Fund Manager Risk and Return Projections: Are they realistic?

Kevin Davis
Department of Finance
The University of Melbourne
Carlton, Vic 3052
Australia
Kevin.davis@unimelb.edu.au

First Draft: 26 November 2018
This Draft: 30 April 2019

ABSTRACT

Superannuation (Pension) funds in Australia which offer a "MySuper" product are required to produce a "dashboard" which lists, *inter alia,* the long term target return, risk level, and benchmark asset composition of the fund's portfolio. This information provides an opportunity to identify the return forecasts for different asset classes implied by those disclosures and compare them with historical values and estimates of forecasts from alternative sources (such as surveys). The paper also examines whether the mandated form of these disclosures provides consistent information for potential investors.

KEYWORDS: Risk Premiums, Pension Fund Performance, Expectations, Disclosure

JEL Categories: G23, G28

Introduction

There is always debate about what future rates of return should be expected on different classes of assets. Most prominent among these debates is that regarding the size of the expected market risk premium – the return on risky assets (generally proxied by equities) in excess of the risk free rate. But also of interest are the differences between expected returns on asset classes (and implied relative risk, or liquidity, premiums) such as infrastructure, property, domestic or foreign equities, or fixed interest.

Investment manager expectations of future returns and risk are clearly important. More accurate forecasts can improve outcomes for the investors whose wealth they manage. And, as is well known, past performance is not necessarily a good guide to future performance. It would thus be useful to gain direct evidence on how views of future asset return distributions are driving fund manager investment decisions, differences between managers, and whether they are realistic and consistent.

One can always survey investment managers to get estimates of expected asset returns. But an alternative is to infer their opinions from what they declare they can achieve for their investor clientele and upon which they are thus effectively staking their reputations. The availability of data on fund manager disclosures of target portfolio return, risk, and asset allocations of “MySuper” superannuation products in Australia provides an opportunity to do this. The Australian Prudential Regulation Authority (APRA) provides such data in its MySuper Quarterly Bulletin, and this paper draws upon that data.

The paper also provides evidence on the informativeness to the public of the specific risk and return metrics mandated for publication by the “MySuper” regulation. The level of financial literacy of retail investors, and their ability to understand and interpret financial information presented in different ways has been an important policy concern, on which experimental results, such as in Bateman, Eckert et al. (2015) is beginning to shed light.

The paper also examines whether the stated willingness of MySuper providers to deviate from their benchmark asset allocations, potentially reflecting a belief in benefits from active management influences their expected portfolio return projections.

The main findings of this study regarding implied expected asset class rates of return are that: (a) the expected (pre-investor-tax) rate of return on domestic (Australian) listed equity (ignoring the value of associated investor tax credits) is not significantly different from than that on foreign equity; (b) the implied forward looking market risk premium (of domestic equity over the risk free rate) is in the order of 4.5 per cent p.a. and; (c) that unlisted equity and infrastructure have expected returns of around 4 per cent higher than domestic listed equity, suggestive of a substantial liquidity premium or higher risk. These returns are in terms of the traditional measure of equity returns (cash dividends plus capital gains), ignoring (ie not “grossing up” for) imputation tax credits resulting from the Australian dividend imputation tax system. It is surprising that expected returns on domestic equity, measured this way, are approximately equal to those on foreign equity given the additional tax benefit of franking credits received by super funds on the former. It could however, reflect an acceptance by fund managers of a view that domestic equity prices are set by integrated global capital markets independent of domestic tax considerations. That issue has been a topic of significant controversy in Australian academic and practitioner debate.

It is shown that the mandated format of risk and return metrics in the fund disclosures does not provide a reliable picture of investment management performance when compared to recalculation of the data in the more commonly used mean – standard deviation framework. This calls into question the merits of the regulation mandating those metrics. But, perhaps surprisingly, an unsophisticated fund member using a ratio of the disclosed measures of return and risk to assess projected risk-adjusted performance would be likely to rank funds similarly to the case where more well-known industry measures (such as a Sharpe ratio) were used.

In Section 1 of the paper the specific research questions addressed are outlined in more detail and contributions to the literature explained. Section 2 provides a description of the data used in the study and the institutional background. Then in Section 3, the metrics disclosed for risk and return are converted into more conventional measures, and the relationship between risk and return and performance measures examined in detail. Section 4 explains how estimates of expectations of asset class expected returns are derived (and potential complications listed), while results from this approach are presented and discussed in Section 5. Section 6 provides some discussion of complications caused to interpretation of the results by the nature of the Australian tax system, and Section 7 concludes with some policy implications and suggestion for future research.

1. Research Questions and Relevant Literature

As noted above, this paper draws on public information disclosed by superannuation fund managers relating to their stated views on future returns and risk arising from their disclosed intended benchmark asset portfolio allocations. Such information would normally only be available from responses to survey questions which face the problems of voluntary (self selection) participation and incomplete response rates and, generally, no public disclosure of participant identities and individual responses. Whether survey responses are an accurate reflection of the values for key variables used in decision making is thus open to question. In contrast, here all fund managers providing the MySuper product are required to publicly disclose such information, and subsequent performance can be benchmarked against the projections.

By extracting fund manager expected returns on various asset classes (equities, cash, fixed interest etc) from the disclosed information, this paper complements the survey based literature which attempts to elicit respondent's views on the forward looking market risk premium. Relevant papers include: Welch (2000), Arnott and Bernstein (2002), Graham and Harvey (2005), Pinto, Robinson et al. (2015), Fernandez, Pershin et al. (2017) . Most such surveys are not specifically focused on the projected returns for other individual asset classes, information about the equity risk premium is generally only one component of the survey, and different groups of respondents (academics, corporate financial officers, fund managers) are often involved.

Moreover, as Greenwood and Shleifer (2014) show, there is considerable variation, indeed a negative correlation, between short term, survey based, expectations and subsequent outcomes for the actual equity risk premium. Koijen, Schmeling et al. (2015) find similar results for other asset returns internationally. Indeed, Martin (2017) argues, drawing on behaviour of his SVIX index[1] as a predictor of expectations, that the short run variability in the market's expected equity risk premium is significant and larger than generally acknowledged. One merit of the data used here is that the implied expectations relate to a longer time horizon (ten years).

Thus the first group of research questions investigated here is how large is the expected equity risk premium implied from the disclosures and how well it aligns to both the historical average and other

[1] Martin's SVIX indicator is the annualised risk-neutral variance of the return on the equity index based on option implied volatilities.

survey results[2], and likewise for the implied expected returns for other asset classes. Several recent studies have examined implied or actual expected returns for other asset classes. Using US Pension Fund disclosures Andonov and Rauh (2018), find evidence that past returns achieved on asset classes by a fund manager are relevant to explaining the manager's current expected returns for those asset classes. Unlike this paper where expected asset class returns must be implied from mandated disclosures, they obtain expected asset class returns directly as required since 2014 by US accounting standards. Ang, Ayala et al. (2014) examine investment behaviour of US Endowment funds to estimate the implied "alphas" on investments in alternative assets (hedge funds, private equity) relative to direct investments in equities and fixed interest.

A second issue warranting investigation, based on this data, is the informativeness and reliability of the specific metrics of risk and return which are required to be presented to potential investors in the MySuper products. It is well known that financial literacy levels are generally low, even in a high-income, developed, economy such as Australia (Lusardi and Mitchell, 2011). It is also well known from the behavioural finance literature that the way in which information is "framed", such as with different presentations of risk and return, can influence individual decision making. Bateman, Eckert et al. (2014), Bateman, Eckert et al. (2015) provide recent Australian evidence on how the framing of investment returns information affects investor behaviour. There is thus interest in identifying whether alternative ways of presenting potential return and risk information, such as discussed in Wallmeier (2011), can be found which assist individuals in their investment choices and whether the mandated format for MySuper disclosures has merit in this regard.

Thus, a second research question is to investigate whether the mandated form of risk - return metrics disclosed provide information about fund manager projections of performance which is consistent with more commonly used metrics used in the finance literature.

A third strand of relevant literature is the debate over whether active fund managers can consistently produce better risk-adjusted returns than passive management. Recent contributions include Pástor, Stambaugh et al. (2015), Cremers, Ferreira et al. (2016). An important aspect of this debate is the extent to which performance is determined by asset allocation policy or stock selection and active management, with important early contributions by Brinson, Singer et al. (1991), Ibbotson and Kaplan (2000) confirming the high importance of asset allocation policy. The data available from the MySuper disclosures enables an (admittedly imperfect) calculation of a "flexibility" indicator which may indicate the extent to which the fund is able or likely to engage in active asset allocation.[3] Assuming that active asset allocation fund managers are of the view that they can generate superior performance relative to a passive strategy, the hypothesis is that those with a higher flexibility indicator would present return and risk projections superior (at least in terms of gross, pre-fee, terms) to those with lower indicators.[4]

2. Data and Summary Statistics

"MySuper" pension (superannuation) funds are accumulation schemes made available by Responsible Superannuation Entities (RSE's) in Australia. They are designed to be low cost products for individuals who are "disengaged' with superannuation. They are default funds for those workers

[2] For Australia, historical information on the equity premium is provided by Brailsford, Handley et al. (2008) and Dimson, Marsh et al. (2009) and survey information by Truong, Partington et al. (2008).
[3] The relevant data in this regard is upper and lower bounds specified for asset allocation percentages.
[4] Data provided on the anticipated level of investment expenses may also provide information on the extent of active stock selection within asset classes, but is not considered here.

who are unable or unwilling to select which fund, among the many funds available offering a range of investment strategies and other features, should receive and manage their compulsory superannuation contributions.[5]

Following the introduction of MySuper default products, providers have been required (under s1017BA of the Corporations Act 2001) since December 2013 to provide information about target returns and risk levels (as well as fees and past performance) in a simple "dashboard" format. The return target is expressed as the "annualised target net return above CPI over ten years", which is the net real return to a representative member with an assumed $50,000 balance after fees charged, and costs (including tax) incurred, by the fund.[6] The level of investment risk is required to be expressed as the "estimated number of negative net investment returns over a 20 year period" (and also expressed in words as being from "very low" to "very high"). While the target return is expressed in real terms, the risk measure is based on nominal returns, after allowing for costs (including taxes) incurred by the fund.[7] The information supplied by MySuper providers on their dashboards is collected and published by APRA, together with other aspects of the funds' investment strategy and costs in its Quarterly MySuper Statistics Bulletin.[8]

The relationship between the disclosed metrics of net real return to the member (r_m) and the (nominal) net investment return (i_n) can be expressed as:

$r_m = i_n – f - \pi$

$i_n = i_g – c - t$

where i_g is the gross investment return, c is investment fees and costs incurred by the fund (per dollar of assets), t is tax paid on investment earnings (per dollar of assets),[9] f is fees charged to the member (per dollar of assets) and π is the inflation rate (measured by the Consumer Price Index). To derive inferences about manager views on gross returns (such as the expected return on the equity market) it is thus necessary to calculate i_g.

Figure 1 provides a snapshot of the raw data reported for March 2018, where there were 76 reporting funds offering non-lifecycle MySuper funds[10]. The investment risk and return target figures are as defined above. Even ignoring one obvious outlier (a very small corporate fund) there is no evidence of a positive relationship, as might be expected, between the return targets and projected investment risk reported. Indeed, even after dropping the outlier fund, a simple regression of target return on investment risk generates a negative slope coefficient (of -0.23) which is statistically

[5] Currently, employers are required to contribute an amount equal to 9.5 per cent of an employee's salary to a nominated superannuation fund. For employees not selecting a specific fund, employers determine which MySuper fund will be chosen. Other individuals can also elect to have their contributions (both compulsory or voluntary) made to a MySuper fund.

[6] At June 2017, there were 15.4 million MySuper member accounts with total balances of $571 billion and the average member account balance was $37,000. (Source: APRA, *Annual MySuper Statistics*, Table 5).

[7] For the subsequent empirical analysis of the relationship between target returns, risk and asset allocation, there is thus a need to convert the target real returns to nominal values and allow for fees and costs.

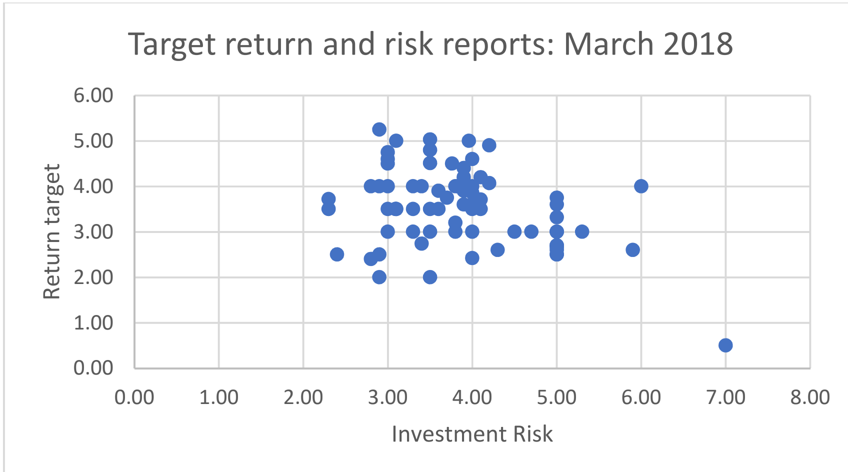
[8] Data is available at http://www.apra.gov.au/Super/Publications/Pages/Quarterly-MySuper-Statistics.aspx and a guide to the collection and reporting requirements and definitions at https://www.apra.gov.au/sites/default/files/20141002_MySuper_selected_feature_overview.pdf

[9] The statutory tax rates for superfunds are 15 per cent on income and 10 per cent for realised capital gains when the member's account is in the accumulation phase. In the retirement (decumulation) phase the tax rate is zero.

[10] Since life-cycle funds adopt different asset allocations related to the member age, they have been excluded from the analysis.

significant at the 5 per cent level, and an $R^2 = 0.06$. In a subsequent section an alternative measure of risk will be derived from the data reported which is more consistent with measures used in financial analysis.

Figure 1: Target Return and Risk Disclosures



There is additional information provided on the dashboards (and in the MySuper Bulletin). Past performance figures (returns to members) are required to be provided, as is information about types of fees charged to members. More relevant for the research questions addressed here is information about benchmark asset allocations of the fund across nine asset categories[11], as well as upper and lower ends of the allocation range for each asset. Table 1 shows the average benchmark allocation across asset classes for the 76 funds. Over 50 per cent of the portfolios are, on average, invested in listed equity, split roughly evenly between domestic and international equities.[12] The "other" category incorporates such things as investments in mortgages, hybrid securities, hedge funds, and receivables.

Table 1: Average Asset Allocations

Asset Class[a]	Average benchmark allocation[b]
Cash (cash)	5.4
Fixed Income (fi)	18.1
Australian listed equity (ae)	26.0
International Listed equity (oe)	26.1
Unlisted equity (ue)	4.9
Property (prop)	9.4
Infrastructure (infra)	6.9
Commodities (comm)	0.6
Other (oth)	10.6

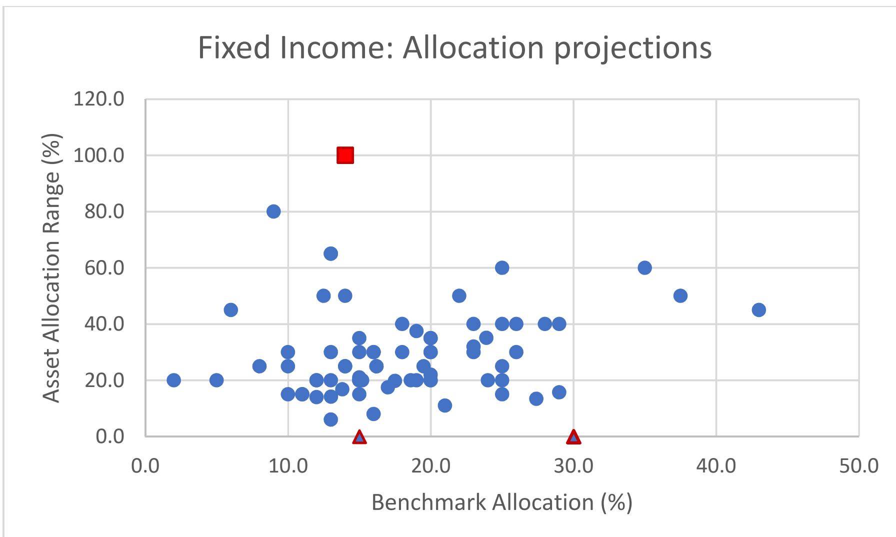
(a) Labels used in subsequent empirical analysis shown in brackets).
(b) The figures for ae, oe and ue are allocations for the 63 funds which provide such information (rather than simply an aggregate figure for all equity (e)). The average of the 15 funds reporting only total equity is 47.5, noticeably below the total of 57 per cent for the other funds reporting the components

[11] 15 of the funds reported only the total for equity investments, rather than a breakdown by domicile or listed/unlisted.

[12] Information is not provided on the extent to which overseas equity holdings are hedged against currency risk. Industry sources advise that a hedge ratio, typically implemented by a currency overlay strategy, in the order of 50 per cent is typical.

Figure 2 provides an example, using the Fixed Income category, of the information provided regarding asset allocation range and benchmark allocation. The horizontal axis shows the benchmark allocation, while the range between upper and lower boundary allocations is shown on the vertical axis. In one case (denoted by a square) the fund manager indicated complete discretion to allocate anywhere between 0 and 100 per cent of the portfolio to fixed income. Two of the fund managers (represented by triangles) did not report information about the range which shows up as a zero value. It is tempting to interpret the range values as indicating the manager's willingness to engage in active rather than passive investment behaviour. However, the ranges do not necessarily indicate the likelihood of allocations varying across the entire range, and may reflect some managers' exercising an option to report less constraining asset ranges, rather than their likely use of that flexibility. Nevertheless, the reported ranges may provide some information on likely degree of active management and will be used for that purpose subsequently.

Figure 2: Fixed Income Asset Allocation Ranges

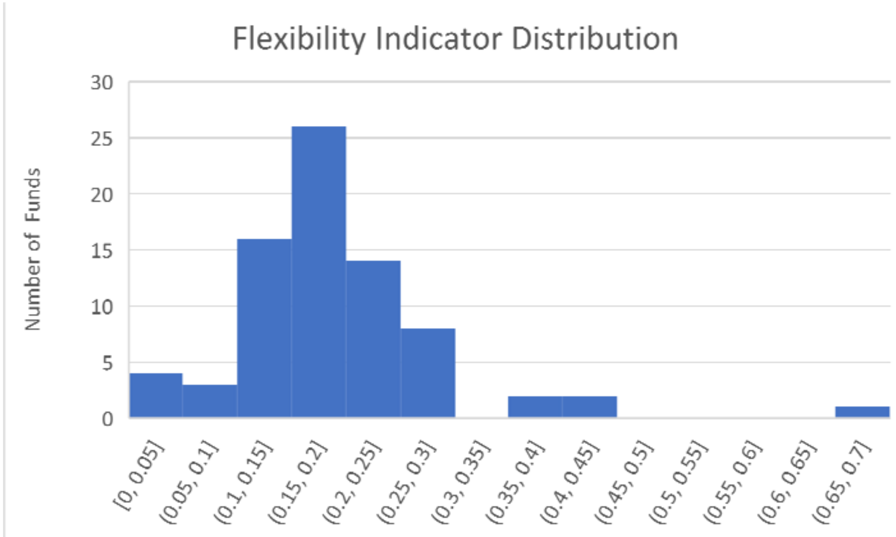


Active Asset Allocation Potential

To identify whether reported target returns and risk may reflect the likely degree of active management by the fund manager, we construct a "Flexibility Indicator" (Flex) using the following approach. For each fund, the specified range of the possible allocation for each of the asset classes is calculated (as the upper end minus the lower end) and these amounts summed. With nine asset classes, the maximum sum is 900 (if for all asset classes the lower end was 0 and the upper end was 100). Where only the total of equity allocation (rather than individual components of ae, oe, ue) was given (by 15 of the 76 funds) the maximum sum is 700. For both groups the FI score is normalised to a range of between 0 and 1, by dividing the sum by 900 or 700 respectively

Figure 3 shows the distribution of the Flexibility indicator. Two of the funds did not provide credible information (both upper and lower bounds set as zero for all assets) and thus will be dropped from the analysis examining the effect of this variable.

Figure 3: Asset Allocation Flexibility Indicator



3. Risk-Return Projections and Projected Performance

The way in which projected returns and risk are presented on the dashboards is meant to be informative to fund members who are not familiar with technical finance concepts. They may not, however, necessarily be good metrics for risk and return analysis. Thus, a first step is to convert that information into a form more conducive to empirical analysis based on finance theory, such as mean and standard deviation terms.

The Probability Distribution of Projected Portfolio Returns

The presentation of target returns takes the form of the target per annum rate of return in excess of the inflation rate[13] (ie a real return) over a ten year horizon, which is denoted by $\bar{r}$. We convert this into an estimate of the average nominal rate of return p.a. (μ) by adding the mean (2.5 per cent) of the Reserve Bank of Australia's target inflation range.[14] Thus $\mu = \bar{r} + 2.5$. To calculate what this implies for the expected gross investment return (pre tax and costs), denoted by "z" it is necessary to add investment and administration costs and taxes paid on investment returns. Thus $z = \mu + f + c + t$. The dashboards provide a statement of expected annual fees and charges (f + c) and this is used.[15] To allow for taxes, the average tax paid (as an annualised number of basis points) over the quarters for which data is available for each fund (generally from December 2013 to June 2018) is calculated.[16]

Risk is depicted on the dashboards as an estimate of the number of times (N) in 20 years that a negative nominal return can be expected. For each fund this is easily converted into an annual probability of the return (r) being less than zero of (P) where P = N/20. Under the assumption that annual returns for the fund are drawn from an i.i.d. normal distribution with mean z and variance

[13] The index used for measuring inflation is the Consumer Price Index.

[14] The inflation target of 2-3 per cent p.a. was introduced in the early 1990s. For more detail see https://www.rba.gov.au/monetary-policy/inflation-target.html

[15] For the March quarter 2018, the actual (unweighted) average was 1.147 per cent compared to the average publicised expected figure of 1.181%, and the correlation of the actual and publicised figure across the funds was 82 per cent.

[16] The (unweighted) average tax cost was 65 basis points, compared to an average target gross return of 7.21 per cent. This implies an actual tax rate of around 9 per cent which is below the statutory tax rate(s) due to tax credits associated with dividends on Australian equities, as discussed later in section 7.

σ^2, the implied volatility of the projected annual return for the fund can be obtained by solving for σ in :

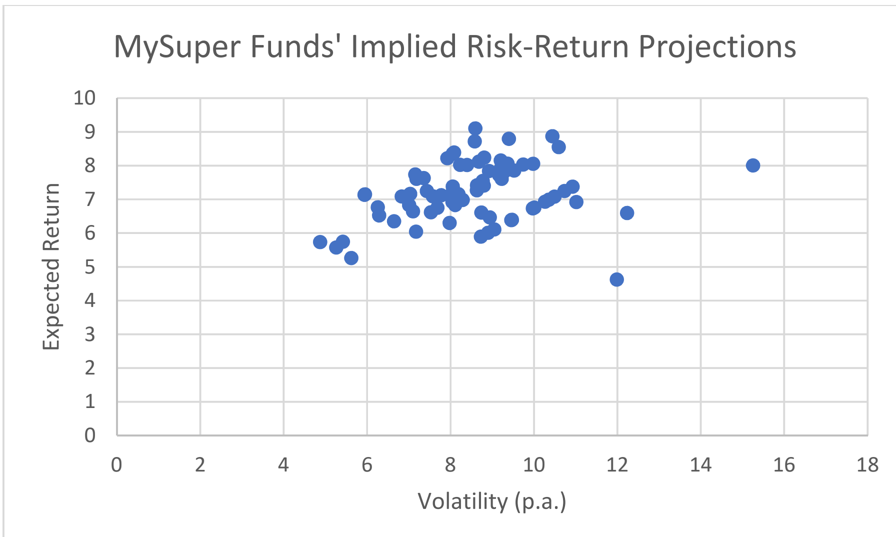
$$\int_{-\infty}^{0} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-(r-z)^2/2\sigma^2} dr = P \qquad (1)$$

The relationship between σ and N thus depends upon the fund's target return to members (μ) and costs (c), fees (f) and taxes (t).

Risk-return projections

Figure 4 shows the risk-return projections for the 76 funds as at March 2018. There are three potential outliers each with volatility greater than or equal to 12 per cent p.a.

Figure 4: Fund Implied Risk-Return Projections

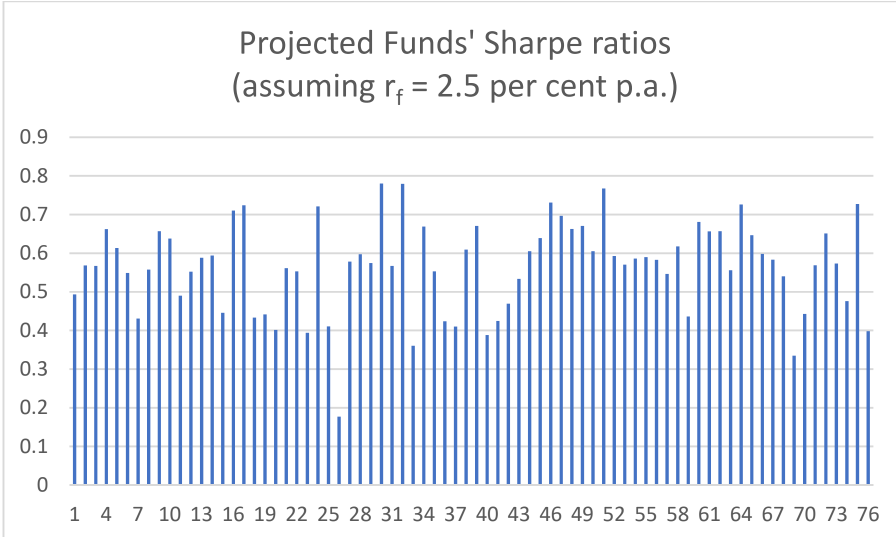


Unlike Figure 1, using the revised, consistent, standard definitions of risk and return, the relationship now displays the expected positive relationship.[17]

To assist in comparing the differences between the funds' projections, Figure 5 shows the implied Sharpe ratio for the projections of risk and return of each fund, calculated assuming that the risk free nominal interest rate is 2.5 per cent.[18] There is considerable variability between the calculated Sharpe Ratios, centred around a mean (median) value of 0.57 (0.58).[19]

[17] The slope coefficient of a simple regression is 0.13 (or 0.25 if the three apparent outliers, with volatilities of 12 per cent or over, are discarded), significantly different from zero at a 1 % confidence level. Interpreting the intercept as the implied risk free rate gives a figure of 6 per cent or 5.15 per cent if the outliers are discarded).
[18] At end March 2018 the 2 and 10 year government bond rates were respectively 1.99 and 2.72 per cent
[19] The value of the risk free rate used affects the size of the Sharpe ratios calculated and consequent rankings of the funds. However, the correlation (rank correlation) is 0.83 (0.81) between the results obtained using r_f = 2.5% and 5%.

Figure 5: Fund Projection Implied Sharpe Ratios



The implied Sharpe Ratios calculated above are for the gross investment return relative to the standard deviation of that return, such as might be used by professional investors. However, for members, the information disclosed relates to the net real return to the member and the likelihood of net (nominal) investment returns being negative. The inter-fund differences between the two sets of information relate to investment and administration expenses (fees) and taxes. It is thus relevant to ask whether an investor using the latter set of information in a simplistic way would rank funds in a similar way to the calculated implied Sharpe Ratios. For this purpose a "pseudo-Sharpe" ratio was calculated for each fund as the ratio of the target real member return to the projected number of negative returns (r_m /N). The correlation of this with the implied Sharpe ratio was 0.92 suggesting that despite the significant difference in the plot of the risk-return figures, a simple comparison would work quite well in signalling to investors the projected risk-adjusted investment performance of the various funds.

Thus, despite the misleading graphical representation of risk-return features arising from the mandated form of disclosure, the effect on investors' rankings of funds is possibly quite small.

4. Deriving Expected Asset Class Returns

The procedure used to derive fund manager long run expectations of asset class returns involves estimating the relationship between target gross return and asset composition as follows.

The target gross return for fund i (r_{pi}) should equal the weighted average of the expected returns (r_{ji}) to be achieved on each of the asset classes (j = 1…n) in which the fund has invested, where the weights (w_{ji}) are the percentage of the portfolio allocated to each asset class. Equation (1) illustrates for fund (i).

$$r_{pi} = \sum_{j=1}^{N} r_{ji} \, . \, w_{ji} \qquad (1)$$

Expectations of asset class returns can differ between fund managers, reflecting different views on market level returns which would be achieved with a passive investment strategy, or a view that through active asset management, and or stock selection, they are able to provide higher returns than implied by the expected market returns (for a given risk level).

Denoting the market average expected return for asset j by R_j, fund i's expected return for asset class j can be written as :

$$r_{ji} = R_j + e_{ji} \qquad (2)$$

where e_{ji} represents the deviation of fund i's expectation from the average expectation of MySuper fund managers. Equation 1 can then be rewritten as:

$$r_{pi} = \sum_{j=1}^{N} R_j \,.\, w_{ji} + u_i \qquad (3)$$

where $u_i = \sum_{j=1}^{N} e_{ji} \,.\, w_{ji}$.

This can be rewritten as a regression relationship of the following form where the dependent variable ($ygross_i$) is the target portfolio return (corresponding to r_{pi} in equation 3) of each fund manager:

$$ygross_i = \beta_1 cash_i + \beta_2 FI_i + \beta_3 ae_i + \beta_4 oe_i + \beta_5 ue_i + \beta_6 e_i + \beta_7 prop_i + \beta_8 infra_i + \beta_9 comm_i + \beta_{10} oth_i + u_i \quad (4)$$

The explanatory (right hand side) variables (corresponding to w_{ji} in equation 3) are the benchmark proportions reported in each asset class. (If a manager has reported the components of equity holdings, the "e" variable is set to zero to avoid duplication, while those that only report total equity holdings have "e"> 0 and zero for the components, ae, oe, and ue).

Since the target gross return should be the weighted average of expected returns on each asset class, the regression coefficients (the β's) provide an estimate of the average (across fund managers) expected market return for the relevant class. The factors causing a manager to anticipate different returns (on individual asset classes or overall) from the market average are captured in the error term.

The regression equation specified does not have an intercept term. The reason is that the asset proportions for each fund manager sum to unity such that including a constant term would lead to perfect multicollinearity. An alternative approach is to delete one of the asset classes and include a constant term (which reflects the expected return on that omitted asset class). [20]

There are several complications in estimating this relationship reflecting the nature of the error term. One possible interpretation of the error term is as reflecting variations in expected asset class returns between managers. The estimated regression coefficients would then be interpreted as the average expected returns across managers. However, if manager asset allocations were systematically related to the manager's expected asset returns this would imply non-zero correlation between the explanatory variables and the error term and biased estimates. (Note, however, that optimal allocations will reflect both expected return and risk projections as well as managerial risk preferences). If it is assumed that asset weights chosen by each manager only depend upon the market-wide average returns and are not related to differences between their individually expected returns and the market average, then the problem of correlated regressors and residuals disappears, enabling the use of OLS.

Alternatively, if portfolio allocations are related to deviations of fund-manager expectations from the average of all funds, correlation of regressors and residuals will occur (since, $w_{ji} = f(e_{1i}, e_{2i}, \ldots e_{Ni}, z)$

[20] When this is done, the same expected returns for each asset class result (the regression coefficients show the difference in return relative to the excluded asset class), but the R^2 is lower (at 0.33 versus 0.99) – although comparison between regressions with and without a constant are problematic - and the standard errors of the estimates are increased.

where z reflects other relevant factors). In this case OLS estimates will be biased, necessitating the use of alternative estimation techniques such as Instrumental Variables (IV).

The procedure used here for constructing suitable IVs, which are correlated with the explanatory variables, but uncorrelated with the error term, is as follows. First, for each fund 'i' find the alternative fund 'k' which has the closest asset allocation to 'i'. This is done by calculating the sum of squared differences (ssd) between asset allocation weights of 'k' and 'i' as

$$ssd_{k,i} = \sum_{j=1}^{N}(w_{jk} - w_{ji})^2$$

and choosing the fund k for which $ssd_{k,i}$ is a minimum. Second, for each fund 'i' construct a set of "IVweights", designated by CashIV, FixedIV, etc given by the weights of its closest fund 'k'. The vector CashIV =($CashIV_1$, $CashIV_2$,…,$CashIV_N$) becomes the IV for the vector Cash = ($Cash_1$, $Cash_2$,…$Cash_N$) etc.

Given the small number of funds reporting only aggregate equity allocation, and difficulties in constructing IV weights for those funds, the IV approach was applied only to the 61 funds reporting types of equity allocations (with N= 9 asset classes). Table 2 shows the correlations between the actual weights and the IV weights (eg between Cash and CashIV etc). With the exception of "Commodities", where very few funds had a non-zero weighting, and "Unlisted Equity" where approximately half had a zero weighting, the correlations are relatively high.

Table 2: Correlations between actual weights and IV weights

Cash	Fixed Interest	Australian Equity	Overseas Equity	Unlisted Equity	Property	Infra-structure	Comm-odities	Other
0.555	0.838	0.860	0.698	0.325	0.596	0.828	0.002	0.885

Another possible complication is that even if all managers have equal expectations of asset class returns, they may be of the view that by active rather than passive management strategies they can do better than the outcome implied by applying those returns to their benchmark asset distribution. The error term would then reflect the performance optimism associated with each manager, and on this interpretation it could be expected that the error terms would all be positive. To allow for this possibility two alternative approaches were considered. One was to include a measure of manager "flexibility" as calculated in an earlier section based on the ranges within which portfolio allocations might vary. This was not significant, and thus not considered further. Another alternative involved estimating a frontier regression, but this generated very similar results to the OLS regression reported below and is not pursued further.

5. Implied Expected Asset Class Returns

The result of estimating the relationship for the 61 funds reporting for 9 asset classes is shown in Table 3. (OLS results including also the funds only reporting aggregate equity holdings are provided in the Appendix). The beta coefficients for the OLS estimation are based on an assumption that either (a) all fund managers have the same expectations or (b) that if there are differences in expectations they are not correlated with the allocations. This latter assumption may appear inappropriate (since a higher expected return than the average might be thought to lead to that fund manager increasing allocation to that asset class) but could be rationalised by noting that asset allocations will also reflect perceived risk and risk preference. The IV estimates allow for the possibility that the regression error term is correlated with the original regressors, and aims to overcome this problem by using a set of IV's as discussed earlier.

Table 3: Implied expected asset-class returns[21]

The dependent variable is target gross (pre tax and costs) return on fund portfolios. Explanatory variables are allocations to all nine asset classes. Because allocations sum to unity, a constant term is not included. The number of superfunds included is 61, and observations are for the March 2018 quarter. Since a null hypothesis that any of the coefficients equals zero is of no interest, the usual "t" and "p" values are not reported.

ygross	Instrumental Variables		OLS	
Regressors	Coef.	Std. Err.	Coef.	Std. Err.
cash	0.037	0.089	0.048	0.027
fi	0.041	0.022	0.036	0.014
ae	0.085	0.027	0.086	0.013
ie	0.089	0.028	0.089	0.017
ue	0.168	0.121	0.132	0.026
prop	0.032	0.051	0.045	0.028
infra	0.124	0.086	0.127	0.028
comm	0.490	3.087	-0.028	0.254
oth	0.060	0.017	0.059	0.012
Root MSE	0.754		0.765	
R-squared	NA		0.991	

In comparing the two sets of estimates, the precision of estimates when using IV falls, particularly for cash, property, and commodities where the IV's had low correlation with the original regressors. In general the precision of the estimates is relatively low leading to wide confidence intervals around the estimated coefficients.

Nevertheless, the estimated coefficients are reasonably consistent with qualitative expectations (and historical data – as discussed in the next section) about relative returns on asset classes. Subsequent discussion refers to the IV estimates.

The difference between the expected cash return and that of fixed interest (both near to 4 per cent p.a.) is not statistically significant. The expected cash return is similar to the historical average, but the expected fixed interest return is lower than its longer term historical average. This may reflect the influence of the post financial crisis experience, where monetary policy has kept interest rates low at both the short and long ends of the yield curve. Expectations of an eventual gradual tightening of monetary conditions which would adversely affect holding period returns (as higher interest rates reduce the price of outstanding securities) may be part of the explanation.

The expected return for Australian equity is not significantly different to that on international equity at around 8.5 to 9 per cent. As discussed later in Section 7, this is potentially anomalous since Australian equity investments offer significant tax advantages over international equity investments for Australian superannuation funds. Unlisted equities appear to command a significantly higher

[21] While the R^2 is reported as an output of the procedure used (using the Stata software) its interpretation is not the same as that of a standard regression which is not forced through the origin. The correlation between the actual and predicted values of the dependent variable is 0.56 (equivalent to an R^2 of 0.33) for the OLS estimates and 0.51 for the IV estimates.

expected return (a premium to listed equities of around 3.4 – 4 per cent) which could be attributable to higher risk or a premium for their relative illiquidity.

The implied Australian market risk premium (Australian equities relative to cash) is in the region of 4 – 5 per cent, which is at the lower end of values typically assumed in regulatory judgements and corporate financial policy, and in other jurisdictions. However, there are special features of the Australian tax system (discussed below) which may explain this, although those explanations create complications for explaining the apparent equality of expected (pre-tax) Australian and global equity returns. Another possible explanation is that "cash" does not reflect a risk free asset class, but includes assets such as short term commercial paper and thus has an expected return higher than the risk free rate.

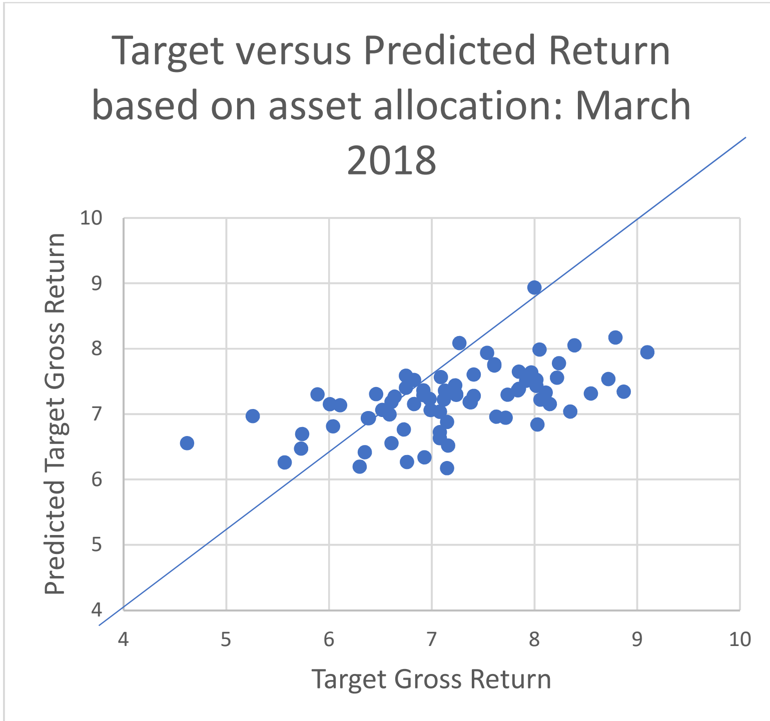
The estimated expected market risk premium figure of around 4.5 per cent p.a. is consistent with historical data for 1988 – 2010 presented in Brailsford, Handley et al. (2012) of an arithmetic average of 5.1 per cent and a geometric average of 3.0 per cent.

Among the other asset categories, infrastructure has a high expected return, consistent with conventional wisdom that the illiquidity associated with such investments leads to a return premium (in addition to its risk premium). Expected property returns are relatively low, despite idiosyncratic risk associated with assets in this class, reflecting relatively low systematic risk (see Mladina (2018)) and resulting portfolio diversification benefits. The concessional taxation of the realised capital gains component of returns, which boosts after tax returns, may also be relevant. The coefficient representing the expected return for commodities has very low precision, reflecting the very small number of funds with (only small) allocations, and is best ignored. The expected return on "other" is between those on fixed interest and equities, consistent with this class including hybrid securities, hedge fund investments, and mortgages.

As noted earlier, one possibility which needs to be considered is that some fund managers may believe that they have the ability to outperform the average return on a particular asset class through better stock selection or timing ability. Alternatively, some may be more optimistic and some more pessimistic about future asset class returns than the average. Since both risk and return are relevant considerations in performance measurement, it is more appropriate to focus on the deviations of stated target return from predicted return from the regression which implicitly will incorporate some (imperfect) allowance for risk associated with differing asset allocations. As would be expected from the estimation procedure, approximately half of the funds have a stated target gross return above (and half below) the predicted target return as shown in Figure 6 for OLS estimates using all 76 funds. These deviations were regressed on the "Flex" indicator and the return volatility calculated earlier, as well as total assets. None of the coefficients were significant.

As noted earlier, an alternative approach to allow for managerial views on ability to outperform using a frontier regression model yielded results not substantially different to the results in Table 3.

Figure 6: Target versus implied predicted return



6. Historical Returns And Alternative Sources of Expected Returns

Expected asset class returns derived from surveys have been shown by Koijen, Schmeling et al. (2015) to be positively related to past actual returns (with weights declining over time). In general this evidence relates to relatively short term forecasts, unlike the longer term forecasts considered here. Nevertheless it can be expected that these longer term forecasts will also be related to historical returns.

Unfortunately, comparison of the forecasts with historical returns is hindered by inadequate data which means that only qualitative comparisons can be made. Also, to compare estimated expected returns with historical experience, an obvious issue is the time period to use for historical comparison, since the choice of period can lead to significant differences in results. A long term perspective is warranted, and the low yield environment of recent years also needs to be taken into account. Table 4 provides information from several sources on average nominal returns over relatively long horizons, as well as longer term expectations of returns from a survey of investors by actuarial firm Rice-Warner.

While there is reasonable correspondence between the forecasts and historical data, it is apparent that expected returns for cash and fixed interest estimated here (and in the Rice-Warner survey data) are significantly lower than the long run historical returns. This is likely to reflect the influence of the recent period of low interest rates, and expectations that this situation is unlikely to be reversed in the near term. Forecast domestic equity return is comparable with the historical record, although that for global equity is relatively higher.

There is inadequate historical data on returns on infrastructure to properly compare with the estimated high expected return on Infrastructure. However, other available information is consistent with a significant expected return premium over equities. The premium for listed global infrastructure relative to global stocks was 2.6% p.a. over 15 years to May 2016.[22] Macquarie Asia Infrastructure Funds were reported as targeting an annual (internal rate of return) return of 14-16 per cent in 2017.[23] However, the Rice-Warner expectations survey provides a much lower expected return.

Table 4: Historical and expected Returns

	Russell-ASX (20 years to 2017)[a]	Vanguard (1990-2018)[b]	Rice-Warner (10 year expectations)[c]	Jorda et al (post 1980)[d]	Estimates
Cash (cash)	4.6	5.5	3.31	3.23	3.99
Fixed Interest (fi)					4.22
Australian Bonds	5.9	7.8	3.76	5.85	
Global Bonds (hedged)	7.	8	4		
Australian listed equity (ae)	8.8	8.6	7.62	8.78	8.44
Overseas listed equity (oe)		6.5			8.40
Global shares (hedged)	7.4		6.91		
Global shares (unhedged)	5.4		7.01		
Unlisted equity (ue)			9.19		13.28
Total equity (e): if equity composition not given					7.74
Property (p)					5.01
Residential investment property	10.2			7.16	
Australian listed property	7.2	8.7	6.49		
Global listed property (unhedged)	7.4	9.1	6.45		
Infrastructure (i)			7.66		12.55
Commodities (comm)					-1.77
Other (oth)					6.66

Sources: (a) ASX-Russell Investments "2018 Long-term Investing Report" June 2018 https://www.asx.com.au/documents/research/russell-asx-long-term-investing-report-2018.pdf ; (b) Vanguard http://insights.vanguard.com.au/static/asset-class/app.html (c) https://www.pc.gov.au/__data/assets/pdf_file/0016/221281/sub056-superannuation-assessment-attachment.pdf - Australian and International (hedged) Bonds are equally weighted averages of figures for government, investment and sub-investment categories unlisted equity is private equity figure. (d) (Jordà, Knoll et al. 2017) – the cash return is for "bills".

7. Taxation Complications and Returns

One complication in deriving expected returns for various asset classes is that the target return figure represents an after-tax return for the super funds which are subject to a 15 per cent tax rate

[22] CBRE Clarion Securities, *Global Listed Infrastructure: A Case for Investing*, June 2016 https://www.ubs.com/content/dam/static/asset_management/australia/miscellaneous/cbre-clarion-global-listed-infrastructure-case-for-investing-june-2016.pdf

[23] https://www.pwc.com/sg/en/publications/assets/cpi-report-3-infrastructure-asset-class.pdf

on income and 10 per cent tax rate on long-run realised capital gains.[24]. Thus for example, a 10 per cent gross return on an asset class (such as fixed interest) would generate an 8.5 per cent return for the superannuation member if 15 per cent tax is paid by the fund.[25] The adjustment to obtain the implied pre-investor-level-tax returns was performed using the average tax rate of the funds over the recent past. This was done to reflect the fact that the absence of information on how much of returns for various asset classes would reflect income or capital gains which are subject to differential tax rates.

However, one significant complication is introduced by the fact that a significant proportion of Australian equities pay dividends which are accompanied by tax (franking) credits. Thus, a $1 cash dividend would generate an after-tax receipt for the super fund of $1.21 reflecting the refund of excess tax credits (or their use against other taxable income).[26] This means that (paradoxically for those not familiar with the Australian imputation tax system) the implied pre-superfund-tax rate of return is 1/1.21 (ie approximately 0.8) times the after-super-fund-tax rate of return for a franked dividend. However, some part of equity returns is capital gains on which a long term tax rate of 10 per cent applies (when realised), and some dividends received are unfranked, on which 15 per cent tax rate applies. Assuming that these capital gains and unfranked dividends are each 25 per cent of total returns, the net overall effect for Australian equities would be to make pre and post tax returns roughly equal.[27]

The consequence of this differential taxation for the results obtained is as follows. Consider two polar cases. If the asset allocation has no Australian equity component, then the upwards adjustment by the average tax rate is appropriate. If the asset allocation were entirely Australian equities, then no upward adjustment would be more appropriate. Thus the calculated pre-tax target return used becomes biased downwards (relative to the "true" value) as the asset allocation share to Australian equities increases. The regression coefficient on Australian equities will thus understate the true expected pre-tax return on Australian equities. Without further analysis it is not possible to estimate the magnitude of this effect. This would increase the implied MRP (measured pre-investor-tax) for Australian equities but would lead to an apparent anomaly of expected ("cash" – ie ignoring tax credits) returns on Australian equities exceeding those on foreign equities despite the former offering tax advantages to the Australian super funds.

8. Conclusion

This paper has used information disclosed by Australian superannuation funds to address several questions. The first, particularly relevant for policy involving disclosure and financial literacy, is whether the mandated form of risk and target return disclosure, designed to be easily understood by potential members of the fund, is well founded. Using those metrics, cross-fund comparisons of risk-return positions look anomalous, displaying no positive relationship between risk and return,

[24] Because MySuper products are accumulation phase products, there is no complication introduced by the zero taxation of retirement phase superannuation funds which would otherwise require some allocation of fund assets between those supporting accumulation versus retirement accounts.

[25] One complication is that the target (and estimated asset class expected) returns are real returns, whereas tax is levied on nominal returns. This increases the effective tax rate on the real return (since the inflation component of nominal returns is taxed). The impact is higher at higher levels of inflation, but is disregarded here on the assumption that investors anticipate continuation of current low levels of inflation.

[26] The $1 cash dividend is grossed up to 1/(1-tc) = $1.43 of taxable income (where the corporate tax rate is tc = 0.3) on which tax at 15 per cent is levied. The fund gets $0.43 of tax credits such that the after tax receipt of the super fund would be $1x(1 - .15) /(1-tc) = $1.214.

[27] The calculation is pre-tax return = 0.8*(franked dividend yield) +1.15* (unfranked dividend yield) + 1.1* (long term capital gains yield) = (0.8*.5+1.15*.25+1.1*.25) post-tax return =0.96 post-tax return.

even though such a relationship exists when more conventional metrics are used. Nevertheless, adopting a simplistic future projected performance measure (a “pseudo-Sharpe” ratio) using those metrics, would not lead to substantially different rankings to those of fund investment performance based on the more conventional Sharpe ratio. This gives some support to the mandated form of disclosures being informative to potential investors.

A second question considered is whether reliable estimates of fund manager expectations of future returns on different asset classes can be derived from mandated disclosures. Expectations largely consistent with conventional wisdom and historical experience are found. However, there remain anomalies associated with the expected returns derived on tax-preferred Australian equities relative to international equities. One benefit of the approach used relative to survey data is the disclosure of the identities of the funds involved which provides greater credibility relative to voluntary, anonymous, survey data. On the other hand, fund manager expectations of future yields need to be inferred from the data provided, rather than given as direct survey responses.

A third question considered is whether the projections of risk and return, and asset allocation practices provide any evidence on the extent, and anticipated effects, of active asset allocation practices. Unfortunately, no reliable evidence could be found, which raises the question of whether the required reporting of asset allocation ranges is warranted.

One question which might be raised about the use of these disclosures is the extent to which it is substantial differences in asset class return expectations, rather than differing asset allocations, which lead to differences in expected portfolio outcomes. Jordà, Knoll et al. (2017) for example, argue that asset allocation differences for US pension funds can explain only 25 per cent of expected portfolio return differences. That is an avenue for further research, however, the derivation of group average risk and return expectations is useful in itself for understanding fund investment strategies, and ultimately performance. Also relevant for future research, as sufficient time-series data becomes available, are an examination of how the disclosed risk and return measures change over time and consistency of disclosures with actual outcomes.

REFERENCES

Andonov, A. and J. D. Rauh (2018). The return expectations of institutional investors. Stanford University Graduate School of Business Research Paper No. 18-5; Available at SSRN: https://ssrn.com/abstract=3091976 or http://dx.doi.org/10.2139/ssrn.3091976

Ang, A., A. Ayala and W. N. Goetzmann (2014). "Investment beliefs of endowments." Netspar Discussion Paper DP 06/2014-027 Ang, Andrew and Ayala, Andres and Goetzmann, William N., Investment Beliefs of Endowments (June 15, 2014). Netspar Discussion Paper No. 06/2014-027. Available at SSRN: https://ssrn.com/abstract=2463186 or http://dx.doi.org/10.2139/ssrn.2463186

Arnott, R. D. and P. L. Bernstein (2002). "What Risk Premium Is" Normal"?" Financial Analysts Journal: 64-85.

Bateman, H., C. Eckert, J. Geweke, J. Louviere, S. Satchell and S. Thorp (2014). "Financial competence, risk presentation and retirement portfolio preferences." Journal of Pension Economics & Finance **13**(1): 27-61.

Bateman, H., C. Eckert, J. Geweke, J. Louviere, S. Satchell and S. Thorp (2015). "Risk presentation and portfolio choice." Review of Finance **20**(1): 201-229.

Brailsford, T., J. C. Handley and K. Maheswaran (2008). "Re-examination of the historical equity risk premium in Australia." Accounting & Finance **48**(1): 73-97.

Brailsford, T., J. C. Handley and K. Maheswaran (2012). "The historical equity risk premium in Australia: post-GFC and 128 years of data." Accounting & Finance **52**(1): 237-247.

Brinson, G. P., B. D. Singer and G. L. Beebower (1991). "Determinants of portfolio performance II: An update." Financial Analysts Journal: 40-48.
Cremers, M., M. A. Ferreira, P. Matos and L. Starks (2016). "Indexing and active fund management: International evidence." Journal of Financial Economics **120**(3): 539-560.
Dimson, E., P. Marsh and M. Staunton (2009). Triumph of the optimists: 101 years of global investment returns, Princeton University Press.
Fernandez, P., V. Pershin and I. Fernández Acín (2017). "Discount rate (Risk-Free Rate and Market Risk Premium) used for 41 countries in 2017: A Survey."
Graham, J. R. and C. R. Harvey (2005). "The long-run equity risk premium." Finance Research Letters **2**(4): 185-194.
Greenwood, R. and A. Shleifer (2014). "Expectations of Returns and Expected Returns." The Review of Financial Studies **27**(3): 714-746.
Ibbotson, R. G. and P. D. Kaplan (2000). "Does asset allocation policy explain 40, 90, or 100 percent of performance?" Financial Analysts Journal: 26-33.
Jordà, Ò., K. Knoll, D. Kuvshinov, M. Schularick and A. M. Taylor (2017). The rate of return on everything, 1870–2015, National Bureau of Economic Research.
Koijen, R. S., M. Schmeling and E. B. Vrugt (2015). "Survey expectations of returns and asset pricing puzzles." London Business School, City University London, and VU University Amsterdam **1**: 66.
Lusardi, A. and O. S. Mitchell (2011). "Financial literacy around the world: an overview." Journal of Pension Economics & Finance **10**(4): 497-508.
Martin, I. (2017). " hat is the expected return on the market? ." Quarterly Journal of Economics, **132**(1): 367-433.
Mladina, P. (2018). "Real Estate Betas and the Implications for Asset Allocation." The Journal of Investing.
Pástor, Ľ., R. F. Stambaugh and L. A. Taylor (2015). "Scale and skill in active management." Journal of Financial Economics **116**(1): 23-45.
Pinto, J. E., T. R. Robinson and J. D. Stowe (2015). "Equity valuation: a survey of professional practice." Review of Financial Economics.
Truong, G., G. Partington and M. Peat (2008). "Cost-of-capital estimation and capital-budgeting practice in Australia." Australian journal of management **33**(1): 95-121.
Wallmeier, M. (2011). "Beyond payoff diagrams: How to present risk and return characteristics of structured products." Financial Markets and Portfolio Management **25**(3): 313.
Welch, I. (2000). "Views of financial economists on the equity premium and on professional controversies." The Journal of Business **73**(4): 501-537.

Appendix

The table below presents the result of OLS estimation of equation using all 76 funds, ie including the 15 funds providing information only on total equity, rather than its components. For those 15 funds ae, oe and ue were set to zero, while for the other funds, e was set to zero to avoid perfect multicollinearity. The results are generally similar to those presented in Table 3, although the coefficient for total equity appears relatively low compared to those for the components. However, given the imprecision of the estimates, it would be difficult to reject the hypothesis that it was not consistent with some reasonable weighted average of the component estimates.

Dependent variable: ygross	Beta Coefficent	Standard Error.	t-values
Explanatory variables (symbols)			
Cash (cash)	3.99	2.12	1.88
Fixed Interest (fi)	4.22	1.10	3.84
Australian listed equity (ae)	8.44	1.00	8.41
Overseas listed equity (oe)	8.40	1.24	6.79
Unlisted equity (ue)	13.28	2.43	5.47
Total equity (e): if equity composition not given	7.74	0.80	9.68
Property (p)	5.01	2.35	2.14
Infrastructure (i)	12.55	1.83	6.85
Commodities (comm)	-1.77	8.73	-0.20
Other (oth)	6.66	1.07	6.24

R^2 = 0.9904.