Passive

Perhaps the biggest decision that an investor needs to make is whether to hire an active or a passive fund manager

A passive fund manager seeks to replicate the performance of a benchmark index such as the S&P500 or FTSE-100

Based on the idea that markets are efficient

They do this by either:

- full replication
- stratified sampling
- derivative strategies

The success is judged by how closely the fund tracks the market (gross of fees)

Passive

Significant proportion of institutional funds are invested in passive funds

The big passive providers (e.g. L&G, State Street) are very efficient trackers

The 'core-satellite' approach is the popular marketing tag

Manager search and monitoring costs are low

Leaving investors free to focus on the strategic aspect of their decisions (eg. Bond versus equities – more on this later)

Passive - the cons

Although the fees are low – especially for institutional investors – they are not zero – so net of fee benchmark

underperformance is guaranteed!!!

Is it suitable for all markets, for example:

- corporate bonds
- emerging markets

Is there an inherent problem as the passive market gets bigger and bigger?

Who wants to track the market down?

Active

Nevertheless, the basic premise of active fund management is that markets are not efficient and that they can spot and profit from these inefficiencies

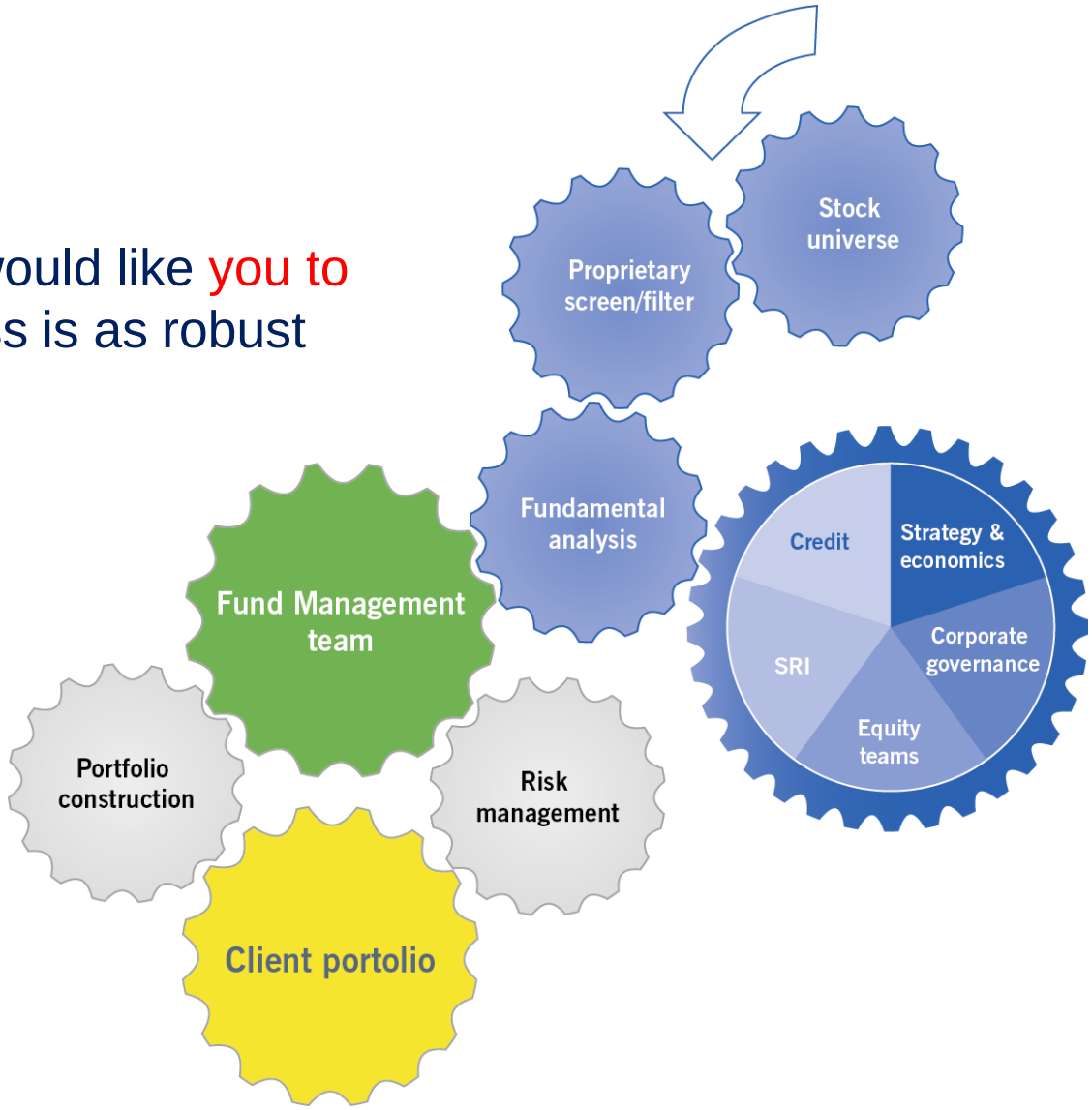
But at best, it is a zero sum game – one manager's gain is another manager's loss

And then there are the fees - making it a negative sum game

A typical active process may look like this …

Active

Active fund managers would like you to believe that their process is as robust as this!



Passive versus Active Summary

In practice most institutional investors have a mix of actively and passively managed funds, eg.

- Developed economy equities – passive
- High conviction equity managers - active
- Corporate bonds – active
- Government bonds – passive

But as we will see later, it is really the asset allocation decision that makes most difference to the performance of any multi-asset class fund

Value Investing

What is value Investing?

Value investing involves investing in situations where a security is perceived to be undervalued, either relative to some historic benchmark or to its peer group.

Typical methods include identifying stocks with one or more of the following characteristics:

- High dividend yield.
- Low price-earnings ratio.
- Low market-to-book.
- Low price-sales ratio

What is value Investing?

A firm may appear cheap on one or more of the value metrics because it has some elevated risk attached.

For example, a high dividend yield might reflect a perceived risk in the market that a dividend cut is imminent.

Proponents of the efficient markets hypothesis argue that there is 'no free lunch' and that the only way to gain additional return is to bear additional risk.

Much of the investment industry, however, is based on the premise that fund managers have the ability to find undervalued situations and generate positive excess returns.

Methods of Value Investing

An example of the relationship between dividend yield and returns in the UK comes from:

Taxes, Dividend Yields and Returns in the UK Equity Market, Morgan and Thomas (1998)

Every firm with at least 5 years of data is assigned to a quintile based on the size of its dividend yield.

A separate group is formed for those firms that do not pay a dividend.

Portfolios are reformed on a monthly basis.

Returns are calculated on an equally-weighted basis

Some typical results are as follows:

Methods of Value Investing

Portfolios ranked by dividend yield using monthly data 1975–1993

Dividend yield portfolio	Average monthly return (%) [a]	Average dividend yield	Average market value of equity [b]	Market model estimate of α	Market model estimate of β
Highest	2.51	11.07	136.53	0.53 [c]	0.95
1	(5.62)				
2	2.23	7.69	207.27	0.18 [c]	1.01
	(5.22)				
3	1.98	5.93	205.68	0.01	0.95
	(5.16)				
4	1.86	4.31	183.93	−0.01	0.94
	(4.90)				
Lowest	1.56	2.25	133.21	−0.44 [c]	0.97
5	(4.93)				
Zero	2.06	0.00	33.66	−0.17	1.16
6	(6.58)				

Source: Taxes, Dividend Yields and Returns in the UK Equity Market, Morgan and Thomas, Journal of Banking and Finance(1998)

Growth Investing

What is value Investing?

Growth investing involves investing in businesses which are typically expanding at a rapid pace.

Firms are frequently characterised by above-average growth rates in sales and earnings.

High growth comes at a price though.

Growth stocks typically have high price-earnings ratios and low dividend yields (or no dividend payable at all).

Often growth stocks are associated with new technology, e.g. the radio industry in the 1920's, the internet in the 1990's etc.

Growth Investing

Academic evidence is less supportive of growth investing.

If high value characteristics have been demonstrated to be consistent with higher returns, it follows that low value characteristics should underperform.

A number of popular investment books have been written on the subject of growth investing though.

"How To Make Money In Stocks" by *William O'Neil* proposes a system whereby investors should focus on only those stocks with the highest (and accelerating) earnings growth.

"The Zulu Principle" by *Jim Slater* is a popular book in the UK. Uses the "Price-earnings-growth" (PEG, price earnings to growth, lower-undervalued) method for selecting stocks. Combines a value and growth method.

A twist on Growth Investing

A conservative approach to growth investing that has gained some popularity in recent years is looking at historical dividend growth.

In the US there are indices formed from companies that have a track record of consistently increasing their dividend.

S&P 500 Dividend Aristocrats only includes S&P 500 firms that have increased their dividend annually for at least 25 consecutive years.

Mergent Dividend Achievers only includes firms that have raised their dividend annually for the past 10 years.

Possible to buy Exchange Traded Funds (ETFs) in these products, e.g. S&P High Yield Dividend Aristocrats (Ticker: SDY).

Applications on Growth Investing

Additional rules for the S&P Dividend Aristocrats index include:

Firms must have a float adjusted market capitalization of at least $3bn.

Firms must have an average trading volume of at least $5m.

Index constituents are reviewed annually in December.

Minimum number of constituents should be 40.

No sector should make up more than 30% of the index.

Some of the results are.....

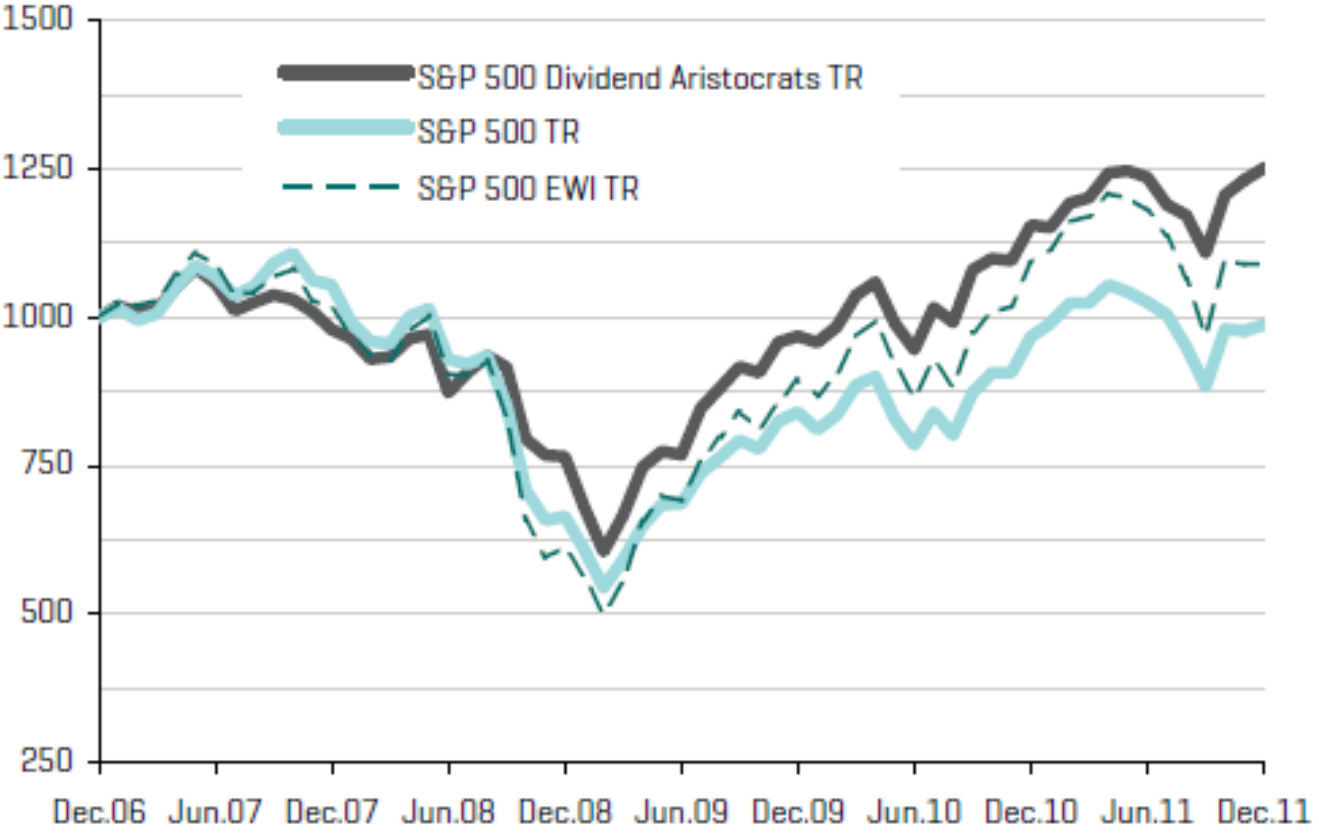
Applications on Growth Investing

S&P Dividend Aristrocats as of 10-Sep-2012	Company	Ticker
	Abbott Laboratories	ABT
	Archer-Daniels-Midland Co	ADM
	Automatic Data Processing	ADP
	AFLAC Inc	AFL
	Air Products & Chemicals Inc	APD
	Bard, C.R. Inc	BCR
	Becton, Dickinson & Co	BDX
	Franklin Resources Inc	BEN
	Brown-Forman Corp B	BF/B
	Bemis Co Inc	BMS
	Chubb Corp	CB
	Cincinnati Financial Corp	CINF
	Colgate-Palmolive Co	CL
	Clorox Co	CLX
	Cintas Corp	CTAS
	Dover Corp	DOV
	Ecolab Inc	ECL
	Consolidated Edison Inc	ED
	Emerson Electric Co	EMR
	Family Dollar Stores Inc	FDO
	Genuine Parts Co	GPC
	Grainger, W.W. Inc	GWW
	HCP Inc	HCP
	Hormel Foods Corp	HRL
	Illinois Tool Works Inc	ITW
	Johnson & Johnson	JNJ
	Kimberly-Clark	KMB
	Coca-Cola Co	KO
	Leggett & Platt	LEG
	Lowe's Cos Inc	LOW
	McDonald's Corp	MCD
	Medtronic Inc	MDT
	McGraw-Hill Cos Inc	MHP
	McCormick & Co	MKC
	3M Co	MMM
	Nucor Corp	NUE
	Pitney Bowes Inc	PBI
	PepsiCo Inc	PEP
	Procter & Gamble	PG
	PPG Industries Inc	PPG
	Sherwin-Williams Co	SHW
	Sigma-Aldrich Corp	SIAL
	Stanley Black & Decker	SWK
	Sysco Corp	SYY
	AT&T Inc	T
	Target Corp	TGT
	T Rowe Price Group Inc	TROW
	VF Corp	VFC
	Walgreen Co	WAG
	Wal-Mart Stores	WMT
	Exxon Mobil Corp	XOM

Applications on Growth Investing

December 30, 2011

5 Year Historical Performance



Source: S&P 500 Dividend Aristocrats Factsheet

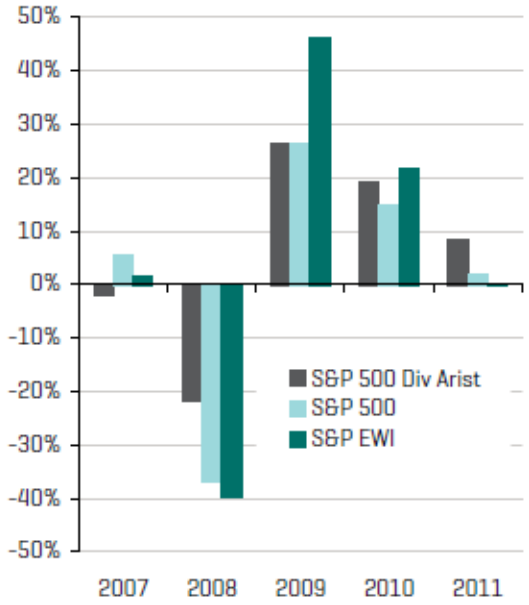
Applications on Growth Investing

S&P 500 DIVIDEND ARISTOCRATS

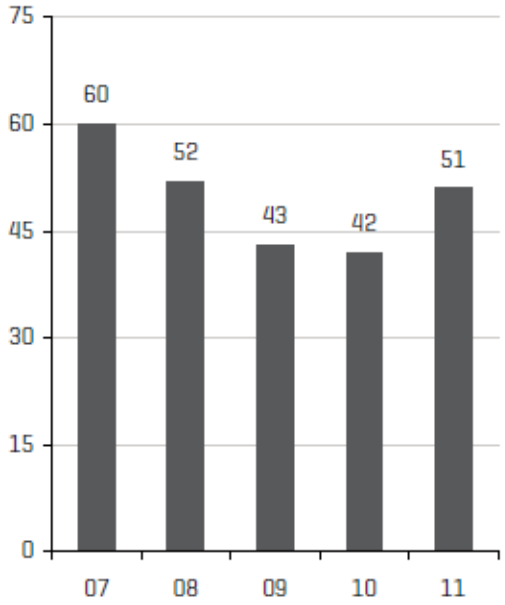
Index Performance

	S&P 500 Dividend Aristocrats	S&P 500	S&P 500 EWI
Returns			
1 Month	1.61%	1.02%	0.12%
3 Month	12.94%	11.82%	12.45%
Annualized Returns			
1 Year	8.33%	2.11%	-0.11%
3 Years	17.84%	14.11%	21.23%
5 Years	4.59%	-0.25%	1.75%
Annualized Risk			
3 Years Std Dev	18.84%	18.97%	23.03%
5 Years Std Dev	17.56%	18.88%	22.86%
Dividend Yield	2.73%	2.10%	1.88%

Annual Performance Comparison



Number of Constituents



Source: S&P 500 Dividend Aristocrats Factsheet

Style Rotation

Morningstar style box