EVALUATING STRATEGIC AND DYNAMIC PROPERTY ASSET ALLOCATION APPROACHES FOR AUSTRALIAN SUPERANNUATION FUNDS

WEJENDRA REDDY
RMIT University, Melbourne, Australia

ABSTRACT

For Australians, the $325 billion not-for-profit industry superannuation funds are a popular retirement saving option. To achieve their investment objectives, industry funds commonly apply the strategic asset allocation approach across seven diversified benchmarked asset classes. Fund managers regularly make adjustments to the strategic policy to reflect changes in investment markets. However, more recently, the volatile behaviour of the global financial markets has made it difficult for institutions to follow long-term strategies and polices. Consequently Australian fund managers are increasingly changing their asset allocation strategies to shorter term timeframe.

In particular, adopting the dynamic asset allocation approach, which works on a medium term (3+ years) timeframe, is now viewed as a more effective strategy by fund managers. Covering a 17 year period, this research compares the performance of the industry fund strategic investment approach against two dynamic asset allocation models. In addition, the research investigates the role of property in these asset allocation strategies. The results show that the dynamic investment models provide a better risk-adjusted return profile compared to the industry fund strategic investment approach with scope to increase the property allocation level from current 10% to the 15-28% range.

Keywords: superannuation; property investment; asset allocation; diversification; portfolio construction.

INTRODUCTION

The A$1.6 trillion superannuation industry represent 82% of the Australian managed funds assets under management. Industry superannuation funds, designed for employees working in the same industry, are the largest not-for-profit superannuation investment option in Australia. Approximately 67% of the A$325 billion industry fund assets are held in the balanced or default investment option, which consists of five major components, namely: equities (Australian and international), fixed income (Australian and international), property, alternatives and cash (APRA 2014, p28; ABS 2013). This research compares the performance of the industry superannuation fund conventional strategic balanced investment approach to two dynamic asset allocation strategies and investigates the role of property in the associated investment models.

For industry superannuation funds, the strategic asset allocation (SAA) policy is the starting point for all portfolio construction. SAA dictates the division of investment capital into different asset classes that best meet the long-term (10+ years) investment objectives and constraints of fund members. The need to generate sustained retirement income for members means that superannuation fund managers annually review and adjust the SAA approach to reflect changes in the investment environment. This is essential as funds have to consider adjustments for changes in member risk/return profile, investment objectives and the emergence of new investment opportunities not currently part of the investment portfolio. Although traditionally any changes to asset class exposures are made within the SAA guidelines, fund managers (mainly active managers) attempt to earn additional returns by adopting shorter term asset allocation strategies, such as through tactical asset allocation (TAA) and dynamic asset allocation (DAA) strategies (Anson

2004; Fabozzi and Markowitz 2011; Sharpe et al 2007).

The different industry fund asset allocation approaches can be compared by evaluating the models, investment characteristics and operational features. Table 1 details the key characteristics of the different asset allocation strategies.

Strategy	**Strategic Asset Allocation**	**Dynamic Asset Allocation**	**Tactical Asset Allocation**
Time-frame	10+ years	3+ years	Monthly/ Quarterly
Preferred Investments	All asset classes	All asset classes	Liquid assets only
Transaction Costs	Medium	Medium	High
Management Costs	Medium	High	High
Liquidity Benefits	Medium	Medium	High

Asset Allocation Strategies: Key Characteristics and Operational Features
Source: Reddy et al 2013; Watson Wyatt 2009
Table 1

SAA is a representation of the industry fund conventional asset allocation model. TAA policy is concerned with improving short-term gains (monthly, quarterly) by over-weighting or under-weighting certain major asset classes or asset subclasses when values and returns appear to be out of line with economic fundamentals, thus offering investment managers the opportunity to generate enhanced returns. In contrast, DAA decisions are made on a medium term investment horizon (3+ years). DAA bridges the gap with long-term SAA and shorter-term TAA policies to provide a more flexible approach to asset allocation. Except for the investment timeframe, DAA displays similar characteristics to the SAA policy and is often referred to in the industry as dynamic strategic asset allocation, or DSAA. Generally, institutions prefer investments with low transaction and management costs, along with high liquidity. Although the liquidity benefits for the TAA model is higher than the comparable strategies, the more frequent rebalancing of asset weights means that tactical strategies are management intensive and costly to implement.

Farrell (2011) found that institutional investors are increasingly changing their focus to shorter term strategies due to the continued erratic behaviour of the investment markets following the 2007 global financial crisis (GFC). Dong and Li (2012) also highlight that portfolio allocation may increase or reduce over different economic phases, including that for property assets. Leading Australian asset consultants Mercer (2011) and Watson Wyatt (2009) noted that the DAA approach in particular provides an effective short-term strategy amid the current unpredictable investment environment. The dynamic strategy medium term timeframe recognises that market dislocations and mispricing can persist for several years. However, its application can place considerable demands on both the institution’s finance and personnel. Lawrence and Singh (2011) and Vliet and Blitz (2011) identified that DAA fund managers can suffer considerable loss due to wrong market predictions and wrong investment decisions. Therefore, the evaluation of current market trends and prediction of future trends is significantly important for the successful implementation of DAA strategies.

In recent years, researchers have attempted to quantify the costs and benefits of active management strategies. Brinson, Hood and Beebower (1986), Brinson, Singer and Beebower (1991) and Ibbotson and Kaplan (2000) found that active investment decisions by large pension funds in the United States did little on average to improve performance and that 93.6-100% of the portfolio returns are dominated by the SAA policy decisions. These and other studies, such as Sharpe (1992) and Bekkers, Doeswijk and Lam (2009), imply that the SAA allocation policy decision is far more important than market timing and asset selection. However, Hoernemann, Junkans and Zarate (2005) argue that active investment strategies should not be ignored. Those managers who are able to make effective TAA and DAA decisions are likely to offer better performance.

Research on the effectiveness of active asset allocation strategies is limited in Australia and mainly focused on the TAA strategy. Gallagher (2001) and Faff, Gallagher and Wu (2005) found that SAA strategies adopted by Australian superannuation funds represent the single most important determinant of portfolio returns. The evidence from their studies indicates that active managers have been unable to deliver to investors superior returns through TAA. More recently, Parker (2013) and Reddy et al (2013) investigated the application of TAA approach for property fund managers and superannuation fund managers. However, literature on the effectiveness of DAA compared to the SAA approach is lacking in Australia. In addition, portfolio construction research has mainly focused on capital market assets such as equities, bonds and cash. Portfolio construction research on the asset allocation component of investments such as property, particularly in the context of active asset allocation strategies, is lacking in Australia.

From a balanced investment option viewpoint, fund managers generally prefer SAA and DAA as these investment strategies provide allocation opportunities across a wider range of asset classes. In the context of property, its very nature (illiquid, long-term investments) means that SAA and DAA are more suitable asset allocation policies. The TAA model is scarcely used and mainly confined to listed property. Reddy (2012), in a recent survey of Australian fund managers, identified that whilst SAA remains the dominant asset allocation strategy for property assets, the dynamic structure has become more prominent for several funds due to its ability to react to uncertain market environments more effectively. The study found that post the 2007 GFC, investors are disbelieving of long-term data and, therefore, the industry is more tactical than in the past. It would appear that those organisations that employ a higher number of property professionals are more open to apply DAA strategies. Therefore, it is important to investigate the optimal allocation to property assets within the setting of dynamic investment models. This will test if active strategies such as DAA can perform better than the conventional SAA investment technique given the current investment environment and determine if a higher allocation to property is feasible and at what level.

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%

Industry Superannuation Funds Asset Weight Parameters: December 2011
Source: Reddy et al 2013
Table 2

The research design involves the construction of two DAA investment models based on the MPT mean-variance portfolio optimisation framework. The Markowitz (1952, 1959) classical mean-variance portfolio selection model serves as the starting point for constructing optimal asset allocation models. In practice, the Markowitz mean-variance framework is altered with various types of constraints that follow the institution's investment guidelines and investment objectives.

This is because 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 2 illustrates the assumed pre-determined weight constraints.

Table 2 illustrates that industry funds place high weighting on the equity markets. The property allocation range is set at 0% to 20%. The level of allocation can relate to historical performance, liquidity, and transaction costs. This information is prepared based on consensus data from six leading Australian industry superannuation funds with A$146 billion of funds under management. Except for the Dynamic – No Constraints investment technique, all strategies used in this research are modelled within the above predefined asset weight parameters. Previous studies (Lee and Byrne 1995; Stevenson 2000) have also examined the role of property within unconstrained and constrained mixed-asset portfolios, with the upper limit to property set at 20% for constrained strategies. However, these studies were mainly confined to the SAA techniques. In contrast, this research will expand the analysis to the DAA portfolio construction techniques.

The next section reviews literature on the importance of the property asset class in superannuation fund portfolios. The following section then details the historical performance of selected asset classes and associated methodology, then the empirical findings and industry implications are provided followed by concluding comments.

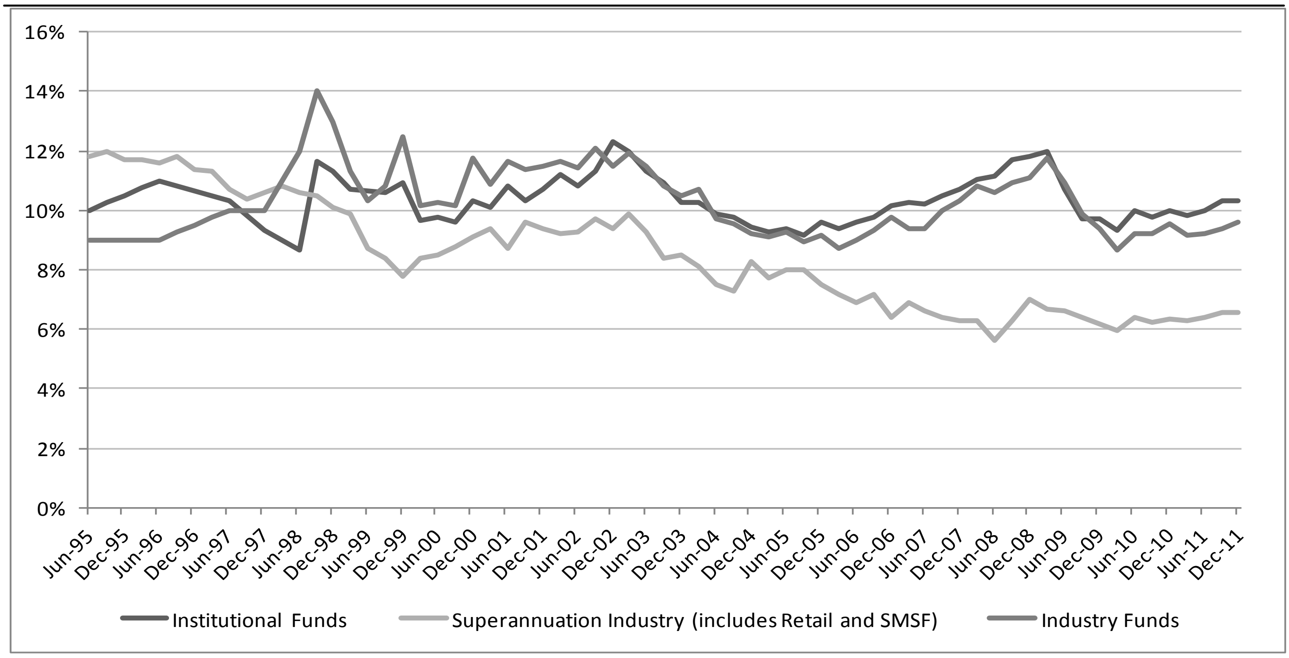
Significance of Property in Superannuation Fund Portfolios

Bond et al (2007) and MacGregor and Nanthakumaran (1992) examined the diversification benefits of property and concluded that property assets provide strong diversification potential when included in a mixed-asset portfolio. Typically, institutional investors have used their property allocations to improve portfolio performance by adding an uncorrelated asset class to the investment portfolio. Hudson-Wilson, Fabozzi and Gordon (2003, pp13, 18-22.) identified that property in an investment portfolio is important to reduce the portfolio's overall risk by combining asset classes that respond differently to expected and unexpected events. Property generally demonstrates low correlation with stocks, bonds and cash. Property's lower volatility offers investors protection from drastically low returns. The recent correction in stock market has resulted in increased allocations to property as investors seek stable portfolios. To a risk-sensitive investor, whose main focus is capital preservation, allocation to property will be the starting point for portfolio construction.

In Australia, institutional investment represents approximately 70% of the core property market (Higgins 2007, p15). Superannuation funds with A$1.6 trillion funds are the dominant institutional investors in the Australian property market and provide a good measure of institutional allocation to the property sector. They hold interest in commercial property, both directly and indirectly, via exposure to more than 1,000 different property funds across Australian real estate investment trusts (A-REITs), property securities funds and unlisted funds such as wholesale property funds and property syndicates (APRA 2014, p28; PCA 2011).

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. Newell (2007, pp38-39), in a study of 395 superannuation fund investment options, found that 218 (55%) contained property in their portfolios. Newell (2007) and Reddy (2012) identified that direct property exposure for large and medium sized superannuation funds is generally in the core property sector, typically via unlisted wholesale property funds. Direct property exposure for the smaller industry based superannuation funds was mainly via unlisted wholesale property funds and prominent property syndicates. Small funds mostly favour the flexibility and liquidity provided by A-REITs.

As at 30 June 2013, the Australian superannuation industry's allocation to property was A$141 billion, representing approximately 50% of the A$300 billion Australian property market's value. This comprises 7% in unlisted property and 2% in listed property (APRA 2014, pp28, 38; PCA 2011, p8). Several superannuation funds had in excess of A$2 billion invested in property assets including AMP Superannuation Trust (A$7.9 billion), AustralianSuper (A$5.2 billion), Colonial First State Superannuation Trust (A$4.9 billion), State Public Sector Superannuation Scheme (A$2.8 billion), Unisuper (A$2.6 billion), and Construction and Building Unions Superannuation (A$2.5 billion). Figure 1 details the Australian superannuation industry historical property allocation trend.



Australian Superannuation Historical Property Allocation Levels
Source: Austrade 2010; Rainmaker Group 2012
Figure 1

Figure 1 illustrates the Australian superannuation industry historical property allocation trend. For the 17 years to December 2011, property allocation for the institutional superannuation sector ranged from 8-12%. The institutional sector, consisting of the not-for-profit funds (corporate funds, industry funds, public sector funds) and retail funds make up 65% of the $1.6 trillion superannuation industry assets under management. Property asset allocation for the industry funds, the largest segment of the institutional superannuation funds sector, averages 10%. However, the overall superannuation industry (including small self-managed funds) demonstrate waning appetite for property assets, with allocation declining from 12% during June 1995 to 6% as at December 2011. This is inconsistent with past asset allocation studies (Bajtelsmit and Worzala 1995; Brown and Schuck 1996; Craft 2001; Hoesli, Lekander and Witkiewicz 2003) that 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%.

Earlier studies such as Baum and Hartzell (2012), Ciochetti, Sa-Aadu and Shilling (1999) and Rowland (2010) have provided several possible explanations as to why superannuation funds invest in property less than the proportion under the theoretical expectation. Examples include fixed costs associated with investing directly in property (such as higher transaction costs, management costs); lack of trust in property data; fund's retiree liabilities may be growing faster than active liabilities, thus making it difficult for funds to hold lumpy assets such as property; and the introduction of new alternative asset classes such as infrastructure funds which offer income security and diversification benefits that are similar to those associated with property. Compared to other investment assets, property requires intensive management. This has been cited as one of the major reasons why fund managers do not include property in their investment portfolios. As a result of these factors, there is usually a mismatch between the importance of the property asset class in value and its weighting in institutional portfolios.

Despite these limitations, property is expected to continue to be a significant asset class in Australian superannuation fund portfolios in future. According to PCA (2009, p16), due to the 'denominator effect' of declining stock market values following the 2007 GFC, the allocation to property assets is expected to increase to 10-15% for some superannuation funds. Leading industry superannuation fund managers, AustralianSuper and Unisuper, have recently announced increased appetite for property assets (Friemann 2012, p50; Hughes 2012, p47). In addition, 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.

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 an increased property allocation. The Australian superannuation industry is projected to reach AU$3 trillion by 2019 and AU$7 trillion by 2028, backed by Government policy and growing and aging population levels (Allen Consulting 2011; Deloitte 2009). 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 capital appreciation. Therefore, it is important to investigate the optimal allocation to property assets within different investment models and to test if higher allocation to property is feasible for industry superannuation fund managers.

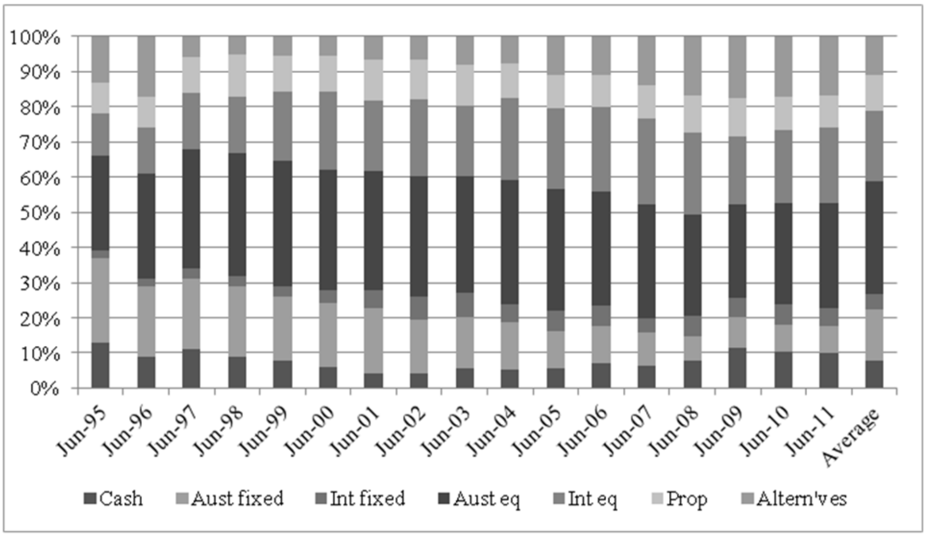
RESEARCH DATA AND METHODOLOGY

This section of the research design involves constructing two DAA investment models based on the MPT mean-variance portfolio optimisation framework. The performance of the DAA models are compared to the industry superannuation fund conventional strategic balanced portfolio. The research data covers a sample period of 17 years (1995 to 2011), comprising 67 quarterly data points. The asset data and benchmark representations for the research are detailed in Table 3.

Table 3 details the benchmark data series for the selected asset classes. The sourced overseas data was converted to Australian Dollars based on the prevailing exchange rate. The property data used to construct the different asset allocation models are raw and not de-smoothed property, which is in line with industry practice. For the alternative asset class data series, the index is constructed from the commencement of selected Australian data series for Infrastructure and Utilities, Hedge Funds (AU), Private Equity, Commodity Prices (AU) based on an equal weighted formula which follows a UK alternative asset class index structure (Bond et al 2007). For the purpose of this research, direct property is represented by investments in direct commercial property assets and unlisted property funds. Listed property is represented by the Australian REITs.

Asset Class	*Representation*	*Source*
Cash	Interbank Rate	Reserve Bank of Australia
Australian Fixed Income (Aust fixed)	CBA Bond: All Series, All Maturities	Commonwealth Bank of Australia
International Fixed Income (Int fixed)	Citigroup World Global Bond Index (Local)	Citigroup Inc.
Australian Equities (Aust eq)	ASX All Ordinaries Accumulation	Australian Securities Exchange
International Equities (Int eq)	MSCI WORLD Standard (Large+Mid Cap) Index (AU$)	Morgan Stanley Capital International World Inc.
Property - Direct Property (Direct Prop)	PCA/IPD Composite Property Index	Investment Property Databank Australia
- Listed Property (Listed Prop)	S&P/ASX 200 A-REIT Index	Australian Securities Exchange
Alternatives Assets (Altern'ves)	Infrastructure and Utilities; Hedge Funds; Private Equity; Commodity Prices	UBS Wealth Management; Dow Jones Credit Suisse; AVCAL & Cambridge Associates; Reserve Bank of Australia

Summary of Sourced Asset Benchmark Data
Source: Author
Table 3



Industry Superannuation Balanced Fund Asset Weights (1995 – 2011)
Source: Rainmaker Group 2012
Figure 2

The benchmark asset allocation series data for the industry superannuation balanced fund seven asset classes was sourced from the Rainmaker Group, a leading superannuation service provider in Australia. Rainmaker Group on a regular (quarterly) basis surveys and publishes asset allocation data for the Australian industry and retail superannuation funds. Figure 2 shows the changes in asset allocation weighting for the industry superannuation default balanced funds.

Figure 2 shows the varying benchmark asset allocation weighting for the industry superannuation balanced funds. The aggregated average over the study period (17 years) was Australian equities 32.2%, international equities 20.4%, Australian fixed income 13.8%, international fixed income 4.7%, alternatives 11.2%, property 10.3% and cash 7.4%. Property allocation includes both direct/unlisted property and listed securitised property (REITs), on average 4.8% and 5.5% respectively. Allocation to property ranged between 9-11%, 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 recorded in at 8.7% in March 2010. This was during the recent GFC storm that led to major falls in REIT prices and property valuations.

The allocation to the alternative asset class has been growing steadily from 1998 to the peak level of 21% in 2009. It now represents the third largest asset group for industry superannuation funds. The level of allocation to different asset classes, including property, depends on industry fund liquidity requirements, risk/return preference for fund members and sector outlook for each investment asset class. For example, superannuation fund asset allocation is tailored to meet liabilities and maximise the surplus, given an acceptable risk level. The asset weightings are also susceptible to variations in economic and financial market conditions (Reddy 2012).

The different investment strategies evaluated included the industry fund's conventional SAA (Strategic) model, Dynamic-No Constraints and Dynamic-Weight Constrained models. The portfolio return for all asset allocation models was calculated using Equation 1.

$$R_p = w_1 R_1 + w_2 R_2 + \ldots + w_G R_G \qquad \text{Equation 1}$$

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

The *Strategic* portfolio is the industry fund original balanced investment option and 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 against which the alternative portfolio performances are evaluated. The Strategic portfolio is rebalanced on quarterly industry asset weighting data supplied by the Rainmaker Group.

The *Dynamic – No Constraints* model is based on the MPT mean-variance portfolio construction technique on a three year rolling timeframe. This follows the approach of Basak and Chabakauri (2010) and Nguyen and Portait (2002) to modelling DAA investment portfolios. In theory, the portfolio optimisation (or mean-variance setting) generates a maximum Sharpe ratio portfolio based on the expected return, volatility and pairwise correlation parameters for all assets to be included in the portfolio. For *n* number of assets in the portfolio, the asset allocation is optimised by minimising portfolio risk for a given level of expected return using Markowitz's (1952) quadratic programming problem, as shown in the quadratic mean-variance function in Equation 2.

$$\text{Minimise } \sigma_p^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} x_i\, x_j\, \sigma_{ij}$$

$$\text{subject to } \mu_p = \sum_{i=1}^{n} x_i\, \mu_i$$

$$\mu_p \geq \mu_o$$

Equation 2

where:

x_i = proportion of portfolio allocated to asset i.

μ_p= expected portfolio return.

μ_i= expected return on asset i.

μ_0= given level of expected return.

σ_{ij}= covariance between asset i and asset j returns.

The covariance and correlation coefficient matrix tests the portfolio diversification benefits for the industry fund balanced investment option asset classes. The *Dynamic – No Constraints* investment strategy is based on the premise of overweighting assets with low variance, thus having high exposure to a specific asset class at specific points of time. The key inputs include the historical total return and standard deviation data. The portfolio asset weights were constrained to being positive (greater than or equal to zero) and the total portfolio weight should sum to 100%. The model does not allow short selling. The Australian Government 3 year bonds are used as the risk free rate.

The *Dynamic – Weight Constrained* model is set within the predefined holding constraints, in similar fashion to the industry superannuation fund Strategic investment portfolio (see Table 2). The *Dynamic – Weight Constrained* model is based on the MPT mean-variance portfolio construction technique on a three year rolling timeframe. Fabozzi et al (2011) explain that the minimal and maximal exposure for individual assets can be controlled by the constraint.

$$L_i = w_i = U_i$$

Equation 3

where:

L_i and U_i = vectors representing the minimum and maximum holding in asset *i*

The use of minimum and maximum holding constraints leads to a more industry practical application of the mean-variance optimisation problem. The asset and portfolio performances were compared using the risk-adjusted return model (Sharpe ratio). The Sharpe ratio, developed by Sharpe (1966, 1994) is the most common measure of comparative performance in the financial market. The risk-adjusted return performance attempts to capture the trade-off between risk and return. Fund manager prefer higher Sharpe ratio performance, with target benchmark being 1.00 (Bernstein 2007).

RESULTS AND DISCUSSION

The results are divided into three major parts. Firstly, the individual asset performance statistics and correlation matrix are discussed. Then the results from the SAA and DAA models are discussed. The final set of analysis investigates the importance of property in these asset allocation models. The industry superannuation fund seven balanced investment option asset classes historical performance statistics over the 17-year sample period is examined in Table 4.

Table 4 illustrates the quarterly performance of the asset classes. 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 over 2.0%. Property (excluding alternative asset class) out-performed 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.

Asset Class	Mean Return	Std Dev	Sharpe Ratio	Kurtosis	Skewness	Annualised Return	Annual'd Std Dev
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%

Descriptive Statistics for Asset Performance: Quarterly Data 1995 – 2011
Source: Author
Table 4

The diversification benefits of the industry superannuation fund balanced investment option seven asset classes can be tested by examining the correlation analysis as shown in Table 5.

Asset Class	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

Correlation Matrix: Asset Benchmark Returns: Quarterly Data 1995 – 2011
Source: Author
Table 5

Table 5 details the correlation matrix for the default fund selected asset classes. Cash, fixed income securities and property generally displayed low or negative correlation with most asset classes. The asset classes with a strong correlation (>0.50) were generally linked to the same local and overseas asset class (for example Australian and 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 underlying asset classes behind the performance of private equity and hedge funds. Property's strong correlation (>0.50) with Australian equities would, in part, relate to the allocation of REITS within the property asset class. REIT short term performance is traditionally linked to the equity market. Likewise, property's strong relationship to the alternative asset class can be due to similar underlying legal structures of assets such as infrastructure, providing a continuity of income.

The performance of industry superannuation funds is also largely influenced by asset allocation strategy. Table 6 compares the performance of the industry fund conventional strategic portfolio and the dynamic investment strategies.

Table 6 illustrates that the Dynamic – No Constraints asset allocation strategy produced the highest mean total return (2.3%). In addition, the Dynamic – No Constraints strategy was the least volatile investment option, with a risk level of less than 2.1%. The result is expected, given that the Dynamic – No Constraints strategy is based on Markowitz's classical mean-variance formulation which seeks to minimise portfolio risk by over-weighting assets with low variance. The industry fund conventional strategic portfolio displayed the highest risk profile. The data trend displays flat kurtosis for both the asset allocation strategies, indicating low and even distribution. Results for the Dynamic – Weight Constrained asset allocation strategy were negatively skewed, meaning this allocation strategy has a greater chance of producing extremely negative outcomes. Results for the Dynamic – No Constraints strategy were positively skewed.

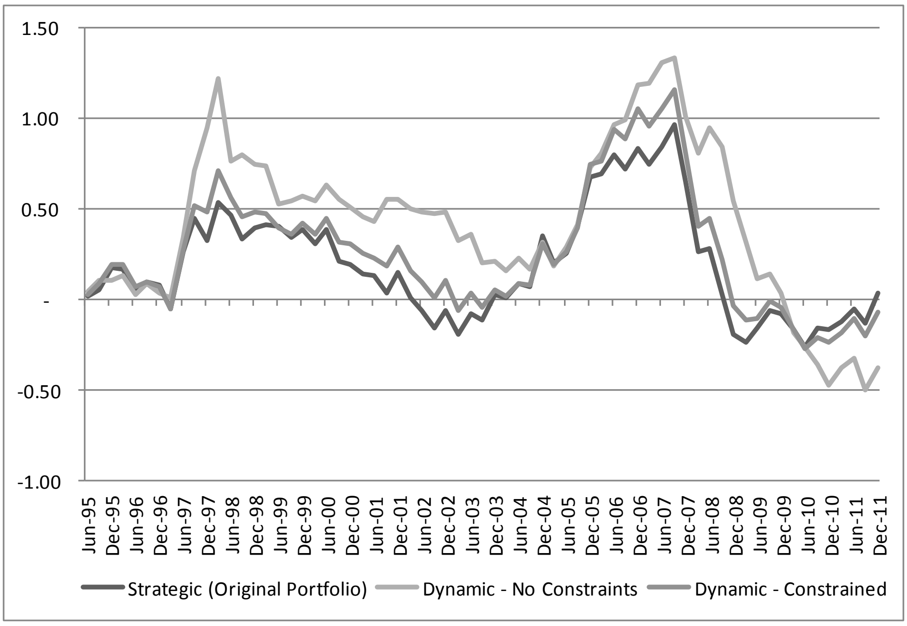
Dynamic – No Constraints strategy recorded a high risk-adjusted return profile (0.29), followed by the Dynamic – Weight Constrained strategy (0.15). The results can be compared to the industry fund conventional Strategic portfolio Sharpe ratio (0.14). On a risk-adjusted return basis, both Dynamic investment strategies have outperformed the industry superannuation fund Strategic portfolio. The results are similar to international studies such as Vliet and Blitz (2011) which show that the use of dynamic investment strategies provide stabilised risk and enhanced expected return, compared to the strategic investment approach.

Asset Allocation Strategy	**Mean Rtn**	**Std Dev**	**Sharpe Ratio**	**Kurt'sis**	**Skewness**	**Annual'd Return**	**Annual'd Std Dev**
Strategic – (Original Portfolio)	2.19%	5.24%	0.14	0.01	-0.38	9.04%	10.49%
Dynamic - No Constraints	2.30%	2.10%	0.29	-0.21	0.07	9.51%	4.19%
Dynamic - Weight Constrained	2.16%	3.55%	0.15	-0.13	-0.46	8.92%	7.11%

Industry Fund SAA and DAA Performance Statistics: Quarterly Data 1995 – 2011
Source: Author
Table 6

The investment performance of the different asset allocation strategies can be further examined by looking at the 17-year historical risk-adjusted return data. Figure 3 demonstrates the 3-year rolling Sharpe ratio for the strategic and dynamic investment portfolios.

Figure 3 illustrates the 3-year moving risk-adjusted return performance for the Strategic and Dynamic investment portfolios. The results display that, in most time periods, the dynamic strategies perform as well or better than the conventional strategic approach. The risk-adjusted return performance has generally remained positive (zero to 1.00) except in the more recent period. The more recent period negative Sharpe ratios can be linked to the significant fall in investment markets during the 2007 GFC. Since June 2010, the industry superannuation conventional strategic approach has outperformed the dynamic investment strategies. This is evidence of severe market correction post the GFC period leading to institutional investment portfolio reprofiling.



Moving 3-Year Strategic and Dynamic Asset Allocation
Sharpe Ratio: Quarterly 1995 – 2011
Source: Author
Figure 3

The industry fund strategic and dynamic investment strategies asset allocation is detailed in Table 7.

Asset Classes	**Strategic - (Original Portfolio)**	**Dynamic - No Constraints**	**Dynamic - Weight Constrained**	**Average**
Cash	7%	31%	11%	16%
Aust fixed	14%	5%	13%	11%
Int fixed	5%	11%	12%	9%
Aust eq	33%	8%	22%	21%
Int eq	20%	4%	12%	12%
Prop	10%	28%	15%	18%
Altern'ves	11%	13%	15%	13%

Aggregate Strategic and Dynamic Investment Portfolio Asset Weights
Source: Author
Table 7

Table 7 details the aggregate asset allocation weights for the industry fund Strategic and Dynamic investment portfolios. The Strategic portfolio actual allocation was equities (Australian and international) 53%, fixed income (Australian and international) 19%, cash 7%, property 10% and alternative assets 11%. The Dynamic – No Constraints portfolio allocation was equities (Australian and international) 12%, fixed income (Australian and international) 16%, cash 31%, property 28% and alternative assets 13%. The Dynamic – Weight Constrained portfolio allocation was equities (Australian and international) 34%, fixed income (Australian and international) 25%, cash 11%, property 15% and alternative assets 15%. The average allocation across the different strategies was: equities (Australian and international) 33%, fixed income (Australian and international) 20%, cash 16%, property 18% and alternative assets 13%.

Equities dominate all other assets in terms of the level of asset weighting in the constrained asset allocation strategy. Compared to the industry fund Strategic portfolio, which is heavily weighted towards equities and fixed income securities, property and cash featured prominently in the Dynamic – No Constraints strategy. However, the Dynamic – Weight Constrained asset allocation data were similar to the industry fund Strategic portfolio, albeit minor increases across the different asset classes except equities. Allocation to equities (mainly international) in the Dynamic – Weight Constrained model declined significantly in favour of higher allocation to property, alternatives and cash. In the context of property assets, the results illustrate that, depending on the asset allocation strategy, weighting to property assets can fall within a 15-28% range. Even on a constrained basis, the allocation to property in the Dynamic investment portfolio was 15%, higher than the current industry fund Strategic portfolio average of 10% reported for the Australian market by APRA (2014) and Rainmaker (2012).

Table 8 further details property allocation levels for the Strategic and Dynamic investment approaches in 3-year rolling intervals on ending months.

Asset Allocation Strategy	**Jun-95**	**Jun-98**	**Jun-01**	**Jun-04**	**Jun-07**	**Jun-10**	**Dec-11**	**17-year Average**	**Range**
Strategic - (Original Portfolio)	9%	10%	11%	9%	10%	10%	10%	10%	2%
Dynamic - No Constraints	44%	46%	29%	14%	29%	21%	33%	28%	32%
Dynamic - Weight Constrained	20%	16%	17%	8%	19%	15%	17%	15%	12%

Property Asset Weighting at Different Time Intervals:
3-Year Rolling 1995 – 2011
Source: Author
Table 8

Table 8 provides 3-year rolling property allocation data for the Strategic and Dynamic investment models. The results illustrate that allocation to property assets varies with time. The industry fund conventional strategic approach allocation to property increased steadily from 9% in 1995 to 11% in June 2001. Since then the Strategic portfolio property allocation has declined to 10% at December 2011. The average property allocation level for the Dynamic – No Constraints and Dynamic – Weight Constrained models were 32% and 12% respectively. For the Dynamic – No Constraints strategy, the property allocation level was above 40% prior to June 2001. Since then, allocation levels have fluctuated sharply, declining to 14% in June 2004 and recovering to 33% in December 2011.

The highest level of property allocation for the Dynamic – Weight Constrained investment strategy was 20% at June 1995. Except for the 8% allocation recorded at June 2004, the Dynamic – Weight Constrained strategy allocation to property has generally tracked 15-19% since June 1995. Property allocation for both Dynamic strategies declined slightly from June 2004 to June 2010. This can be attributed to the lag effect of 9/11 (September 2001) and the 2007 GFC. More recently (December 2011), property allocation has increased slightly across both Dynamic investment strategies.

To ascertain which property investment scenario – that is, including direct property, or listed property, or both – provides the best investment option, the investment strategies were further tested under three different property investment scenarios: All Prop (the model includes both direct and listed property); Direct Prop (property is represented in the model by direct property component only); and Listed Prop (property is represented in the model by the listed property component only). Table 9 displays the performance of the Strategic and Dynamic investment strategies using different property asset allocation scenarios.

Table 9 illustrates that the Dynamic – No Constraints direct property led portfolio recorded the highest mean total return (2.4%). On a risk-adjusted basis, the Dynamic – No Constraints direct property led portfolio outperformed the Strategic and Dynamic – Weight Constrained strategies with a Sharpe ratio of 0.30. The Strategic 'Listed Prop' risk-adjusted return was 0.13 compared to the Strategic 'Direct Prop' and 'All Prop' Sharpe ratios (0.14). The Dynamic – No Constraints 'Listed Prop' risk-adjusted return was 0.26, compared to the 'Direct Prop' portfolio (0.30) and 'All Prop' portfolio (0.29). The risk-adjusted return profile for the Dynamic – Weight Constrained 'Direct Prop' and 'All Prop' portfolios was similar (0.15), higher than the 'Listed Prop' portfolio (0.13). Overall, the results demonstrate that direct property led investment portfolios offer better risk-adjusted return performances compared to listed property led portfolios.

Asset Allocation Strategies	Mean Return	Standard Deviation	Sharpe Ratio	Annualised Return	Annualised Standard Deviation
Strategic - (Original Portfolio)					
All Prop	2.19%	5.24%	0.14	9.04%	10.49%
Direct Prop	2.19%	5.29%	0.14	9.05%	10.58%
Listed Prop	2.17%	5.54%	0.13	8.97%	11.07%
Dynamic - No Constraints					
All Prop	2.30%	2.10%	0.29	9.51%	4.19%
Direct Prop	2.37%	2.23%	0.30	9.81%	4.45%
Listed Prop	2.32%	2.40%	0.26	9.60%	4.80%
Dynamic - Weight Constrained					
All Prop	2.16%	3.55%	0.15	8.92%	7.11%
Direct Prop	2.25%	3.60%	0.15	9.30%	7.20%
Listed Prop	2.19%	3.79%	0.13	9.04%	7.58%

Investment Strategy Performance with Different Property Allocation Scenarios: Quarterly Data 1995 – 2011
Source: Author
Table 9

The lower risk-adjusted performance of the 'Listed Prop' portfolios compared to the 'Direct Prop' portfolio can be attributed to the recent poor performance of A-REITs. Listed property recorded negative total return in 13 out of 20 quarters leading up to December 2011 and 21 out of 68 quarters for the entire sample period. However, recent data (ASX 2014) shows that the A-REITs sector has recovered strongly which may lead to improved portfolio allocation in future.

Across the different asset allocation strategies, the risk-adjusted return performances of the 'All Prop' portfolio were similar to the 'Direct Prop' led portfolios. This indicates that fund managers are better off adopting SAA and DAA investment strategies that include both direct and listed property assets as such approaches offer a more diversified investment portfolio. Including listed property also provides liquidity benefits for the fund manager.

The allocation to property also has an influence on the performance of the investment portfolios. Table 10 details the performance of the asset allocation models by including and excluding property in the Strategic and Dynamic portfolios.

Table 10 demonstrates the performance benefits of including property within different investment strategies. The empirical analysis shows that including property assets within a multi-asset portfolio improves returns and provides stability by reducing overall portfolio risk. All property inclusive investment strategies demonstrated lower standard deviation and higher mean total return when compared to the property excluded investment strategies. The property inclusive industry fund Strategic investment portfolio illustrates a 9% increase in risk-adjusted return and 7% reduction in portfolio risk compared to the property excluded portfolio. The Dynamic – No Constraints strategy demonstrated a risk-adjusted return difference of 12% and portfolio risk reduction of 21%, when property assets were included.

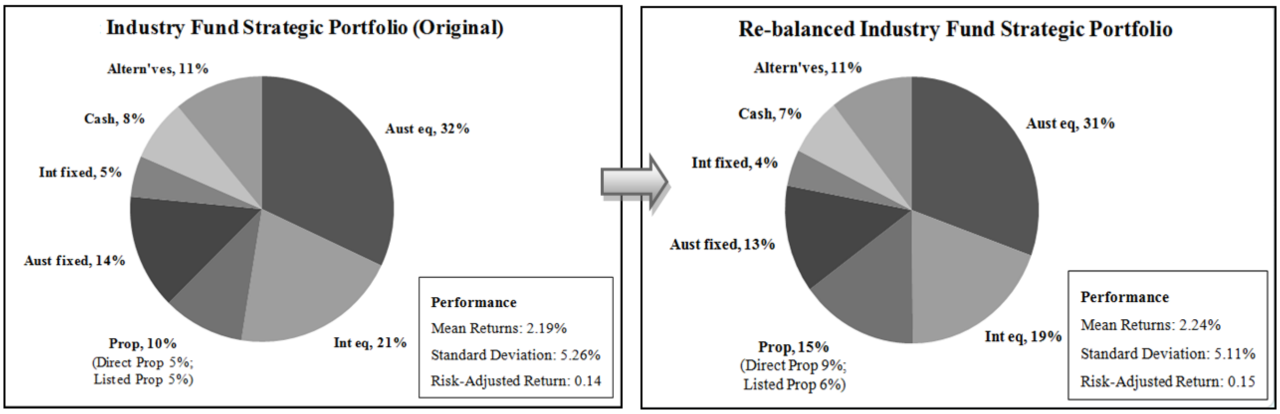
All Prop Strategies	**Property Inclusive Portfolios**			**Property Excluded Portfolios**			**Benefits of including Property**	
	Mean Return	*Standard Deviation*	*Sharpe Ratio*	*Mean Return*	*Standard Deviation*	*Sharpe Ratio*	*Portfolio Risk Reduction*	*Risk Adjusted Return Difference*
Strategic - (Original Portfolio)	2.19%	5.24%	0.14	2.17 %	5.60%	0.13	6.6%	8.7%
Dynamic - No Constraints	2.30%	2.10%	0.29	2.01 %	2.54%	0.26	21.0%	11.5%
Dynamic - Weight Constrained	2.16%	3.55%	0.15	2.12 %	3.80%	0.11	7.0%	36.4%

Performance of Property Included and Excluded Strategies:
Quarterly Data 1995 - 2011
Source: Author
Table 10

The property included Dynamic – Weight Constrained investment strategy (which works on similar holding constraint parameters as the industry fund Strategic investment approach) displayed an improved risk-adjusted return (36%) and reduced risk profile (-7%) compared to the property excluded portfolio. The Dynamic – Weight Constrained portfolio allocation for property ranged from 8-20% over the 17 year sample period. This high allocation suggests that property provides strong risk reduction features when compared to alternative asset classes. The results overall conform with earlier studies (Bajtelsmit and Worzala 1995; Brown and Schuck 1996; Craft 2001; Hoesli et al 2003) which state that allocation to property should be in the range of 10-30% and that inclusion of property leads to a substantial improvement in the portfolio performance.

During different time periods over the 17-year study period, the allocation to property assets in the Dynamic – No Constraints investment strategy ranged from 14-46%. The Dynamic - Weight Constrained investment strategy recorded property allocation of 8-20%. On average, the results show that there is scope to increase the superannuation balanced fund current 10% property weighting to the 15-28% range. Whilst allocations of 30% to property may not be practically justifiable, Australian fund managers can benefit from the increased 15% allocation recommended in the Dynamic – Weight Constrained investment strategy.

The industry implication for a 15% allocation to property can be investigated by rebalancing the superannuation fund Strategic balanced investment portfolio. Figure 4 details the asset allocation composition and performance of the industry superannuation fund original and rebalanced Strategic portfolio. The rebalanced portfolio has 15% invested in property compared to the actual 10% in the original Strategic portfolio. The allocation to equities (Australian and international), fixed income (Australian and international), cash and alternatives are proportionate to the level of benchmark asset weighting data as supplied by Rainmaker Group (see Figure 2). It is appreciated that rebalancing property is dependent on factors such as availability of investment product and investment mandates.



Industry Fund Original and Rebalanced Strategic Portfolios:
Quarterly Data 1995 – 2011
Source: Author
Figure 4

Figure 4 demonstrates the industry fund original and rebalanced Strategic investment portfolio with property allocation increased from 10% to 15%. The results show that allocation to equities (Australian and international) still dominates the industry fund rebalanced Strategic portfolio. Cash, fixed income (Australian and international) also recorded slight declines. In contrast, allocation to property is higher (15%), while the proportion invested in alternative assets remained constant (11%). The results conform to current industry superannuation fund practice of reducing portfolio equities exposure in favour of higher allocation to property assets. APRA (2014) data shows industry superannuation fund allocation to equities has declined from 57% in June 2007 to 54% as at June 2013. In contrast allocation to property has increased from 9% in June 2007 to 11% as at June 2013.

In addition, the combined real asset (property and alternatives) allocation accounts for 26% of the rebalanced portfolio. This high allocation is in line with JP Morgan Asset Management (2012) and Jones Lang LaSalle (2012) prediction of real assets occupying 25% of institutional portfolios in the next decade. The increased allocation to property is backed by the improved risk-adjusted return performance of the rebalanced industry fund Strategic portfolio. The Sharpe ratio for the rebalanced portfolio is 0.15, higher than 0.14 recorded for the original portfolio. This knowledge will be beneficial for funds currently reprofiling investment portfolios to achieve stable risk-adjusted returns. It is appreciated that rebalancing the portfolio is not without costs. To increase the mean return from 2.19% to 2.24% and the Sharpe ratio from 0.14 to 0.15 could provide minimal gains due to added management and transactions costs.

The rebalanced industry fund Strategic portfolio property allocation has 9% invested in direct property and 6% in listed property. This compares to the evenly split 5% direct property and 5% listed property allocation in the original industry fund Strategic portfolio. The results substantiate the findings from recent studies (CFS 2008; De Francesco and Hartigan 2009; Newell and Razali 2009) that anticipate higher allocation 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 property. Reddy (2012) in a recent survey of leading Australian fund managers and asset consultants found that the push towards direct property reflects the need for funds to achieve greater portfolio stability, deliver sound risk-adjusted return performance and have more control over how they invest in property. The evolution of indirect property investment vehicles such as unlisted property funds and property syndicates offer fund managers effective direct property exposure options. In addition, these investments are generally designed to meet fund specific liquidity and investment requirements and are effective portfolio diversification options within both strategic and dynamic investment approaches.

RESEARCH IMPLICATIONS

The research has important implications for both the practical and academic fields. Literature on superannuation fund performance utilising DAA investment strategies and the related property allocation components is lacking in Australia. Previous studies (Gallagher 2001; Faff et al 2005) have generally focused on the TAA strategy and mainly investigated the role of equities, fixed income securities and cash within the portfolio construction process.

In contrast, this research provides significant insight on the DAA investment approach with an important focus on property asset allocation. In addition, earlier studies such as Brinson, Singer and Beebower (1986, 1991) and Ibbotson and Kaplan (2000) found that active investment decisions did little on average to improve pension fund performance. Gallagher (2001) and Faff et al (2005) also found that SAA strategies adopted by the Australian superannuation funds represent the single most important determinant of portfolio returns.

However, this research provides empirical evidence that active investment strategies, such as DAA, can offer fund managers more stable and improved risk-adjusted return investment portfolios compared to the industry superannuation fund conventional SAA investment approach. The results are comparable to international studies, such as Vliet and Blitz (2011), which show that dynamic investment strategies provide stabilised risk and enhanced expected return compared to the strategic investment approach.

CONCLUSIONS

This research compares the performance of the Australian industry superannuation fund conventional strategic investment approach with two dynamic asset allocation strategies alongside investigating the role of property in the associated investment models. The analysis is undertaken over a 17 year timeframe (1995 to 2011) using ex-post quarterly total return asset benchmark data.

In evaluating the different asset allocation models, in many instances property allocation was found to be under allocated on a return optimisation basis. The dynamic asset allocation models recommend an average increase to industry superannuation fund property allocation in the 15-28%

range. This compares to the industry fund current 10% property allocation. This increased allocation to property is supported by the improved risk-adjusted return profile of the rebalanced industry fund strategic portfolio. The risk-adjusted return for the industry fund original Strategic investment portfolio was 0.14, compared to the Dynamic – No Constraints strategy (0.29) and the Dynamic – Weight Constrained model (0.15).

The continued reeling effects of the recent GFC mean that investment markets have remained unpredictable. Therefore, using dynamic asset allocation strategy would effectively allow fund managers to protect against market extremes and achieve an improved portfolio risk-adjusted return profile. In the context of property, the dynamic strategy's medium term timeframe favours investment in both direct and listed property assets. Furthermore, 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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Email contact: **wejendra.reddy@rmit.edu.au**