



## **Realindex Investments Research Document**

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## **Realindex Investments**

Realindex Investments Pty Limited (Realindex) is an investment management subsidiary of the Colonial First State group of companies (Colonial), managing approximately A\$3.8bn across Australian, global and emerging market shares (as at 30 April 2012). Realindex was incorporated as a company in September 2008 and operates under a wholesale AFSL license and is responsible for the research, construction, portfolio management, trading and institutional sales of service for its underlying Funds. Realindex has a dedicated team of portfolio managers with responsibility for research and portfolio management but also leverages the significant resources of its parent company Colonial, one of Australia's largest fund managers, and the underlying methodology and on-going research resources of Research Affiliates.

## **The Colonial First State group of companies**

Colonial First State Global Asset Management ('CFSGAM') is the consolidated asset management division of the Commonwealth Bank of Australia with offices and investment capability across Australia, Asia, Europe and the US.

Colonial First State Investments Limited (CFSIL) has been helping Australians with their investment needs since 1988. In that time Colonial First State has become one of Australia's leading wealth management groups, providing investment, platforms, superannuation and retirement products to investors and advisers.

## **Research Affiliates**

Realindex has a research relationship with Research Affiliates in regards to the underlying methodology used within the construction of its portfolios. Research Affiliates was established in 2002 by Robert Arnott and is majority employee-owned. The firm manages and sub-advises over US\$78bn in assets across global asset allocation and Fundamental Index™ strategies with a staff of approximately 50 (as at 30 September 2011).

## **Funds available**

Realindex currently manages five funds:

- Realindex Australian Share Fund
- Realindex Australian Small Companies Fund
- Realindex Global Share Fund
- Realindex Global Share Fund Hedged
- Realindex Emerging Markets Fund

## **Investment philosophy**

Realindex believes that markets are not perfectly efficient and that pricing errors can lead to a performance drag for traditional market cap-weighted index indices such as the S&P ASX 200 or MSCI World.

The belief that markets are not perfectly efficient assumes the stock price of a firm is not exactly equal to its true fair value at every moment in time. This in turn means that a cap-weighted approach will systematically overweight firms that are overvalued and underweight firms that are undervalued. As such Realindex believes that as markets tend to move towards fair value prices, overvalued firms will experience relatively lower returns and undervalued firms will experience relatively higher returns. On aggregate, this means cap-weighted index funds that are systematically misallocated to both over- and undervalued securities will suffer a performance drag.

Aiming to avoid this performance drag, Realindex uses the Fundamental Index™ methodology in the construction of its portfolios. Stocks are selected and weighted using fundamental measures of firm size, including cash flow, sales, book value, and dividends. This is further enhanced by adding factors such as quality of earnings and distress measures. These factors provide a sound anchor to rebalance the portfolio, rely on easily accessible data, are not intended to be predictive of future size or value, are broadly available across countries and most importantly break the link the price and portfolio weight.

While the Realindex funds are constructed to avoid the return drag experienced by traditional cap-weighted portfolios, they also aim to retain what we believe are the major advantages of traditional index-based portfolios: lower cost, lower turnover and broad market exposure.

The methodology has been back-tested over long periods of time through different market conditions, across regions, countries, sectors and across company size. The performance will and can vary versus traditional market capitalisation funds and underperform at times, but the research highlights the outperformance versus a cap weighted index over the long term is anywhere from 2% to 4% in developed markets and higher in more inefficient markets such as emerging markets.

The Realindex portfolio of companies will represent today's economy, favouring neither value nor growth companies relative to their economic scale and paying no direct regard to valuation multiples or price.

## **The shortcomings of market capitalisation weighted indexes**

Market capitalisation weighting (cap weighting) has major shortcomings including the following:

- Cap-weighted indexes may not be mean–variance optimal if markets are not perfectly efficient. Theoretically, it is possible to construct a more optimal portfolio. Markowitz’s portfolio optimisation (mean–variance optimisation) suggests a method for optimal portfolio construction. In general, that method does not recommend buying and holding a cap-weighted equity market portfolio.
- It is a statistical truism that any weighting scheme that depends on market price, including cap weighting, has the potential to overweight overpriced stocks and underweight underpriced stocks. This is the opposite of what is commonly regarded as good investment practice. Therefore, cap-weighted portfolios may suffer from a structural negative return drag. Overweighting overvalued stocks and underweighting undervalued stocks will create a performance drag that is theoretically proportionate to the variance of the stocks’ price deviation from fair value.
- Cap-weighted indexes have traditionally become more heavily concentrated in growth stocks (high P/E stocks) during periods of P/E multiple expansion, making cap-weighted indexes particularly vulnerable to market bubbles. By contrast, a fundamental index approach would have a value orientation relative to this growth orientation of a cap weighted index.

## **Realindex aims to overcome these shortcomings**

Realindex aims to remove the short comings of market cap weighted indexes by avoiding weighting a portfolio by price and weighting the portfolio on the economic footprint of a company.

## Investment Process

### Fundamental measures

The Realindex funds combine four individual fundamental measures of a company's economic size to create a portfolio:

- **Sales:** Company sales averaged over the prior five years.
- **Cash flow:** Company cash flow averaged over the prior five years.
- **Book value:** Latest company book value as at the review date.
- **Dividends:** Total dividend distributions averaged over the prior five years, including special dividends paid in cash. For companies that have never paid dividends, the portfolio weight is re-calculated based on the other metrics.

Realindex funds use these four metrics as we believe they represent the most objective measures used to measure the economic size of a firm. The four measures are each equally weighted and five years of data is used to smooth the metrics of sales, cash flow and dividends over time, thereby limiting the impact of peaks and troughs in these metrics.

The methodology seeks to eliminate the linkage between portfolio weight and any over- or under-valuation associated with weighting a portfolio by market capitalisation, with the aim of randomising the weighting errors and reducing the associated performance drag.

The original research into the methodology was conducted in the US market by Research Affiliates and published in the Financial Analysts Journal in 2005. The following table summarises Research Affiliates Fundamental Index (RAFI) research for developed global markets:

**Figure 1: Back-tested RAFI returns 1984-December 2011, Simulated Data Non Actual Returns**

Index	Ending Value of \$1	Annual Return	Volatility	Sharpe Ratio	Tracking Error
MSCI World	\$12	9.4%	15.7%	0.29	0.0%
MSCI Equal Weight Developed	\$17	10.7%	16.4%	0.37	4.1%
Book	\$19	11.0%	16.0%	0.39	4.4%
Cash Flow	\$33	13.3%	15.1%	0.56	7.3%
Sales	\$23	11.9%	16.6%	0.43	5.2%
Gross Dividend	\$26	12.4%	14.8%	0.51	6.1%

*Note: Based on RAFI Developed 1000. THE INDEX DATA PUBLISHED HEREIN IS SIMULATED, UNMANAGED AND CANNOT BE INVESTED IN DIRECTLY. PAST SIMULATED PERFORMANCE IS NO GUARANTEE OF FUTURE PERFORMANCE AND IS NOT INDICATIVE OF ANY SPECIFIC INVESTMENT. ACTUAL INVESTMENT RESULTS MAY DIFFER. The simulated data contained herein is based on the patent-pending non-capitalization weighted indexing system, method, and computer program product first published in an article written by Robert D. Arnott, Jason Hsu, and Philip Moore (2005), "Fundamental Indexation," Financial Analysts Journal (March/April): 83–99. Source: Research Affiliates, based on data from Bloomberg, CRSP and Compustat.*

Figure 1 illustrates the empirical results that using non-price weighted accounting metrics added 1.6% to 2.9% return per annum above an equivalent cap weighted benchmark within the framework of the study. Furthermore, the composite measure added 2.5% p.a. versus the market cap equivalent with a similar level of volatility.

### **Why combine the factors?**

Realindex allocates weights to companies based on their 'economic footprint'. We combine the four non-price weighted measures of company size as relying on a single metric can result in over- or under exposure of the portfolio to certain segments of the economy. A closer look at each of the four metrics reveals that each has its own particular biases<sup>1</sup>:

- Relying only on sales to measure size may over-emphasise companies with lower profit margins.
- A cash flow-based metric may lead to over or under exposure to companies with highly cyclical income.
- A dividend-based metric may bias the portfolio to mature slower growth companies and will exclude a large number of growth companies potentially leading to skewed sector allocations. For these reasons, companies that have paid no dividends in the past five years are weighted equally according to the other three metrics.
- A book value metric may lead to over or under exposure to companies with aggressive or conservative accounting practices. It may also favour older firms with legacy assets on their balance sheets.

Using the multiple year, composite measure has the benefit of providing more stable weights to rebalance to the portfolio, helping to reduce portfolio turnover. Averaging fundamentals over the trailing five year period also has the benefit of mitigating short-term swings caused by the business cycle. Overall, the use of the composite measure in the Realindex funds aims to provide the greatest diversification, broadest cross section of companies, lowest turnover, and highest capacity.

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<sup>1</sup> Robert D. Arnott, Jason C. Hsu & John M. West *The Fundamental Index: A Better Way to Invest* (John Wiley & Sons, 2008)

## **Enhanced methodology**

The methodology used in the Realindex funds includes additional factors, as well as quarterly rebalancing, all with the aim of delivering stronger long term performance.

The enhancements used in the Realindex funds aim to improve the risk-return characteristics of the Fundamental Index strategy by addressing some unintentional biases which exist in the passive methodology, while still maintaining a similar level of turnover and tracking error.

## **Quality of earnings**

The quality of earnings factor is employed as a means of reducing exposure to companies with aggressive accounting practices. Using the quality of earnings screen, the weights of companies in the Fundamental Index are adjusted and weights in the Fundamental Index are decreased for companies which score poorly.

## **Financial distress**

The financial distress screen is employed to reduce exposure to highly distressed companies that could be subject to liquidity or refinancing shocks. Scoring poorly on this screen suggests that a company has insufficient income to cover its short-term debt servicing costs and companies that score extremely poorly have a high risk of financial distress. Weights in the Fundamental Index are decreased for such companies.

## The Fundamental Index concept works globally

The RAFI methodology was first researched in the US market and then tested out-of-sample in global equity markets beyond the US. The results of this research are summarised in Figure 2 below.

**Figure 2: RAFI concept works globally, December 2011 simulated data**

23 Country Return Statistics through 31 December 2011 (Ranked by Value Added)							
Country	RAFI Return	MSCI Return	Value Added	Tracking Error	Info Ratio	Alpha t-statistic	Start Date
Austria	14.0%	6.8%	7.3%	8.9%	0.81	4.44	1984
Japan	-1.2%	-5.3%	4.1%	4.2%	0.97	3.29	1984
Ireland	6.8%	3.2%	3.6%	23.7%	0.15	0.77	1988
France	13.1%	9.6%	3.5%	6.1%	0.58	3.17	1984
Portugal	8.1%	4.7%	3.3%	12.1%	0.28	1.47	1989
Hong Kong	17.8%	14.8%	3.0%	5.8%	0.52	2.94	1984
Canada	11.8%	8.9%	2.9%	6.2%	0.47	3.77	1984
Germany	10.8%	7.9%	2.9%	5.2%	0.56	3.61	1984
Norway	12.7%	10.2%	2.6%	7.4%	0.35	1.78	1984
Spain	12.1%	9.6%	2.5%	4.4%	0.58	3.68	1988
Singapore	9.4%	7.1%	2.3%	6.6%	0.35	1.87	1988
United Kingdom	12.3%	10.3%	2.1%	4.4%	0.46	2.33	1984
United States	12.3%	10.3%	2.0%	4.9%	0.41	2.90	1984
Italy	10.3%	8.4%	1.9%	5.4%	0.36	1.83	1984
Australia	12.5%	10.8%	1.7%	4.1%	0.42	2.90	1984
Sweden	14.3%	12.9%	1.4%	8.6%	0.17	1.40	1984
Finland	9.8%	8.4%	1.3%	16.7%	0.08	0.90	1988
Greece	5.9%	5.1%	0.9%	12.7%	0.07	0.32	1989
Switzerland	9.3%	9.2%	0.1%	4.6%	0.03	0.12	1984
Belgium	9.5%	9.5%	0.0%	7.9%	0.00	0.26	1984
Netherlands	9.7%	9.8%	-0.1%	9.9%	-0.01	-0.51	1984
Denmark	8.2%	9.1%	-1.0%	10.0%	-0.10	-0.43	1984
New Zealand	2.7%	4.7%	-2.0%	9.3%	-0.22	-1.08	1988
<b>23-Country Average</b>	<b>12.4%</b>	<b>10.1%</b>	<b>2.3%</b>	<b>3.3%</b>	<b>0.69</b>	<b>3.49</b>	<b>1984</b>

*Note: 23-Developed Country Average values are determined from the return series of the average country, not the average of each respective statistic in the above table. Source: Research Affiliates, LLC. Based on data from Worldscope, Datastream, CRSP and Compustat. THE INDEX DATA PUBLISHED HEREIN IS SIMULATED, UNMANAGED AND CANNOT BE INVESTED IN DIRECTLY. PAST SIMULATED PERFORMANCE IS NO GUARANTEE OF FUTURE PERFORMANCE AND IS NOT INDICATIVE OF ANY SPECIFIC INVESTMENT. ACTUAL INVESTMENT RESULTS MAY DIFFER. The simulated data contained herein is based on the patent-pending non-capitalization weighted indexing system, method, and computer program product first published in an article written by Robert D. Arnott, Jason Hsu, and Philip Moore (2005), "Fundamental Indexation," Financial Analysts Journal (March/April): 83–99.*

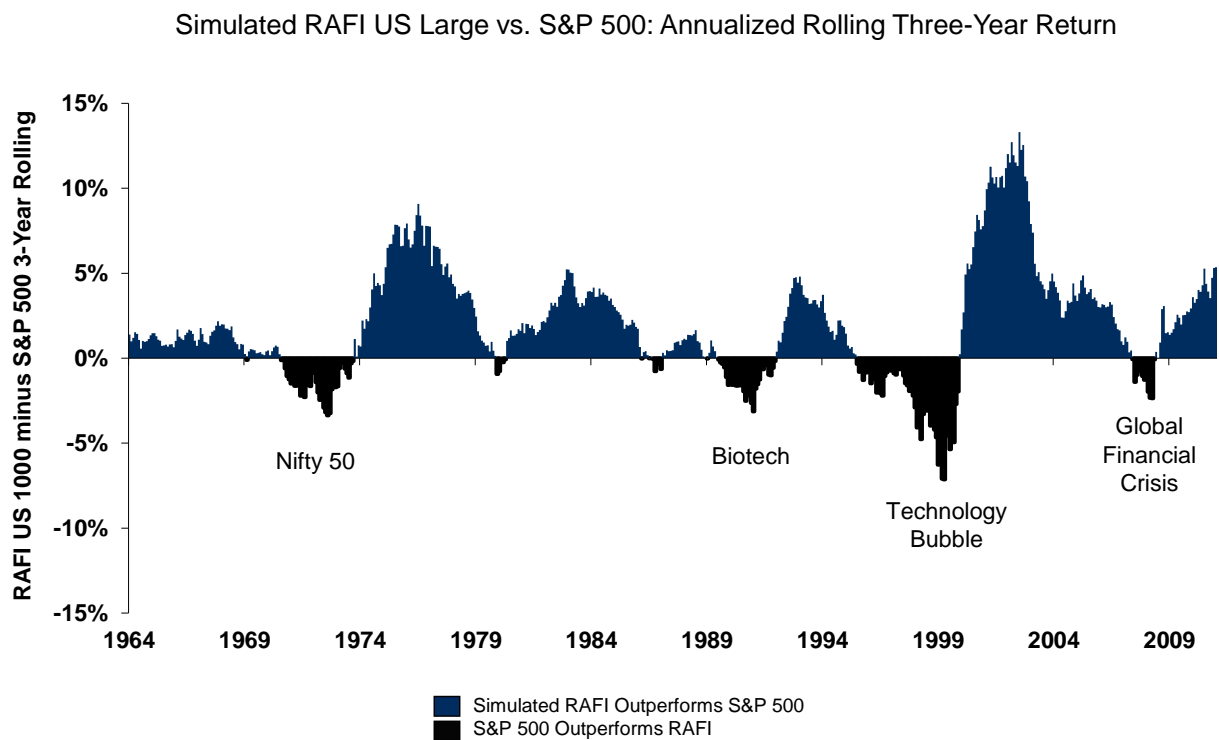
Figure 2 shows that the RAFI concept outperformed in 20 out of 23 countries globally, added 2.3% p.a. on average versus a market capitalisation equivalent and was statistically significant in many markets. In any statistical simulation there will be natural dispersion as evidenced by Austria and New Zealand, both small concentrated markets.



## The Fundamental Index underperforms in irrational bubbles

The Fundamental Index adds value over longer periods of time; however, there can be market environments when it underperforms relative to a market cap portfolio. Figure 3 below shows that in the US the methodology underperformed in three distinct time periods: (1) the nifty fifty in the early 1970's, (2) the biotech run up in the early 1990's, and (3) the TMT boom in the late 1990's. Each of these markets can be characterised as strong growth- and momentum-driven markets during which little attention is paid to underlying company fundamentals and after which subsequently come to be called "bubbles". Whilst the methodology underperformed during each of these periods, the level of outperformance following the correction of these periods was significantly greater than the level of underperformance during them.

**Figure 3: RAFI underperforms in irrational bubbles (US simulated data 1962-2011)**

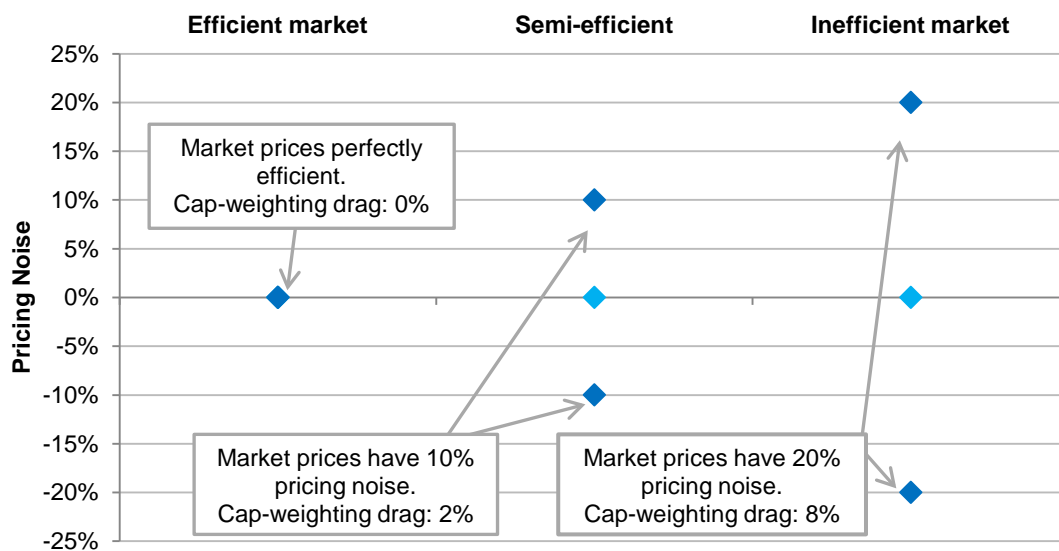


*Source: Research Affiliates, LLC., based on data from Bloomberg, CRSP and Compustat. THE INDEX DATA PUBLISHED HEREIN IS SIMULATED, UNMANAGED AND CANNOT BE INVESTED IN DIRECTLY. PAST SIMULATED PERFORMANCE IS NO GUARANTEE OF FUTURE PERFORMANCE AND IS NOT INDICATIVE OF ANY SPECIFIC INVESTMENT. ACTUAL INVESTMENT RESULTS MAY DIFFER. The simulated data contained herein is based on the patent-pending non-capitalization weighted indexing system, method, and computer program product first published in an article written by Robert D. Arnott, Jason Hsu, and Philip Moore (2005), "Fundamental Indexation," *Financial Analysts Journal* (March/April): 83–99.*

## An efficient index for an inefficient market

A market cap index weights companies by their market capitalisation which is a function of a company's share price so that, all other factors unchanged, the higher a company's share price climbs the larger its weight will be in a cap-weighted index. Conversely, as a company's share price declines, the lower its weight in a cap-weighted index. Thus if markets are not perfectly efficient and price is not equal to a company's fair value, then cap-weighted indices will overweight overvalued companies and underweight undervalued companies, which causes a return drag when prices mean revert. In emerging markets, which display a higher level of inefficiency, the level of over- and undervaluation and price noise of individual companies can be significantly greater than developed markets causing the return drag from market capitalisation weighting to be larger.

**Figure 4: Performance drag on market capitalisation weighting by pricing noise**



Source: Research Affiliates, LLC.

Figure 4 shows that the less efficient the market, the greater the return drag on capitalization weighted returns relative to a non-price weighted portfolio. This naturally raises questions about the appropriateness of traditional index investing in less efficient asset spaces, such as Emerging Markets. Figure 5 on the next page demonstrates the effect of this price drag as markets become more inefficient.

**Figure 5: Simulated USD performance to December 2011**

	Annualized Return	Annualized Volatility	Annualized Value Add	% 3-Year Wins	Start Date
<b>Simulated RAFI US Large</b>	<b>11.3%</b>	<b>15.5%</b>	<b>2.0%</b>	<b>74.2%</b>	<b>1962</b>
S&P 500	9.3%	15.2%			
<b>Simulated RAFI 23 Country Average</b>	<b>12.4%</b>	<b>16.5%</b>	<b>2.3%</b>	<b>91.7%</b>	<b>1984</b>
MSCI - 23 Country Average	10.1%	15.9%			
<b>Simulated RAFI Int'l Mid-Small 1500</b>	<b>9.2%</b>	<b>17.2%</b>	<b>2.2%</b>	<b>85.1%</b>	<b>1999</b>
MSCI EAFE Small Cap	7.0%	19.8%			
<b>Simulated RAFI U.S. Mid-Small 1500</b>	<b>14.8%</b>	<b>19.8%</b>	<b>3.8%</b>	<b>95.6%</b>	<b>1979</b>
Russell 2000	11.0%	20.1%			
<b>Simulated RAFI All World 3000</b>	<b>12.6%</b>	<b>15.9%</b>	<b>4.2%</b>	<b>90.7%</b>	<b>1984</b>
MSCI All Country World	8.4%	15.8%			
<b>Simulated RAFI EM</b>	<b>13.9%</b>	<b>25.7%</b>	<b>8.4%</b>	<b>99.4%</b>	<b>1994</b>
MSCI EM	5.5%	24.5%			

Source: Research Affiliates, LLC. based on data from Worldscope, Datastream, CRSP, and Compustat. THE INDEX DATA PUBLISHED HEREIN IS SIMULATED, UNMANAGED AND CANNOT BE INVESTED IN DIRECTLY. PAST SIMULATED PERFORMANCE IS NO GUARANTEE OF FUTURE PERFORMANCE AND IS NOT INDICATIVE OF ANY SPECIFIC INVESTMENT. ACTUAL INVESTMENT RESULTS MAY DIFFER.

## Portfolio construction

The portfolio construction process begins with the list of all stocks trading on the relevant exchange. Each company in this initial universe is given a weight for each of the fundamentals, based on the relative strength of their dollar-value data compared to the sum of the entire universe. For example, if a company has \$1,000 average sales over the past five years, and the sum of five year average sales for the entire universe is \$100,000 the company gets a 1% weight for that factor. The table below highlights the different strategies and their respective universes.

**Figure 6: Realindex strategies and universes**

Fund	Universe	Peer benchmark	Domicile	Currency
Realindex Australian Share Fund	Top 200 stocks by fundamental measures	S&P/ASX 200 Accumulation Index	ASX listed companies	n/a
Realindex Australian Small Companies Fund	200 stocks outside the top 100 stocks by fundamental measures and the S&P ASX 100	S&P/ ASX Small Ordinaries Accumulation Index	ASX listed companies	n/a
Realindex Global Share Fund	Top 1500 global stocks by fundamental measures	MSCI All Country World ex-Australia(AUD)	Developed and Emerging Market countries	Unhedged
Realindex Global Share Fund Hedged	Top 1500 global stocks by fundamental measures	MSCI All Country World (AUD) ex-Australia hedged	Developed and Emerging Market countries	Fully hedged to Australian dollar
Realindex Emerging Markets Fund	Top 450 emerging markets stocks by fundamental measures	MSCI Global Emerging Markets	Emerging Market countries	Unhedged

Each of the weights for the four factors – five-year trailing average sales, cash flow and dividends and latest book value – are then equally weighted and averaged to calculate the company's composite weight. However, so as not to penalise a segment of the market, for companies who do not pay dividends an equal weighted average of the other three factors is taken. Any companies with negative weights are removed so the portfolio does not hold any short positions.

At this point, the portfolio is narrowed from the entire universe to the number of stocks desired in the portfolio. For example, for the Realindex Australian Share Fund the top 200 companies by fundamental measures are taken. Enhancements are then applied to the portfolio by reducing the weight of companies that score poorly on the quality of earnings and distress metrics, without removing them from the portfolio. Liquidity screens such as average daily volume and bid ask spread are also taken into account in the construction process. The Realindex funds, based on the enhanced Fundamental Index methodology, are rebalanced back to enhanced fundamental weights on a quarterly basis.

We believe that the resulting portfolios represent the underlying economy, with neither valuation multiples or error-prone price having an impact on the fundamental weights allocated to companies. The portfolios do not contain time-sensitive information regarding the stocks being traded, and as such our primary focus is on minimising transaction costs (explicit and implicit). Cost, cash slippage, liquidity, and market impact are very important in any trading decision.

**Disclaimer**

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