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REAL ESTATE ALLOCATION: AN EVALUATION OF AUSTRALIAN SUPERANNUATION FUND'S OPTIMAL PROPERTY ALLOCATION USING ELEVEN MIXED ASSET PORTFOLIOS

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ABSTRACT

Property is a key investment asset class that offers considerable benefits in a mixed-asset portfolio. Previous studies have concluded that property allocation should be within the 10-30% range and that higher allocation to property significantly enhances the multi-asset portfolio risk-adjusted return profile. However, there seems to be wide variation in theory and practice. Historical Australian superannuation data (APRA 2015; 2007, p.57) shows that the level of allocation to property asset class in institutional portfolios has remained constant in recent decades, restricted at 10% or lower. This is seen by many in the property profession as a subjective measure and needs further investigation. To do this, the research compares the performance of the A$325 billion industry superannuation funds' strategic balanced portfolio against ten different investment strategies.

The analysis used 17 years (1995-2011) of quarterly data covering seven benchmark asset classes, namely: Australian equities, international equities, Australian fixed income, international fixed income, property, cash and alternatives. Property provided the second highest risk-adjusted return profile (0.21) behind the alternative asset class (0.44). The selected passive and active asset allocation models are set within the standard Modern Portfolio Theory (MPT) framework, using Australian government 10 year bonds as the risk-free rate. The ten different asset allocation models perform as well as the industry fund strategic approach. The empirical results show that there is scope to increase the property allocation level from its current 10% to 26%. Upon excluding unconstrained strategies, the recommended allocation to property for industry funds is 17% (12% direct and 5% listed). This high allocation is backed by improved risk-adjusted return performance.

Keywords: property investments, asset allocation, portfolio construction, superannuation.

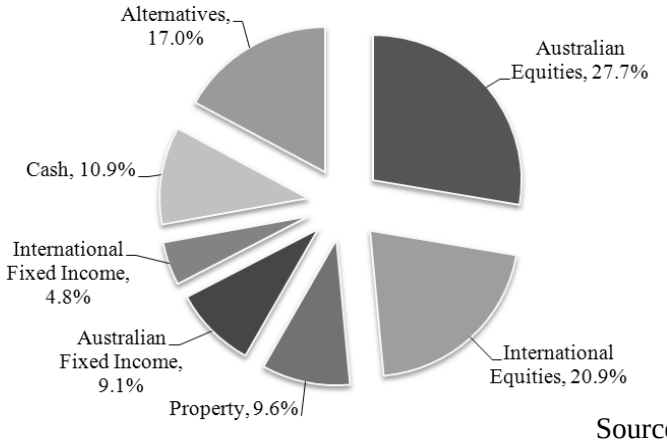
INTRODUCTION

In Australia, superannuation or 'pension fund' is an important source of retirement income arrangement for its aging and growing population. Superannuation assets have increased sixfold (or 605%) since early 1990s to AU$1.9 trillion in December 2014, backed mainly by the Australian government's mandated compulsory retirement saving scheme. This makes Australia the fourth largest superannuation market in the world, behind United States, Japan and United Kingdom. Consequently, in the past decade investments in the Australian property market also increased from A$100 billion in 2000 to almost A$300 billion currently (ABS 2014; PCA 2011, p. 6). However, the proportion allocated to the property asset class in institutional portfolios remains unchanged, at 10% or lower (APRA 2015; 2007, p.57). While several overseas studies (Craft 2001; Hoesli, Lekander & Witkiewicz 2003; Worzala & Bajtelsmit 1997) have suggested property allocations within a range of 10-30%, comprehensive empirical evidence on Australian institutional property asset allocation strategies is underdeveloped. To address the gap in literature, this research critically evaluates the performance of the A$325 billion industry superannuation fund's conventional Strategic balanced investment portfolio with ten alternative asset allocation models.

The default balanced fund is the most popular investment option, accounting for 67% of the industry funds' investments (APRA 2014). Balanced funds offer stable income returns and capital growth derived from a diversified range of asset classes. The common benchmark asset classes include Australian equities, international equities, Australian fixed income securities, international fixed income securities, property, cash, and alternative assets (index comprising infrastructure, hedge fund, private equity and commodity).

Figure 1 illustrates the aggregated balanced industry superannuation fund default option asset allocation, as at December 2011.

Figure 1: Industry Superannuation Balanced Fund Option Portfolio: December 2011



Source: Rainmaker Group 2012.

Equities (Australian and international) is the dominant asset class, representing nearly 50% of the industry superannuation balanced fund portfolio, followed by alternatives (17%), fixed income securities (Australian and international) 14%, cash (11%), and property (10%). These asset allocation components do change over time as fund managers regularly rebalance investment portfolios to reflect prevailing market conditions. For example, allocation to property ranged from 9%-11% in the 17 year period to December 2011, having peaked at 14.0% in September 1998, which corresponded with the push by REITs to offshore property investment. The lowest allocation to property was 8.7% at March 2010, during the recent Global Financial Crisis (GFC) that led to major falls in REIT prices.

As repair of financial markets continues, the way institutional investors treat property as an asset class will continue to change. Market reports by JP Morgan Asset Management (2012) and Jones Lang LaSalle (2012) anticipate institutional real assets allocation will increase to 25% in the next decade as fund managers reprofile investment portfolios in search of stable, risk-adjusted returns in the post-GFC era. These predictions need further examination using different asset allocation techniques.

The analysis is based on quarterly ex-post benchmark data covering the industry superannuation balanced fund seven asset classes over a 17 year period (1995-2011). All asset allocation models are proprietary developed and constructed using the Microsoft Excel program. The selected passive and active asset allocation models are set within the standard MPT framework using Australian government 10 year bonds as the risk-free rate. The individual asset and portfolio performances were compared using the Sharpe ratio. Table 1 details the eleven different asset allocation techniques.

Table 1: Eleven Asset Allocation Models: Key Characteristics and Operational Features

Asset Allocation Strategies	Model Characteristics
Strategic	Industry fund conventional long-term strategy.
Buy and Hold	Asset weighting remains constant for the investment horizon.
Traditional	Allocation restricted to equities, bonds and cash.
Optimal – No Constraints	Mean-variance optimization with no asset weight constraints.
Optimal – Weight Constrained	Mean-variance optimization with pre-defined weight parameters.
Turning Points	Allocation based on cyclical movement of GDP.
Equal Weighted	Equal weighting to all assets.
Tactical – No Constraints	Short-term asset rebalancing with no asset weight constraints.
Tactical – Weight Constrained	Short-term asset rebalancing with pre-defined weight parameters.
Dynamic – No Constraints	Medium term asset rebalancing with no asset weight constraints.
Dynamic – Weight Constrained	Medium term asset rebalancing with pre-defined weight parameters.

Source: Author; Reddy et al. (2013).

Table 1 details the characteristics of selected asset allocation strategies. The Strategic allocation represents the industry superannuation funds' balanced investment option – it is the funds' conventional asset allocation model. The Buy and Hold, and Equal Weighted, strategies are passive techniques. The Optimal strategies seek the highest risk-adjusted returns, a technique known in the field of MPT as Markowitz mean-variance portfolio optimisation. The Traditional strategy is constrained to equities, bonds and cash. The Turning Points allocation is based on the cyclical movement of GDP. The Tactical asset allocation (TAA) strategies are based on risk parity and momentum investment technique. The mean-variance portfolio optimisation formulation is used to construct the Dynamic asset allocation (DAA) strategies on a medium term (three year rolling) timeframe. The Optimal, Tactical and Dynamic strategies are modelled both on an unconstrained and constrained basis (asset weight and no short-selling constraints) similar to the industry fund Strategic portfolio.

The next section provides a literature review on property asset allocation. Section three details the research data and methodology. Section four provides the empirical research findings and industry implications of the study. The last section provides the concluding comments.

LITERATURE REVIEW

The AU$1.9 trillion superannuation funds are the dominant institutional property investors in Australia and provide a good measure of institutional allocation to the property sector. Most superannuation funds would set strategic targets to meet the long-term goals of the fund and its members. Because property investments are long-term and provide regular income and capital growth, most superannuation funds have some exposure to property. As at 31 December 2014, the Australian

superannuation industry's allocation to property was A$141 billion, representing approximately 50% of the Australian property market's value. Despite their significance, the overall superannuation industry demonstrate waning appetite for property assets, with allocation declining from 16% during December 1989 to 7% as at December 2011. Property allocation for the industry funds, the largest segment of the institutional superannuation funds, averages 10%. This comprises 7% in direct/unlisted property and 3% in listed property (APRA 2015; PCA 2011, p. 8; Rainmaker Group 2012).

Baum and Hartzell (2012, p. 11) stated that property's under-weighting in institutional portfolios can be attributed to several factors including:

i. The operational difficulties of holding properties, including illiquidity, lumpiness (specific risks) and the difficulty in aligning the investment management process for property and equities.
ii. The introduction of new alternative asset classes, such as private equity, infrastructure and hedge funds which offer income security and diversification benefits similar to real estate.
iii. A lack of trust in property data, due to the nature of valuations, suspicions of smoothing in valuation-based indices and the lack of historical time-series total return data.

As a result of these factors, there is usually a mismatch between the importance of property asset class in value and its weighting in institutional portfolios. Studies by Bajtelsmit and Worzala (1997), Craft (2001) and Hoesli, Lekander and Witkiewicz (2003) have concluded that the optimal weight for property in mixed-asset portfolios should be within the 10-30% range, and that including property in such portfolios reduces the portfolio's risk level by 15-25% reduction. JLW Research (1989) investigated the asset allocation from the property perspective in the post-war period up until the late 1980s in Australia and found that the mean-variance optimal portfolio comprised of 50% holding in property.

Lee and Byrne (1995) investigated the SAA problem of a mixed-asset portfolio using the unconstrained and constrained portfolio optimisation models. In their study, the upper limit to property was set at 20%. The results illustrated that even with the constrained approach there can still be a higher allocation to property and that property reached the upper bound quite rapidly. Bekkers, Doeswijk and Lam (2009, p. 64) evaluated data on ten US asset classes within the SAA portfolio model and found that adding property to the traditional asset mix of stocks and bonds creates the most value for investors. The allocation to property in the mean-variance optimal portfolio was 26%. Stevenson (2000) constructed the optimal portfolios using 5%, 10%, 15% and 20% fixed allocation to property. Under all four scenarios, including property leads to low risk and improved returns, with the frontier with 20% allocation to property dominating the results. More recently, AXA Real Estate (2012, p. 12) used both raw and de-smoothed UK IPD time-series data from 1971-2011 to determine optimal weighting to property. The results show optimal weighting to property at approximately 20% in both models.

Mueller and Mueller (2003) argue that while allocations of 50% to property within unconstrained optimisation models, for example, may be only theoretically justifiable, superannuation funds can benefit from increased property allocation. The stable rental income returns from property would be beneficial when most superannuation funds move into heavy payout periods with more retirees, at which point annual cash flow becomes more important than price appreciation.

DATA & METHODOLOGY

The research covers a 17 year timeframe (1995-2011), and uses ex-post quarterly total return asset benchmark data and the industry superannuation fund balanced investment option asset allocation data. The total return benchmark data series included: cash, Australian fixed, international fixed, Australian equities, international equities, property (index comprising both direct/unlisted property, and listed property), and alternatives. The alternative index was constructed using data series for Infrastructure and Utilities, Hedge Funds (AU), Private Equity, and Commodity Prices (AU), based on an equal weighted formula that follows the UK model (Bond et al. 2007). The data was sourced from the Rainmaker Group. The range of asset allocation is exhibited in Table 2.

Table 2: Industry Superannuation Balanced Fund Range of Asset Allocations, 1995-2011

	Aust eq	Int eq	Prop	Aust fixed	Int fixed	Cash	Altern'ves
Average	32.2%	20.4%	10.3%	13.8%	4.7%	7.4%	11.2%
Minimum	24.3%	12.0%	8.7%	5.3%	2.0%	3.3%	3.6%
Maximum	37.0%	27.6%	14.0%	24.0%	7.9%	13.0%	21.0%
Range	12.7%	15.6%	5.3%	18.7%	5.9%	9.7%	17.4%

Source: Rainmaker Group 2012.

Table 2 shows that Australian fixed income had the highest asset allocation range (19%), followed by alternatives (17%). Allocation to property ranged between 9-11%, having peaked at 14% in September 1998, which corresponded with the push by REITs to offshore property investment. The lowest allocation to property was recorded at 9% in March 2010. This was during the recent GFC that led to major falls in REIT prices and property valuations.

The key parameters from past market data provide the platform for the analysis of the recorded benchmark industry superannuation funds' strategic allocation against the suitability of different asset allocation models. The standard MPT approach is applied with the efficient frontier, mean-variance optimisation using Australian government 10 year bonds as the risk-free rate. The Markowitz (1952) classical mean-variance portfolio selection model serves as the starting point for constructing optimal asset allocation models. The classical mean-variance portfolio optimisation can often result in extreme allocation in specific assets. Therefore, in addition to the SAA policies, industry superannuation funds also formulate a range of permissible investable asset weights as a primary risk management tool. Including holding constraints leads to a more industry practical application of the mean-variance optimisation problems. Table 3 illustrates the assumed predetermined weight constraints for industry superannuation fund balanced portfolios.

Table 3 details the benchmark Australian industry superannuation fund asset allocation range across the recognised asset classes. The level of allocation can relate to historical performance, liquidity, and transaction costs. This information is prepared based on consensus data from six leading industry superannuation funds with A$146 billion of funds under management. Except for the Optimal – No Constraints, Tactical – No Constraints and Dynamic – No Constraints investment techniques, all strategies are modelled within the above predefined asset weight parameters.

Table 3: Industry Superannuation Funds Asset Weight Parameters

Asset Class	Minimum Weight	Maximum Weight
Australian Equities	20%	40%
International Equities	10%	30%
Property	0%	20%
Australian Fixed	0%	20%
International Fixed	0%	15%
Cash	0%	15%
Alternatives	0%	25%

Source: Author.

The portfolio return for all asset allocation models was calculated using Equation 1.

$$R_p = w_1R_1 + w_2R_2 + \ldots + w_GR_G$$ **Equation 1: Portfolio Return**

Equation 1 states that the return on a portfolio (*Rp*) of G assets is equal to the sum over all individual assets' weights in the portfolio multiplied by their respective return (Fabozzi et al. 2012). For all eleven asset allocation models, the individual asset return is represented by the time-series benchmark return data (see Table 3). The individual asset weighting data is detailed in Table 2. Except for the industry fund Strategic portfolio, the asset weight data for the ten alternative asset allocation models are modified to suit the different investment styles.

The *Strategic* portfolio includes investments in equities (Australian and international), fixed income (Australian and international), cash, property (direct and listed), and alternative assets. The Strategic portfolio is also used as the benchmark portfolio. *Buy and Hold* is a passive investment strategy, where superannuation fund buys and holds the assets over the long-term. The asset weights were determined at the start of the investment period (June 1995) and remained constant throughout the investment period. *Traditional* portfolio includes investments in equities, fixed income, property, and cash. *Optimal – No Constraints* model is based on the MPT mean-variance portfolio construction technique. *Optimal – Weight Constrained* strategy is the same as the Optimal – No constraints model except that it is modelled using minimum and maximum holding constraints (see Table 3). *Turning Points* model is based on the cyclical movement of Australian GDP to the long-term moving average. Funds are allocated to growth focused assets (equity, alternatives, and property) during improved economic conditions. Income focused assets (fixed income, cash, and property) are selected in declining market conditions.

Equal Weighted model allocates equal weighting to all asset classes. For *Tactical – No Constraints* model, asset weight shift was determined on a quarterly basis using the 'Risk Parity & Momentum' portfolio construction technique. Gray et al. (2012) investigated different TAA models and identified 'Risk Parity & Momentum' as the best performing technique. Risk parity (a simple volatility-weighted technique) over-weights less volatile assets and under-weights more volatile assets. Exposure to assets with negative quarterly returns is reduced to zero with the weight redistributed to cash. This allows increases in risk-adjusted return (higher Sharpe ratio) in the long run because of capital preservation.

Tactical – Weight Constrained strategy is the same as Tactical – No Constraints model but with predefined weight parameters for all asset classes (see Table 3). *Dynamic – No Constraints* model is based on the MPT mean-variance portfolio construction technique on a three year rolling timeframe. *Dynamic – Weight Constrained* strategy is the same as Dynamic – No Constraints, but is modelled using minimum and maximum holding constraints based on the industry fund strategic portfolio asset weight parameters (see Table 3).

RESULTS AND DISCUSSION

Table 4 illustrates the quarterly performance of the asset classes. The mean quarterly total return for the seven asset classes ranged from 1.3-3.1% (5.4-12.8% annualised). The best performing asset on a risk-adjusted basis was the alternative asset class with an impressive risk-adjusted return (Sharpe ratio) of 0.44. Australian equities, international equities, and property, also recorded returns of more than 2%. Property (excluding the alternative asset class) outperformed all other asset classes with a risk-adjusted return of 0.21. International equities and Australian equities were the most volatile assets, with a standard deviation of 14.6% and 7.3% respectively. International fixed income displayed high kurtosis, reflecting a low even return distribution from its mean. Property and fixed income securities returns displayed attractive greater negative skewness.

Table 4: Descriptive Statistics for Asset Performance – Quarterly Data, 1995-2011

Asset Class	Mean Return	Standard Deviation	Risk-Adjusted Return	Kurtosis	Skewness	Annualised Return	Annualised Standard Deviation
Cash	1.32%	0.26%	-0.45	-0.09	0.28	5.37%	0.52%
Aust fixed	1.87%	2.35%	0.19	0.32	0.55	7.70%	4.71%
Int fixed	1.38%	2.80%	-0.02	10.94	-0.62	5.62%	5.60%
Aust eq	2.43%	7.28%	0.14	1.24	-0.56	10.07%	14.56%
Int eq	2.10%	14.59%	0.05	0.70	0.19	8.69%	29.17%
Prop	2.29%	4.12%	0.21	3.16	-1.19	9.50%	8.24%
Altern'ves	3.06%	3.65%	0.44	-0.08	-0.01	12.80%	7.30%

The performance of the alternative asset class can be explained by the increase in allocation in recent years to underlying alternatives sector assets – specifically private equity, infrastructure, and commodity investments. On average, the allocation to alternative assets within the industry superannuation fund portfolio has risen from 8% (prior to 2005) to 15% in 2012, having peaked at 21% in March 2009. Over a period of ten years (2001-2011), the alternative asset class has significantly outperformed all other asset classes with a mean return of 2.5%. Property was the only other asset to have recorded a mean return of more than 2% during this period. The diverse movements in the asset classes can be further examined by correlation analysis, as shown in Table 5.

Table 5: Correlation Matrix – Asset Benchmark Returns – Quarterly Data, 1995-2011

	Cash	Aust fixed	Int fixed	Aust eq	Int eq	Prop	Altern'ves
Cash	1.00						
Aust fixed	0.28	1.00					
Int fixed	0.10	**0.55***	1.00				
Aust eq	-0.09	-0.38	-0.37	1.00			
Int eq	-0.16	-0.39	-0.38	**0.69***	1.00		
Prop	-0.02	0.01	-0.22	**0.58***	0.37	1.00	
Altern'ves	0.24	0.05	-0.10	**0.52***	**0.55***	**0.55***	1.00

* significant correlation (P<5%)

Table 5 illustrates the diversification benefits of the selected asset classes. Asset classes with a strong correlation (>0.50) were linked to the same local and overseas asset class (for example, Australian & international Equities). In addition, the alternative asset class showed a relatively strong relationship with Australian and international Equities (>0.50). In part, this may relate to the underlying asset classes behind the performance of Private Equity and Hedge Funds. For property, the strong correlation (>0.50) with Australian Equities would relate, in part, to the allocation of REITs within the property asset class. Traditionally, REITs short-term performance is linked to the equity market. Likewise, property's strong relationship to alternative asset class can be due to similar underlying legal structures of assets, such as infrastructure, and providing a continuity of income.

Table 6 details the performance of the different asset allocation strategies using the Sharpe ratio as the risk-adjusted return comparison. Other performance comparison measures include beta, alpha, tracking error, and information ratio analysis. The ten alternative portfolio results are benchmarked against the performance of the industry superannuation funds' Strategic balanced portfolio, as produced by the Rainmaker Group (2012). The CAPM is used to measure the portfolio systematic risk (beta), separating fund manager skills from the exposure to the market (alpha).

Table 6 results illustrate that, except for the Traditional portfolio, all other strategies have outperformed the industry fund's Strategic investment portfolio. The results also provide evidence that Australian fund managers can provide enhanced risk-adjusted returns by using active asset allocation strategies, such as TAA and DAA. The Tactical strategies recorded the highest Sharpe ratio, followed by the Dynamic investment models. Even on a constrained basis, both Tactical and Dynamic asset allocation strategies recorded higher risk-adjusted return profiles than the industry fund Strategic portfolio. However, the higher Sharpe ratio for the Tactical models must be read with some caution. Generally, TAA strategies involve overweighting best performing assets to benefit from short-term market movements. The process requires considerable manager skills, and can involve high operational costs and portfolio volatility. In addition, the positive excess kurtosis indicates that the Tactical models have greater probability of large losses. Lee and Higgins (2009) have explained that risk-averse investors dislike negative skewness and positive excess kurtosis (fat tails) because, generally, they indicate a higher probability of large losses than is the case with normally distributed returns. The data trend displays flat kurtosis for all other asset allocation strategies, indicating low and even distribution of results.

Table 6: Industry Fund Strategic versus Alternative Portfolio – Performance Analysis

Asset Allocation Strategies	Mean Return	Standard Deviation	Sharpe Ratio	Kurtosis	Skewness	Beta	Alpha	Tracking Error	Information Ratio
Strategic (Original Portfolio)	2.19%	5.25%	0.14	0.01	-0.38	1.49	0.21%	2.12%	0.07
Buy and Hold	2.15%	3.77%	0.19	-0.15	-0.35	1.09	0.11%	0.77%	0.13
Traditional	2.05%	6.15%	0.10	0.19	-0.36	1.62	0.37%	2.58%	0.09
Optimal – No Constraints	2.19%	2.86%	0.26	1.68	0.07	0.64	0.09%	2.21%	0.06
Optimal – Weight Constrained	2.17%	3.98%	0.18	0.57	-0.43	1.13	0.14%	1.12%	0.11
Turning Points	2.96%	5.21%	0.29	1.20	0.11	1.16	0.37%	1.49%	0.22
Equal Weighted	2.04%	3.42%	0.18	-0.20	-0.26	0.99	-0.01%	0.44%	-0.02
Tactical – No Constraints	2.25%	0.95%	0.86	19.77	3.36	0.02	0.01%	3.46%	0.06
Tactical – Weight Constrained	4.02%	5.30%	0.49	0.28	0.36	1.47	2.93%	2.41%	0.83
Dynamic – No Constraints	2.30%	2.10%	0.41	-0.21	0.07	0.41	0.10%	2.52%	0.10
Dynamic – Weight Constrained	2.16%	3.55%	0.20	-0.13	-0.46	1.01	0.11%	0.83%	0.14

The results also illustrate a wide spread of beta values (0.77-1.62) across all asset allocation strategies. Generally, fund managers regard a low beta level (1 or less than 1) as desirable. Except for the Traditional portfolio, all asset allocation strategies recorded a beta level 1 or less than 1. Fabozzi and Markowitz (eds 2011) explain that a higher beta level is not a sign of poor fund manager performance, but may be a result of more aggressive fund management tactics. The alpha values were close to zero for all asset allocation models, showing that there were limited continuous excess returns, except for the Tactical – Weight Constrained strategy which is based on momentum investing. While overweighting assets based on momentum signals from ex-post data is simple, in reality the process of determining tactical shifts based on forecast data is much more challenging. The excess returns over benchmark for the various asset allocation models can be further examined by looking at the information ratio and tracking error data.

The tracking error is the standard deviation of the portfolio's active return, where active return is calculated as the portfolio's actual return minus the benchmark's actual return. The information ratio is another key industry measure of the degree to which a fund consistently outperforms/underperforms the appropriate benchmark. In this research the average portfolio return for the seven asset class Strategic portfolio is used as a benchmark to evaluate the performance of the alternative asset allocation strategies. This follows the Fabozzi, Grant and Vardharaj (2011) method of calculating tracking error and information ratio.

A positive information ratio indicates outperformance of the benchmark, and a negative information ratio indicates underperformance of the benchmark. Except for the Equal Weighted strategy, all alternative investment strategies recorded an information ratio close to, or above, the industry fund Strategic portfolio. In addition, the Tactical – Weight Constrained strategy recorded an information ratio close to 1.0, which is regarded in the industry as exceptional. The tracking error range across the different strategies was 0.44%-3.46%. The industry practice is to keep tracking error below 2%. Except for the Equal Weighted strategy, the tracking error data shows evidence of different investment styles across the various asset allocation models. Unconstrained investment strategies (Tactical – No Constraints, Dynamic – No Constraints) recorded tracking error above 2%, where portfolio weighting was predominately towards a single asset class such as equities. Weighted constrained balanced portfolios (Strategic, Optimal – Weight Constrained, Tactical – Weight Constrained, Dynamic – Weight Constrained) and passive models (Buy and Hold, Equal Weighted) displayed lower tracking error.

The risk/return performance of the different asset allocation strategies is detailed in Figure 2. Figure 2 illustrates that, except for the Turning Points and Tactical strategies, all alternative investment portfolios generally displayed similar or higher returns, but lower risk, than the industry fund Strategic portfolio. Overall, the performance statistics indicate that Australian fund managers can benefit from adapting alternative investment strategies evaluated in this research. In particular, the performance of the Tactical, Dynamic and Optimal weight constrained portfolios, which work on the same modelling parameters as the industry superannuation fund Strategic investment model, would be useful to fund managers seeking an improved risk-adjusted return profile.

Looking across the different asset allocation strategies, for an Australian superannuation balanced fund, the empirical results show that there is scope to increase the property allocation level from current 10% position. Table 7 details the asset allocation component of the industry superannuation fund conventional Strategic portfolio, and the ten alternative asset allocation models.

Figure 2: Risk/ Return Performance – Industry Fund Asset Allocation Strategies

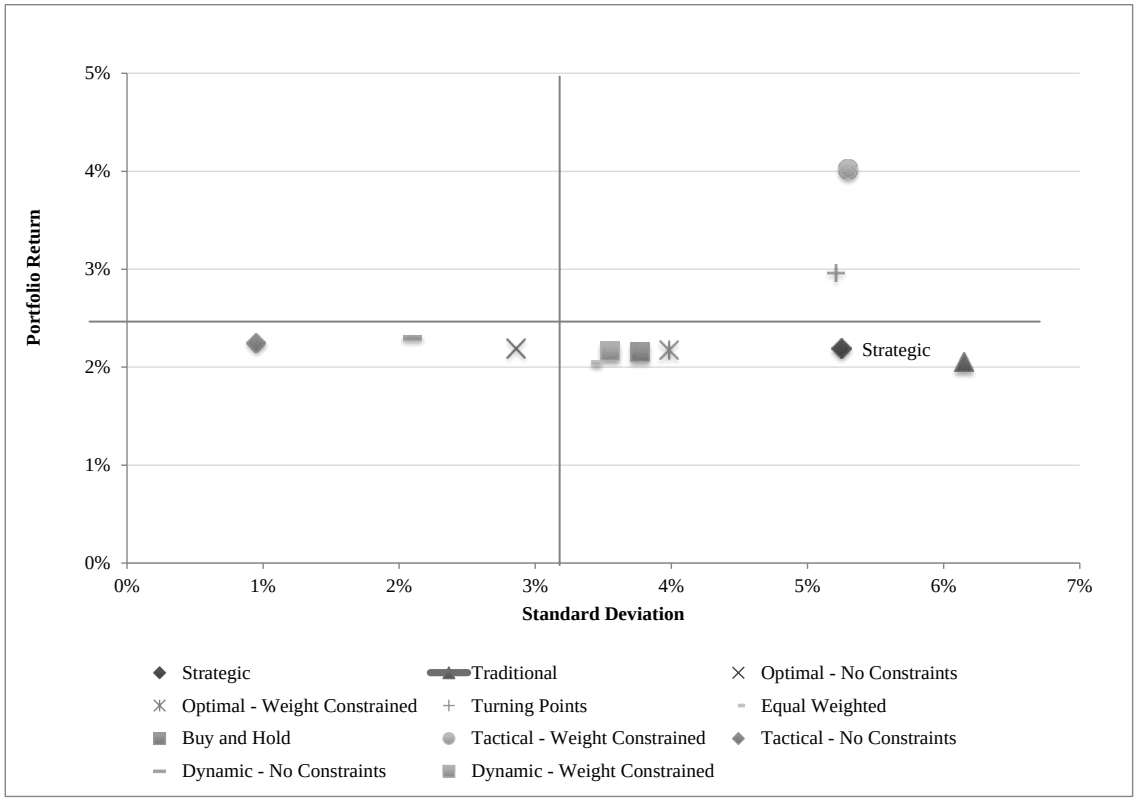


Table 7: Industry Fund Strategic versus Alternative Portfolio – Asset Allocation Breakdown

Asset Allocation Strategies	Aust eq	Int eq	Direct Prop	Listed Prop	Aust fixed	Int fixed	Cash	Alter n'ves
Strategic (Original Portfolio)	32%	20%	5%	5%	14%	6%	7%	11%
Buy and Hold	27%	12%	5%	4%	24%	2%	13%	13%
Traditional*	37%	23%	7%	5%	15%	5%	8%	0%
Optimal - No Constraints	5%	7%	50%	0%	3%	4%	16%	15%
Optimal - Weight Constrained	22%	13%	20%	6%	13%	6%	10%	10%
Turning Points	21%	13%	12%	10%	19%	7%	11%	7%
Equal Weighted	13%	13%	13%	13%	13%	13%	13%	13%
Tactical - No Constraints	3%	2%	17%	2%	4%	4%	65%	3%
Tactical - Weight Constrained	30%	19%	12%	4%	9%	5%	11%	10%
Dynamic - No Constraints	1%	0%	43%	4%	0%	7%	35%	10%
Dynamic - Weight Constrained	21%	12%	15%	12%	14%	10%	10%	6%
Average Allocation	**18%**	**11%**	**20%**	**6%**	**12%**	**6%**	**18%**	**9%**

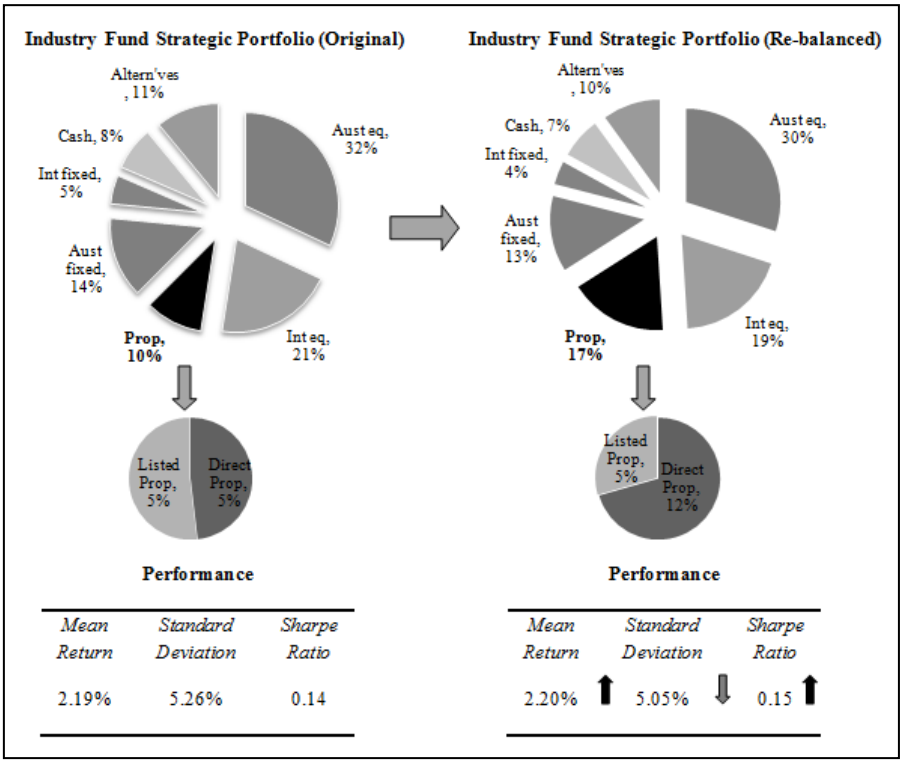
*Property Inclusive

Overall, the results presented in Table 7 demonstrate that at different times over the 17 year study period, the allocation to property across the eleven asset allocation models ranged from 9% (Buy and Hold) to 50% (Optimal – No Constraints), with an average allocation of 26%. Excluding unconstrained strategies, the recommended increase to the industry superannuation fund property allocation is 17% (12% direct property and 5% listed property). This compares to the industry superannuation fund average property allocation level of 10% (5% direct property and 5% listed property) during 1995-2011.

The recommended 17% increase in allocation to property can be investigated by rebalancing the industry superannuation fund Strategic portfolio. Figure 3 compares the performances of the industry fund original Strategic portfolio (which includes 10% property allocation) against a rebalanced industry fund strategic portfolio with 17% allocation to property. It is appreciated that rebalancing property is dependent on factors such as availability of investment product and investment mandates.

The results presented in Figure 3 show that allocation to equities (Australian and international), although slightly lower, still dominates the industry fund rebalanced SAA investment portfolio. Cash and fixed income (Australian and international) also recorded a slight decline in the rebalanced SAA model. Allocation to property is higher (17%), while the proportion invested in alternative assets remains steady at 10%. The combined real asset (property and alternatives) allocation accounts for 27% of the rebalanced industry fund Strategic portfolio. This high allocation is in line with the predictions of JP Morgan Asset Management (2012), and Jones Lang LaSalle (2012), that real assets will occupy 25% of institutional portfolios in the next decade. The increased allocation to property is backed by the improved risk-adjusted return performance. The Sharpe ratio for the rebalanced portfolio is 0.15, higher than 0.14 recorded for the original portfolio.

Figure 3: Industry Superannuation Fund Strategic Original and Rebalanced Portfolio



The rebalanced industry fund strategic portfolio property allocation has 12% invested in direct property, and 5% in listed property. The results substantiate the findings from recent studies (De Francesco & Hartigan 2009; Newell & Razali 2009) that anticipate higher allocations to direct property in the short to medium term

in Australia. The latest superannuation fund market report by APRA (2014) shows that the industry fund allocation to property was 11% in June 2013, with a large 10% invested in direct.

CONCLUSION

This research investigated the Australian superannuation fund optimal allocation to property assets using eleven different asset allocation models. The selected passive and active asset allocation models were set within the standard MPT framework using the Australian government 10 year bonds as the risk-free rate. The individual asset and portfolio performances were compared using the Sharpe ratio. The empirical analysis covered a sample period of 17 years (1995-2011), comprising 67 quarterly data points involving the AU$325 billion industry superannuation fund's seven benchmark asset classes including cash, Australian fixed, international fixed Australian equities, international equities, property, and alternatives asset class. Industry funds are the largest institutional not-for-profit superannuation investment option in Australia, and thus provided a good representation of asset allocation trends in the Australian managed funds industry.

The historical analysis of the balanced portfolio showed variances in industry superannuation fund benchmark asset allocation data. Equities (Australian and international) dominated the balanced fund portfolio with an allocation of more than 50%. Australian fixed income had the highest asset allocation range (19%), followed by alternatives (17%). Average allocation to property was 10%, evenly split between listed (5%) and direct property (5%). Property provided the second highest risk-adjusted return profile (0.21) behind alternative assets (0.44), index comprising infrastructure and utilities, hedge funds, private equity, and commodity prices.

The performance of the industry superannuation fund Strategic balanced portfolio is compared against ten alternative investment strategies. The Strategic, Traditional, Optimal, Turning Points, Tactical and Dynamic models have set parameters. The passive investment strategies included are Buy and Hold, and Equal Weighted, models. Based on the alternative asset allocation models, the inclusion of property asset offers an improved performance profile with property allocations moving above the current 10% average. For industry application, while allocations over 50% to property may not be practically justifiable, Australian fund managers can benefit from increasing property allocation to an average 17% recommended for the constrained investment strategies. This increased allocation to property is supported by the improved risk-adjusted return profile of the rebalanced industry fund Strategic portfolio. With Australia's growing and aging population, the stable rental income returns from property would be beneficial when most superannuation funds move into heavier payout periods.

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