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Asset Allocation Policy, Returns and Expenses of Superannuation Funds: Recent Evidence Based on Default Options

Abstract:

We examine the asset allocation, returns, and expenses of superannuation funds whose assets are mainly invested in default investment options between 2004 and 2012. A majority of these funds fail to earn returns commensurate with their strategic asset allocation policy. It appears that much of the variation of returns between the funds might be a result of their engaging in significant active management of assets. Our results indicate that returns from active management are negatively related to expenses. We also find strong evidence of economies of scale existing in these superannuation funds across different size categories.

Keywords:

Superannuation funds, asset allocation, fund performance, returns, expenses, active management, economies of scale

1. Introduction

The level of public scrutiny of the performance of superannuation funds has intensified in recent times. The erosion of superannuation account balances of fund members and retirees (with account based pensions) in the aftermath of Global Financial Crisis (GFC) has renewed the debate over whether superannuation funds are serving their constituents well. By analysing the Australian Prudential Regulation Authority (APRA) statistics in 2010, the Australian Broadcasting Corporation (ABC) reported that the annually compounded net return of superannuation funds between 1997 and 2009 was only 3.04%, which was barely ahead of an inflation rate of 2.8% and much lower than the 4.5% average return offered by bank term deposits during this period (Long 2010). The report argued that the system-wide poor returns could not be attributed to share market downturns (as the Australian share market returned 6.6% during the same period) but were mainly driven by very high fees and expenses charged by some funds.

The issue of higher expenses dragging down members' returns was a focal point of the Cooper Review of Australian Superannuation System, which submitted its recommendations to the Commonwealth Government in 2010. It is well known that majority of members accept the default option nominated by the trustees of their funds.[1] The Cooper Review has recommended that the default option be designed as a cost-effective product called MySuper that would include a range of regulatory requirements to ensure trustee accountability in terms of pursuit of members' best interest and the containment of fees and expenses (Cooper 2010)

[1] In Australia, as of June 2012, nearly half of all superannuation assets were invested in default investment options (APRA 2013a). If we exclude retail funds, nearly two-thirds of all superannuation assets were invested in default investment options. But this phenomenon is not uniquely Australian. For example, in the US, Choi, Laibson, Madrian, and Metrick (2003) found that 80% of assets of retirement plans in their study are invested in default options. The evidence on default options is similar in countries like UK (Bridgeland 2002) and Sweden (Cronqvist and Thaler 2004).

In this paper, we examine the asset allocation, returns and expenses of Australian superannuation funds during the period 2004-2012 with respect to their default investment options. Basu and Drew (2010) observe significant variation between default investment options in terms of their asset allocation strategies. We seek to analyse that to what extent could the variation in returns of default options be attributed to the asset allocation strategies selected by the trustees. To our knowledge, this is the first study to investigate the role of asset allocation in explaining the cross-sectional variation in returns of superannuation funds.

Next, we explore the relationship between superannuation fund returns and expenses. Apart from looking at total returns, we isolate the returns attributable to active management only and investigate how it relates to fund expenses. This is an important contribution since the question of whether higher expenses, commonly associated with active management, lead to higher returns has not been studied before in the context of Australian superannuation funds.

Finally, we examine factors like fund size that could be responsible for the variation in expense ratios of individual funds. The evidence on economies of scale in superannuation funds is divided. Moreover, the research on this topic is quite dated since the last study with a large sample of funds (Coleman, Esho, and Wong 2006) examined data that is now almost a decade old. Recently Sy (2010) looks into the issue of economies of scale but his sample consists of small APRA funds only. Our study updates the literature on existence of cost efficiencies by analysing data between July 2003 and June 2012.

Prior to this paper, Ellis, Tobin, and Tracey (2008) attempt to investigate investment performance, asset allocation and expenses of superannuation funds. Besides presenting more recent evidence, our work differs from their study in a number of ways.

First, the sample in Ellis et al. (2008) consists only of funds that survived till 2006, which exposes their results to survivorship bias.[2] Our study is free from such survivorship issues and therefore, the results are more indicative of actual performance. Second, whilst Ellis et al. (2008) focus on differences in asset allocation between funds based on their trustee types, we explore that to what extent does asset allocation drive the cross-sectional variation in individual fund returns. Accordingly, we not only rely on descriptive analysis of benchmark returns but also employ cross-sectional regression of individual fund returns against benchmark returns. Third, Ellis et al. (2008) mainly provides a comparative snapshot of expenses across different fund types and fee categories. In contrast, our research goes far beyond a descriptive analysis of fund expenses in the APRA dataset. We investigate the relationship between expenses and returns from active management to establish whether the latter activity adds any value to the members' returns.

The remainder of the paper proceeds as follows. Section 2 briefly reviews the literature on the relationship between asset allocation and returns and that between returns and expenses. Section 3 describes the data used in this study. Section 4 reports the results of our analysis and section 5 concludes.

2. Literature Review

2.1 Asset Allocation and Returns

In their seminal 1986 study, Brinson, Hood, and Beebower (hereafter BHB) analyse the performance of 91 corporate pension plans in the United States between 1974 and 1983 and report that the variability of a fund's return over time could be mainly attributed to its investment policy or strategic asset allocation decision. They find that the asset allocation policy explains, on average, 93.6% of the variation in total returns of these plans over the

[2] Survivorship bias is acknowledged as a serious issue in empirical finance that can potentially lead to spurious conclusions (see, Brown, Goetzmann, Ibbotson, and Ross, 1992)

sample period. Later studies like Brinson, Singer and Beebower (1991) and Blake, Lehmann and Timmermann (1999) reach similar conclusions about the dominant role of asset allocation policy.[3]

One problem with the BHB study is that it does not examine that to what extent does asset allocation influence the return variation between pension funds. By its very design, their study is meant to explain the return variability of a fund over time rather than explaining the variation of returns in the cross-section of pension funds.[4] Since our primary interest in this paper is to explain return differences between individual superannuation funds, it is pertinent to look at studies that review this aspect. Among them, Tokat, Wicas and Kinniry (2006) use a sample of US mutual fund returns from 1966 to 2003 to conduct both time-series and cross-sectional regressions. Their results show that the asset allocation explains 82% of a fund's return variation over time (which is consistent with the conclusion made by BHB on the high explanatory power of asset allocation) but only 19% of the cross-sectional variation in fund returns. Ibbotson and Kaplan (2000) conduct a similar analysis with US balanced funds' data from 1988 to 1998. They find that whilst asset allocation explains 93.6% of the variation of returns of a fund over time, it only explains 40% of the return variation between individual funds. Other studies like Vardharaj and Fabozzi (2007) and Xiong, Ibbotson, Idzorek and Chen (2010) find that asset allocation policy and active management are almost equally important in explaining return variation between funds.

In Australia, there has been little research done on the role of asset allocation in explaining return differences between superannuation funds. Sy (2010) attempts to assess

[3] Despite the acknowledgement of the paramount importance of strategic asset allocation, there is disagreement about the true extent of its dominance in explaining variation of returns. For example, see Hensel, Ezra, and Ilkiw (1991) and Jahnke (1997).

[4] Jahnke regards this to be the crux of the debate. He suggests a cross-sectional regression of actual annual or cumulative returns against benchmark or policy returns, in which the comparative investment outcome is better represented.

the degree to which asset allocation explains the difference in investment returns between small APRA funds and other funds. The results indicate that out of an average return differential of 2.2% between the two groups, 0.9% can be attributed to asset allocation decision. Our study is the first to examine the extent to which asset allocation explains the variation in the cross-section of fund returns.

2.2. Returns and Expenses

Expenses refer to the fees and costs incurred by a fund for the general operation and management of assets. The relationship between expenses and performance is clearly of concern to investors. Ippolito and Turner (1987) examine the effect of fees and turnover on performance separately. They do not find any statistically significant relationship in either case suggesting that there is no adverse impact of turnover or fees on performance. Droms and Walker (1996) investigate the performance of mutual funds over a 20-year period and find a positive relationship between returns and expenses, which implies that the incurring higher expenses in anticipation of higher returns is justified. However, Carhart (1997) finds contradictory evidence to show that the returns of US mutual funds decrease by 154 basis points for every 100 basis point increase in their expense ratios.

In Australia, Drew (2003) investigates the issue of fees and performance. He finds the existence of a negative relationship between management fees and risk-adjusted returns with retail superannuation funds underperforming ASX 100 and ASX 200 accumulation indices by 50 and 93 basis points respectively. Coleman, Esho and Wong (2006) analyse the relationship between returns, volatility and expenses. They find that higher fees charged by investment managers do not necessarily translate into higher returns. For example, retail funds are found to have the lowest returns but the highest expense ratio of 1.70%. They also find that industry funds have a higher expense ratio of

1.39% compared to the corporate and public sector funds with expense ratios of 0.87% and 0.82% respectively.

Whilst the above studies provide important insight into the relationship between returns and expenses of superannuation funds, none of them examines how expenses are related to returns from active management. This lack of scrutiny is surprising given the common perception of higher expenses resulting from greater active portfolio management. Therefore, in addition to updating the literature on relationship between total returns and expenses, we specifically examine the relationship between returns from active management and expenses.

2.3. Economies of Scale

In pension plans, economies of scale exist when the costs within a plan increase less than proportionally with increase in fund size, as fixed costs can be spread over a larger asset or member base. Mitchell and Andrews (1981) find significant evidence of scale economies in US pension plans with costs increasing by 0.5% and 0.3% for every 1% increase in participants and assets respectively. Supportive evidence is provided by Latzko (1999), who finds that mutual fund expenses increase by less than the proportional increase in fund assets. Furthermore, by computing an average cost curve, he shows that the scale economies begin to diminish when fund assets exceed $3.5 billion.

In Australia, Malhotra, Marisetty and Ariff (2001) find no evidence of existence of scale economies in superannuation funds as a whole. However, they do report some evidence of scale economies among smaller funds in their sample. In contrast, Bateman and Mitchell (2004) find an increase of 0.4% (and 0.5%) in administrative expenses for every 1% change in participants (and assets) implying existence of scale economies.[5] Their results also suggest that expenses in defined benefit (DB) plans are about one-third higher than that of defined contribution (DC) plans.[6] This result is in contrast to that of an earlier US study by Klumpes and McCrae (1999) who find that expenses are greater for DC plans (0.82% of total assets) than that for DB plans (0.39% of total assets).[7] Coleman, Esho and Wong (2003) report economies of scale within Australian superannuation funds between 1995 and 2002. Among fund types, they observe greater cost reductions in corporate and public sector funds. However, the same authors find the evidence on economies of scale to be weaker in a later study when they exclude the smaller funds (with assets of less than $60 million) from their sample (Coleman, Esho and Wong 2006). Finally, Sy (2010) finds evidence of economies of scale among small APRA funds and suggests a cost efficiency threshold of $200,000.

The findings on economies of scale among Australian superannuation funds so far has been inconclusive with some studies indicating it to be insignificant or weak, but others finding strong evidence of its existence. Moreover, with the exception of Sy (2010), all of the above studies examine data from the 1990s. Our study updates the research evidence by analysing recent data and therefore, is more relevant to the current debate on cost efficiencies of superannuation funds.

3. Data

The primary source of superannuation fund data is APRA. The data set used is sourced from the 2012 Superannuation Fund Level Profiles and Financial Performance publication, which has data for all APRA regulated superannuation funds with more than

[5] The authors use a dataset where administrative expenses are reported under a heading ‘all expenses of an administrative and investment management nature’. They do not rule out the possibility of underestimation of investment expenses as a result of this categorisation.
[6] This is conjectured to be due to the higher costs associated with hiring actuaries and paying out retirement benefits in which the risk of the fund not meeting the required return is taken on by the sponsor.
[7] The authors attributed the lower cost of DB plans to greater cohesion of interest between employers and employees over that of financial intermediaries and members.

four members. The publication, however, excludes data from pooled superannuation trusts (PSTs) as their assets are captured in other superannuation funds, exempt public sector superannuation schemes (EPSSS), funds that wound up during a given reporting period and funds that did not submit an annual return.[8]

According to APRA, the rate of return (ROR) represents the combined earnings on all invested assets across all its investment options. The ROR would only be a reasonable representation of earnings from assets invested in the default option if the fund has just a few investment options and a large proportion of assets are invested in the default option. In other words, to analyse the performance of the default option, it would be inappropriate to consider funds whose assets are spread across a variety of investment options, as their reported returns to APRA reflect the combined performance of all the investment options and not just that of the default option.[9] Therefore, we only include in our sample those funds that invest at least 95% of members' assets in the fund's default option. To reduce the potential effect of survivorship bias, all funds that meet the specified criteria are included in the sample regardless of whether they exist (or have data available) over the entire sample period.[10] As a result, the number of funds in our sample varies from year to year.

The number of funds comprising our sample and their total assets under management for each of the 9 years in our sample period is shown in Table 1. There is a decline in the absolute number of funds that qualify for our sample over time, which shows that there has been a shift of members' assets from default options to other

[8] A pooled superannuation trust is a unit trust which pools together assets of different superannuation funds and other approved deposit funds.
[9] For each fund, the APRA data provides the asset allocation profile of the default option only.
[10] Survivorship bias refers to funds that have existed over the entire sample period. This focus may lead to greater skewness or false conclusions, as funds that have discontinued their operations will be excluded from studies, and hence the sample will only represent funds that have been successful enough to survive the relevant period.

investment options in recent years. However, as a percentage of all funds reporting to APRA, the number of funds in our sample remains relatively steady over time.

Apart from ROR, the APRA publication also provides data on benefit structure, expenses, membership size, number of investment options, and the assets of the reporting superannuation funds. Table 2 displays summary statistics for these variables. Corporate funds are sponsored by the employer or pool of related employers. Investment within these funds is restricted to the employees of such organisations. Similarly, public sector funds are sponsored by the relevant government authority whose membership belongs to government employees. Both these types of funds operate on a 'not for profit' basis. Industry funds also operate on a 'not for profit' basis but they are sponsored by a group of companies or associations within a common industry, like hospitality or education. Whilst their membership is mainly comprised of those who are employed within the respective industry, many of these funds are now accessible to the general public. Coleman, Esho and Wong (2006) report that the 'not for profit' funds commonly charge lower fees and have a requirement of a 50% member representation on the board of trustees. The 'for profit' sector consists of retail funds, which are managed by commercial entities (mainly financial institutions) and open for membership to the general public. Since minimal amount of data is available for public sector funds within the APRA publication, we report these under corporate funds in this paper, wherever analysis is undertaken by fund types.[11] As the numbers indicate, superannuation funds in Australia are predominantly of accumulation or DC type with very few funds offering DB plans to their members.[12]

3.1 Returns and Expenses

[11] This is consistent with Coleman, Esho and Wong (2006) who assert that corporate and public sectors funds operate in similar manners.

[12] The funds reported as belonging to the hybrid benefit structure in the APRA data are treated as DB plans within our sample.

We use gross returns of the funds instead of net returns as the former has a more direct relationship with the asset allocation policy decision of the sponsors. Asset allocation benchmark returns are reported gross of fees and expenses. Moreover, since part of the analysis investigates the relationship between expenses and returns, using gross returns allows for ease of interpretation. Active returns are calculated by taking the difference between gross ROR and asset allocation benchmark return. The expenses shown in the APRA publication represent all investment and operating expenses reported by superannuation funds. In this respect, we differ from Malhotra, Marisetty, and Ariff (2001) who use only operating expenses or Bateman and Mitchell (2004) who consider only administrative and investment expenses, where administrative expenses are a part of total operating expenses.

3.2 Asset Allocation

Asset allocation data is provided in terms of apportionment of funds between 7 distinct asset classes – Australian equities, international equities, Australian bonds, international bonds, listed property, unlisted property, and cash—as well as a separate category termed 'other assets'. While details of the 'other assets' category is not reported in the APRA publication, it is said to include assets in alternative investments such as hedge funds and those not included in the standard asset categories. Following Basu and Drew (2010) we apportion the 'other assets' allocation across all risky assets—shares, property and bonds.[13]

3.3 Investment options

The number of investment options refers to the number of predetermined asset allocation choices in which members have the option to invest. APRA advises that the ROR would

[13] The BHB study as well as other papers like Arshanapalli, Coggin and Nelson (2001) allocate 'other assets' across all asset categories, including cash, on a pro-rata basis. Basu and Drew (2010) does not allocate to cash, as they consider the *other* category represents a risk-return profile that would normally not be associated with cash.

be a reasonable representation of fund earnings where a fund has only a few investment options and a large amount of assets are invested in the default option. To ensure that the ROR is a reasonable representation of the returns from the default option, we exclude funds with more than 50 investment options from the data set. On average, this filtering results in a sample where at least 95% of funds offer no more than 10 investment options.

3.4 Index Returns

To determine how much of the variation in fund returns is explained by asset allocation, a benchmark for the latter needs to be identified and its return calculated. We select an appropriate benchmark index for each asset class as outlined in Table 3. Asset allocation benchmark return is calculated as the sum of weights allocated to the different asset classes within a fund multiplied by the return on the corresponding asset market index.

4. Results

Table 4 reports the descriptive statistics of fund returns and expenses. Both at aggregate level and by fund type, the average ROR is consistently less than the average benchmark return across the sample period. This result suggests that funds generally find it difficult to outperform the benchmark indices of the different asset markets they invest in. With respect to returns and expenses, no apparent relationship is observed at an aggregate or at the fund type level. Retail funds, on average, are found to have higher expense ratios and lower returns, while corporate (and public sector) and industry funds show relatively higher returns with lower expense ratios.

The higher average returns for the ‘not for profit’ funds is consistent with Ellis et al. (2008), although their study finds the expenses to be higher for industry funds than that for retail funds. In general, higher fees or expense ratios are attributed to greater fund manager expertise, more number of investment options, better customer service, marketing, and greater degree of investment management (Carhart 1997; Coleman et al.

2003). If higher expenses are incurred in employing greater expertise in fund management, it would be reasonable for members to expect superior performance. However, the descriptive statistics by different fund types illustrate that higher expenses do not necessarily correspond to higher returns.

The results should be interpreted with some caution, as they are dependent on the quality of the data reported to APRA. Ellis et al. (2008) point out that the reported returns are likely to have embedded expenses and taxes, especially for retail funds. Moreover, according to APRA, the expense data are generally understated by funds due to various reasons including some funds not being able to provide necessary information about entry and exit fees.

4.1 Asset Allocation Policy and Fund Returns

Table 5 reports the proportion of funds in our sample that have produced higher returns than that of their respective benchmarks in each year. Overall, individual superannuation funds appear to be struggling to match the asset allocation benchmark return. On average, only 35% of funds are able to produce returns that are greater than their respective asset allocation benchmark returns over the sample period. In 2008, only 17% of funds record outperformance. This period coincides with the serious downturn in the Australian and international equity markets due to the GFC. The following year, when the equity markets rebound, the proportion of outperformers increase to 51%.

Similar results are reported across different fund types. In terms of outperforming the benchmark portfolio, corporate funds appear to have a superior performance relative to both industry and retail funds with higher proportion of funds reporting returns greater than the asset allocation benchmark return in most years. The better showing may be partly due to the alignment of interests between the board and the funds members in corporate and public sector funds due to high member representation in boards. Many of these funds have an employer contribution rate that is well in excess of the mandatory 9% rate and hence there may be greater emphasis on performance.

Our results are consistent with Ippolito and Turner (1987) who find high levels of underperformance amongst US pension plans. In Australia, Drew (2003) provides evidence of retail funds underperforming the benchmark by a significant margin on a risk-adjusted basis. This finding is confirmed by Bateman and Thorp (2007) who show that funds generally do worse in comparison to a benchmark portfolio of asset class indices. Ellis et al. (2008) examines the impact of choice of 'other assets' benchmark on the performance results. While average gross returns of all fund types except retail outperform the asset allocation benchmark return when cash rate is used as the 'other assets' benchmark, using Australian share index to proxy 'other assets' results in underperformance by all fund types except public sector. Given our treatment of 'other assets' as explained in 3.2, the results appear to be consistent with their findings.[14]

Next, we analyse the important question of how much of the variation in returns between superannuation funds in our sample is explained by their respective asset allocation policies. Ibbotson and Kaplan (2000) attempt to explain cross-sectional variation in fund returns among US pension funds by employing OLS regression. We similarly estimate the relationship between the ROR of individual funds and their asset allocation benchmark return *(BR)*

$$\text{ROR} = \alpha_0 + \beta_1 \text{BR} + \varepsilon \qquad (1)$$

Table 6 outlines the r-square values for each regression from 2004 to 2012, representing the variation in returns that is explained by asset allocation policy. The regressions are performed both at the aggregate level and by fund types. The average r-square at the aggregate level suggests that only 36% of the variation in returns among

[14] The embedded expenses in the reported return data, as suggested in Ellis et al (2008), can explain part of the underperformance, especially for retail funds.

funds is explained by the difference in their strategic asset allocation. This result implies that funds engage in a considerable degree of active management, which could explain the remaining variation. This finding is consistent with the studies by Ibbotston and Kaplan (2000), Vardharaj and Fabozzi (2007) and Xiong, Ibbotson, Idzorek and Chen (2010), all of whom reported r-squares around 40%.

The above results demonstrate that the strategic asset allocation, whilst important, does not explain cross-sectional variation in returns among individual funds as well as it does for the temporal variation in returns. In the cross-section, the variation of returns between funds is significantly influenced by their active management of assets. To evaluate this relationship further, we perform separate regressions for corporate, industry, and retail funds. The average r-square estimates are 31%, 35% and 44% for these fund types respectively. The larger r-square value for retail funds seem to suggest that active management does not play as large a role in explaining actual returns of these funds in comparison to industry and corporate funds. It is a commonly held perception that that higher fees charged by some funds is a result of active portfolio management to deliver superior returns. Given the higher fees charged by retail funds, it comes as a surprise that a relatively smaller proportion of variation of returns in these funds could be explained by active management.

4.2. Returns and Expenses

The fees and expenses used to assess the relationship with returns aggregate all investment and operating expenses and expressed as a percentage of average assets. We initially examine the relationship between total returns and expenses. Next we turn to the relationship between active returns and expenses. Active returns are the returns made in excess of the asset allocation benchmark return and calculated by taking the difference between ROR and BR. Estimating this relationship directly provides important insight into the true impact of active management on members' account balance.

Both regressions are performed at the aggregate level and also by fund types. Our data spreads both in time series and cross-sectional dimensions. Pooling the data allows for dynamic comparison of the different funds over the entire sample period by simultaneously capturing the variation through time and cross-section. We regress gross returns as well as active returns against the expense ratio as follows.

$$ROR_{i,t}(or\ AR_{i,t}) = \alpha_0 + \beta_{it}ER_{it} + e_{it} \quad (2)$$

where $AR_{i,t}$ and ER_{it} are the active return and expense ratio of fund *i* in year *t* respectively. Using ordinary least squares (OLS) method to estimate the relationship in a pooled dataset could be essentially problematic due to possible serial correlation, contemporaneous correlation, and heteroskedasticity (Stimson 1985; Hicks 1994). We employ generalised least squares (GLS) regression to allow for possible unequal error variances and correlation between different errors. The results are reported in table 7.

At an aggregate level, fund returns have significantly negative relationship with expenses. Returns decrease by 0.1% for every 1% increase in expense ratio. For corporate funds, the relationship between the returns and expense ratio is not significant whilst industry funds show a weakly significant negative relationship. For the retail funds, there is a 0.74% decline in returns for every 1% increase in expense ratio. This difference between 'not for profit' and retail funds needs to be interpreted with caution. Ellis et al. (2008) points out that the apparent underperformance of retail funds is mainly a result of many of these funds reporting gross returns with embedded expenses and taxes rather than poor investment management skills.

Similar to our results for total returns, expenses seem to have a negative relationship with active returns. At an aggregate level, for every 1% increase in expense ratio, active returns decrease by 0.28%. Similar to the previous investigation between total return and expense ratio, retail funds exhibit a negative relationship between active returns and expense ratio. Industry funds show a positive coefficient for expense ratio although it lacks statistical significance. The negative coefficient for retail funds (nearly 70 basis points) has high significance. Active management is commonly stated as an important contributor of returns in retail funds. Our results suggest that, for these funds, the higher expenses associated with active portfolio management could not be justified by any claim of superior returns.

We also conduct regressions of returns against expense ratios for different fund types year by year over the sample period. Although the results are not presented here due to paucity of space, we find the expense ratio coefficients to be positive on a number of occasions. However, in 2008 and 2009, all fund types show negative coefficients. This seems to indicate that active management have hurt investors more during the volatile market conditions prevailing in those two years. Nevertheless, superannuation funds at an aggregate level do exhibit a statistically significant negative relationship between active returns and expenses, suggesting that the higher fees paid have actually resulted in a drag for active returns during the sample period.

4.3 Economies of Scale

To estimate scale economies, a translog cost function is commonly used (Latzko 1999). In this study, we manipulate this standard model following Bateman and Mitchell (2004), which allows economies of scale to vary with the level of assets, as identified by a multi-product cost function in the following equation.

$$\ln(e_t) = \alpha_0 + \beta_1 \ln(a_t) + \beta_2 \ln(p_t) + \beta_3 \Sigma X + \varepsilon_t \qquad (4)$$

where e_t = total expenses (total investment and total operating expenses)

a_t = total assets

p_t = total number of members

X = sum of additional explanatory variables.

We test whether total assets and total number of members enrolled has any significant effect on the plan's cost efficiency (or lack of it) by testing the hypothesis $\beta_1 \neq 0$ and $\beta_2 \neq 0$. If any of the individual hypotheses $\beta_1 = 0$ and $\beta_2 = 0$ are rejected, then we would expect the β_1 and β_2 coefficients exhibit values of less than 1 for scale economies to exist, suggesting that a 1% increase in assets (or members) will increase expenses at a rate of less than 1%.

We measure the additional impact of plan type, fund type and the number of investment options available, represented by the *X* variable. To illustrate the effect of plan type (*DB or DC* plans,) fund type (corporate/public, industry, or retail funds), and number of options available to investors, we conduct the following regression.[15]

$$\ln(e_t) = \alpha_0 + \beta_1 \ln(a_t) + \beta_2 \ln(p_t) + \beta_3 P + \beta_4 C + \beta_5 I + \beta_6 O + \varepsilon_t \qquad (5)$$

where P = dummy variable equal to 1 if DB plan type, 0 otherwise

C = dummy variable equal to 1 if corporate funds, 0 otherwise

I = dummy variable equal to 1 if industry fund, 0 otherwise

O = number of investment options.

DC plans and retail funds are used as reference categories to interpret the coefficients of the relevant dummy variables.[16]

The results of the GLS regression are reported in Table 8. After controlling for the plan and fund types as well as the number of options, for every 1% increase in assets, there is 0.47% increase in expenses. Similarly, for every 1% increase in members,

[15] We combine hybrid plans with DB plans as in Bateman and Mitchell (2004)

[16] One potential concern could be about not including the interaction effects of the plan and sponsor type variables among themselves and with other variables. Bateman and Mitchell (2004) include the interaction variables as an extension of the regression model similar to ours and find most of these to be statistically insignificant.

expenses rise by 0.35%. Both coefficients are statistically significant at 1% level and provide convincing evidence for existence of scale economies in superannuation funds. This result is consistent with previous Australian studies by Bateman and Mitchell (2004) and Coleman, Esho and Wong (2003) reporting scale economies. Bateman and Mitchell (2004) find that expenses increase 0.50% and 0.40% respectively for every 1% increase in assets and participants.[17] These are slightly higher than our estimates.

As regards plan types, DB plans exhibit lower expenses than DC plans for every year of our sample period. Our results show that expenses for DB plans have been 45% lower than DC plans on average, after controlling for fund type, assets, and size of membership. This result is in contrast to Ippolito and Turner (1987) who suggest DB plans have higher costs due to their establishment and management expenses. As such, the higher costs in DC plans can partially be attributed to the maintenance of an extensive member base and a potential lack of cost efficiencies relative to those of DB plans. However, one has to be mindful that in our sample the vast majority of plans are DC plans, with DB plans not being more than 30% of the sample in any particular year.

The coefficients of the fund type variables differ between corporate and industry funds. While expenses for the corporate funds are not significantly different from that of the retail funds, the industry funds show significantly higher expenses.[18] The results show that, *ceteris parabus*, industry funds have nearly 41% higher expenses compared to the retail funds. This result seems to indicate that, contrary to popular perception, all ‘not for profit’ funds may not necessarily have fewer expenses relative to the ‘for profit’ funds.

[17] Malhotra, Marisetty and Ariff (2001), however, find no significant evidence of economies of scale on small funds.
[18] In our year-wise analysis, corporate funds had negative coefficients in 4 out of 6 years whereas industry funds exhibit positive coefficients in every year.

It is expected that for every additional investment option, costs would increase to administer the increased selections available to members. Our results show that expenses do increase by 3% for every additional investment option over sample period.

Past research has shown varying cost efficiencies across different size categories. Coleman, Esho and Wong (2006) report average expense ratio increasing for the medium and large-sized funds relative to small-sized funds. On a different classification of scale, Malhotra, Marisetty and Ariff (2001) find evidence of economies of scale in funds with assets greater than $30 million. To further assess whether scale economies vary with fund size, we estimate cost functions across different asset size categories. Figure 1 shows the results. All asset size categories display economies of scale, with the exception of $50-100 million category in which the asset coefficient is 1.07. The greatest scale benefit of asset size is observed among funds in the $100-500 million category closely followed by funds in the 'less than $50 million' category. Interestingly, the latter category of funds exhibits the greatest scale benefit in terms of number of members. On an average, scale benefit of asset size reduces significantly for funds with size of more than $500 million.

5. Conclusion

This paper investigates returns and expenses of Australian superannuation funds between 2004 and 2012. Our results suggest that almost two in three superannuation funds fail to match the asset allocation benchmark returns of their default options even before considering any expense. The return variation between the default options of superannuation funds is explained only partially by the strategic asset allocations chosen by the trustees that suggests that the funds engage in considerable active portfolio management. It appears that the result of such active management is detrimental to investors in more than one way. While fund returns fail to match passive market index returns at the gross level, higher expenses incurred on account of active management certainly lower net returns. We find evidence of negative relationship between expenses and returns, and more importantly between expenses and active returns. For the latter, the negative relationship is more pronounced during the more volatile market periods.

Our result indicates scale economies do exist in the Australian superannuation fund industry. Unlike Coleman, Esho and Wong (2006) who find weak evidence of economies of scale, our results have strong statistical significance. In comparison to Bateman and Mitchell (2004), the scale benefits reported in our paper are slightly higher. Also, contrary to their study, we find strong evidence of DB plans having lower expense ratios relative to DC plans.

Our analysis by fund types reveals some interesting findings about retail funds. Surprisingly, we find that the variation of returns between these funds is better explained by their benchmark asset allocation than their industry and corporate counterparts. Also, unlike Bateman and Mitchell (2004) and several other studies, we find expense ratios of retail funds are not significantly different from employer sponsored funds and actually lower than industry funds after controlling for assets, members, and plan type (DB or DC), and number of investment options. However, since we exclusively analyse funds with very high proportion of assets invested in the default option, one needs to exercise caution when comparing with results reported by other researchers.

The evidence presented in this paper leads to two clear policy implications. First, it lends support to the 'low cost default' argument for majority of members who demonstrate little engagement with their superannuation investments. It appears that the default funds would do well to deliver benchmark index returns for their members rather than pursuing active returns. Second, our results suggest that economies of scale is visible in superannuation funds industry and some funds may be bearing too high expenses with fewer members and assets to spread their costs to achieve such cost efficiencies. A rationalisation in the number of default options may be necessary to optimise members' retirement benefits.

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Table 1: Fund Sample

This table presents the number of funds analysed in the sample period 2004-2012 and their combined assets under management.

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number of Funds in the Sample	124	130	91	77	70	49	41	40	48
Total Assets (million $)	47,727	66,399	41,448	45,020	42,518	19,385	35,567	26,387	46,414

Table 2: Descriptive Statistics of Sample

This table presents superannuation fund descriptive statistics across the sample period 2004-2012, where DC are defined contribution plans, DB are defined benefit plans (combined with hybrid plans) and mean number of options are the number of investment options available.

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mean Cost *($'000)*	3,015	3,536	4,748	5,523	6,292	3,851	4,526	6,611	6,799
Mean Assets *($'000)*	346,729	469,371	416,574	530,122	616,566	417,671	1,202,568	626,857	954,037
Minimum Assets *($'000)*	315	51	712	1376	1339	1328	641	538	1635
Maximum Assets *($'000)*	6,021,587	6,893,335	7,996,051	10,563,053	12,368,332	3,740,752	13,211,506	15,823,486	18,067,467
Mean Members *('000)*	47,083	52,851	64,631	73,427	88,510	73,182	99,179	113,620	124,839
DC *(total)*	117	126	88	76	67	47	29	30	37
DB *(total)*	7	4	3	1	3	2	12	10	11
Corporate & Public *(total)*	86	74	46	35	31	18	18	18	16
Industry *(total)*	18	22	16	14	13	8	7	5	5
Retail *(total)*	20	34	29	28	26	23	16	17	27
Mean Number of Options	2	2	3	3	3	3	3	3	3
Total Number of Funds	124	130	91	77	70	49	41	40	48

Table 3: Benchmark Indices

This table presents the indices utilized in the calculation of the asset allocation benchmark return, reported in Australian dollars.

Asset Class	Index
Australian Equities	S&P/ASX 300 Index
International Equities	MSCI World ex AU Index
Property	AMP Capital Core Property Fund
Australian Fixed Interest	UBS Australian Government Index (7-10yr)
International Fixed Interest	Barclays Capital Global Treasury
Cash	UBS Bank Bill Index 0+yr

Table 4: Descriptive Statistics of Returns and Expenses

This table presents the descriptive statistics of fund return and expense ratio across the sample period, at an aggregate and fund-type level, where the fund types are corporate (combined with public), industry and retail. The expense ratio is the sum of investment and operating expenses, divided by average assets. The number of funds represents the number of observations within each individual sample period year.

ALL FUNDS		**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Average**
	Mean Rate of Return (%)	13.56	12.45	13.72	14.94	-6.3	-8.03	4.83	4.02	0.34	5.50
	Mean Asset Allocation Benchmark Return (%)	13.79	14.47	13.02	17.00	-2.63	-7.14	6.75	6.49	0.76	6.95
	Mean Expense Ratio (%)	1.14	1.54	3.78	1.50	1.99	1.61	3.85	3.79	1.6	2.31
	Number of funds	124	130	91	77	70	49	40	41	48	74
FUND TYPES											
Corporate											
& Public	***Mean Rate of Return (%)***	14.19	13.07	15.13	16.20	-7.44	-8.92	6.16	5.42	0.83	6.07
	Mean Asset Allocation Return (%)	14.43	14.83	13.83	18.27	-3.63	-7.15	6.43	6.32	0.4	7.08
	Mean Expense Ratio (%)	1.16	1.38	1.79	1.56	2.03	1.14	4.21	3.49	1.21	2.00
	Number of funds	86	74	45	35	31	18	18	18	16	38
Industry	***Mean Rate of Return (%)***	13.87	14.30	16.04	17.16	-6.77	-12.26	9.82	4.61	0.52	6.37
	Mean Asset Allocation Return (%)	13.83	16.1	15.13	19.57	-2.46	-10.48	7.13	6.34	-0.15	7.22
	Mean Expense Ratio (%)	1.53	1.09	1.17	1.09	1.26	1.09	2.5	1.77	1.43	1.44
	Number of funds	18	22	16	14	13	8	7	5	5	12
Retail	***Mean Rate of Return (%)***	10.6	9.9	11.84	12.27	-4.72	-5.86	6.01	5.92	0.01	5.11
	Mean Asset Allocation Return (%)	11	12.62	10.56	14.12	-1.52	-5.96	6.94	6.73	1.14	6.18
	Mean Expense Ratio (%)	1.86	1.95	2.03	1.8	1.99	2.06	4.05	4.7	1.86	2.48
	Number of funds	20	34	29	28	26	23	16	17	27	24

Table 5: Benchmark Outperformance

This table reports the number of funds outperforming or producing higher returns than the asset allocation benchmark return across the sample period 2004-2012 at an industry and sector level, where the fund types are corporate (combined with public), industry and retail. The number of funds represents the number of observations within each individual sample period year.

			2004	2005	2006	2007	2008	2009	2010	2011	2012	Average
ALL FUNDS												
		Outperformers	51	19	61	16	12	25	20	11	23	26
		Number of Funds	124	130	91	77	70	49	40	41	48	74
		Proportion	41%	15%	67%	21%	17%	51%	50%	27%	48%	36%
FUND TYPES												
	Corporate & Public	***Outperformers***	34	12	35	7	5	8	7	5	9	14
		Number of Funds	86	74	46	35	31	18	18	18	16	38
		Proportion	40%	16%	76%	20%	16%	44%	39%	28%	56%	36%
	Industry	***Outperformers***	8	3	10	2	2	2	6	1	3	4
		Number of Funds	18	22	16	14	13	8	7	5	5	12
		Proportion	44%	14%	63%	14%	15%	25%	86%	20%	60%	34%
	Retail	***Outperformers***	9	4	16	7	5	6	8	5	11	8
		Number of Funds	20	34	29	28	26	23	18	17	27	25
		Proportion	45%	12%	55%	25%	19%	26%	44%	29%	41%	32%

Table 6: Cross-Sectional Variation in Fund Returns

This table reports the estimates for the coefficient of determination (*r-square*) representing to what extent the variation in returns between superannuation funds is explained by the differences in their asset allocation policy. Total returns of individual funds are regressed against their asset allocation benchmark returns. The regression is estimated across the sample period 2004-2012 at aggregate and fund type level, where the fund types are 'Corporate', 'Industry' and 'Retail'. The number of funds appears in parenthesis

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Average**
All Funds	0.4752	0.2325	0.2008	0.6338	0.403	0.2304	0.3823	0.2826	0.3947	0.359
By Fund types										
Corporate	0.2553	0.4039	0.216	0.2507	0.2921	0.086	0.4486	0.1974	0.6167	0.307
Industry	0.4755	0.2943	0.1479	0.3708	0.2167	0	0.6014	0.862	0.186	0.351
Retail	0.6594	0.4054	0.1376	0.8173	0.5028	0.31	0.2914	0.3332	0.5091	0.441

Table 7: Relationship of Expense Ratio with Returns

This table reports the GLS regression results of superannuation funds' total returns and active returns against expense ratios. Active return is the difference between rate of return and asset allocation benchmark return and expense ratio is the sum of investment and operating expenses, divided by average assets. The relationships are estimated across the sample period 2004-2009 at aggregate and fund type level, where the fund types are 'Corporate', 'Industry' and 'Retail'. Values in the parentheses represent standard errors. ***, **, * indicate statistical significance at 1%, 5% and 10% levels, respectively.

	Rate of Returns	***Active Returns***
	Expense Ratio Coefficient	
All funds	-0.102***	-0.282***
	(0.019)	(0.012)
Corporate	-0.049	0.086
	(0.096)	(0.018)
Industry	0.552**	0.630***
	(0.232)	(0.023)
Retail	-0.745***	-0.697***
	(0.093)	(0.019)

Table 8: Economies of Scale

This table reports estimates of a multi-product cost function over the entire sample period of 2004-2009, where the dependent variable is logarithm of expenses, and the independent variables are logarithm of assets, logarithm of members, plan type as represented by a dummy variable (with 'DC plans' as the reference category), fund type as represented by dummy variables for each respective fund type (with 'Retail' as the reference category) and the number of investment options available. Values in the parentheses represent standard errors. ***, **, * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Explanatory variable		*Dependent Variable ln(expenses)*
	Alpha	-1.359***
		(0.285)
Plan Scale	*Assets (ln)*	0.467***
		(0.030)
	Members (ln)	0.345***
		(0.025)
Plan Type	*DB (vs DC)*	-0.454***
		(0.103)
Fund Type	*Corporate*	0.070
		(0.114)
	Industry	0.414***
		(0.117)
	Options	0.032***
		(0.009)

Figure 1: Scale Economies across Asset Size

Figure 1 depicts the estimates of economies of scale across asset sizes, where the log of expenses is regressed against the log of assets and log of members. The x-axis represents the coefficients of the variables and the y-axis represents asset size.