Working Paper

Effect of fund size on the performance of Australian superannuation funds

Dr James Richard Cummings – March 2012

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Australian Prudential Regulation Authority

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Effect of fund size on the performance of Australian superannuation funds

by

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Abstract: This paper finds that fund size has a positive impact on the performance of not-for-profit superannuation funds, which is evident both in gross returns and in expenses. Larger not-for-profit funds have higher allocations to investments, such as private equity and real estate, where they are likely to have a size-related advantage. Lower investment expense ratios of larger not-for-profit funds suggest that they negotiate more favourable fee schedules with external managers. Larger funds (whether retail or not-for-profit) realise substantial operational cost savings. However, fund size does not have an overall positive impact on the performance of retail superannuation funds.

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Executive summary

Superannuation Guarantee legislation introduced in 1992 significantly increased both the total amount of money flowing into the Australian superannuation system, and the size of the average superannuation fund. This trend has been bolstered by frequent mergers between superannuation funds, with the trustees of many smaller corporate funds deciding to transfer members' accounts to larger industry funds and retail master trusts.

Using data from 280 funds over the period from September 2004 to June 2010, this paper examines three ways that members could possibly benefit from these larger fund sizes:

- better gross investment returns, due to investment opportunities that can be more effectively exploited by larger funds;

- lower investment expenses, with larger funds using their bargaining power to reduce the fees they pay to investment managers; and

- lower operating expenses, with larger funds spreading their fixed costs across a larger pool of assets and more members.

In a recent APRA Working Paper, Cummings and Ellis (2011) find that not-for-profit superannuation funds earn higher risk-adjusted returns than retail superannuation funds as a result of their higher allocations to illiquid investments, for example, private equity and real estate. This paper examines whether investing in these asset classes involves a size-related advantage, such as having access to a wider range of investment opportunities. This paper finds that larger not-for-profit funds earn higher risk-adjusted gross returns than smaller not-for-profit funds. However, there are no such economies of scale evident for retail funds.

As documented in another APRA Working Paper (Liu and Arnold, 2010), Australian superannuation funds outsource almost all of their investment management. Economic theory suggests that larger funds should be able to negotiate lower fees with external managers than smaller funds. This paper finds that larger not-for-profit funds benefit from lower investment expense ratios. As is the case for gross returns, however, these economies of scale are not evident in the retail sector. To the contrary, larger retail funds exhibit higher investment expense ratios, although not to a statistically significant level.

This paper finds that larger funds, both in the not-for-profit and retail sectors, have significantly lower operational expense ratios to net assets. This finding suggests that larger funds are able to spread fixed costs associated with administration and IT infrastructure over a larger asset base. Furthermore, not-for-profit funds with larger account balances per member have significantly lower operational expense ratios. This suggests that not-for-profit funds with larger member balances are also able to reduce variable costs, such as those associated with member interface and insurance claims management. While they benefit from spreading fixed costs over a larger asset base, retail funds do not realise any reduction in variable costs from administering larger member balances.

In sum, this paper provides strong evidence that the performance of not-for-profit superannuation funds improves with fund size. Based on this evidence, fund members are likely to benefit from further industry consolidation in the not-for-profit sector. The results of this study indicate that the greatest benefits accrue when not-for-profit funds grow to a multi-billion dollar size and are not exhausted at the largest Australian fund sizes. However, the merits of industry consolidation are not evident in the retail sector.

Introduction

In the past two decades, Australian superannuation funds have experienced sustained growth in net cash inflows. Strong growth in membership, compulsory employer contributions (currently 9 per cent of wages) and positive investment returns have meant that the average fund size has increased rapidly, as shown in Table 1. This trend has been bolstered by frequent mergers between superannuation funds, with the trustees of many smaller corporate funds deciding to transfer members' accounts to larger industry funds and retail master trusts. Some industry analysts argue that further industry consolidation is desirable, to reduce the number of funds and maximise the returns to scale (see Gray and Watson, 2011). This study examines whether the members of Australian superannuation funds obtain any risk/return benefits from being invested in larger funds.

Table 1

AVERAGE SIZE OF A SUPERANNUATION FUND ($ million)

	June 1995	*June 2000*	*June 2005*	*June 2010*
Not-for-profit	25	60	275	1,675
Retail	96	459	1,072	2,205
All funds	32	89	412	1,867

The Australian superannuation industry provides an ideal setting to examine the extent of scale economies realised by multi-asset class investment funds. Previous studies of scale economies in funds management have mainly focused on fixed income and equity mutual funds (for example, Philpot, Hearth, Rimbey and Schulman, 1998; Indro, Jiang, Hu and Lee, 1999). These studies do not consider the ability of large superannuation funds to reallocate assets towards investments where they may have an advantage relative to other investors (for example, in direct property or private equity). By allocating resources to these areas, superannuation funds may capture scale economies that are not captured by mutual funds specialising in single asset classes. This is why we use the superannuation data to examine the impact of scale, for industry sectors that vary in the extent to which they allocate across a variety of different asset classes.

A contribution of this paper is that it identifies the sources of scale economies for pension funds, in the context of widespread investment outsourcing. In contrast to similar-sized funds in the United States and Canada, the largest Australian superannuation funds outsource almost all of their investment management function (see Liu and Arnold, 2010). Therefore, any scale effects on investment performance are more likely to be derived from the greater bargaining power of larger funds with external investment managers, than

through the development of in-house investment teams. At the fund-level, this study investigates how superannuation funds' gross returns and costs are impacted by the relative negotiating power of fund trustees with external investment managers for funds of different sizes.

Scale economies in the superannuation industry

This study investigates an issue that is fundamental to understanding the role of a superannuation fund in a retirement income system — the economies of scale in the superannuation industry. A better understanding of this issue would be useful for investors, given the large inflows and extensive merger activity that have increased the average size of funds in recent years. This paper quantifies the value created (or destroyed) when a fund has a larger membership base and the proportion of that value passed through to existing fund members (in the form of net returns on their accumulated balances).

Previous research suggests that there are diseconomies of scale for mutual funds that invest entirely in listed equity securities (see Beckers and Vaughan, 2001; Chen, Hong, Huang and Kubik, 2004; Yan, 2008). These studies find that scale erodes the performance of equity funds, because of the market-impact costs and execution delays associated with large trades in equity markets and the loss of flexibility in implementing stock-selection ideas.[1] Similarly, in their study of the performance and costs of the domestic equity investments of United States pension funds, Bauer, Cremers and Frehen (2010) find that fund size and performance are strongly negatively related. While scale brings about cost advantages, they find that these are overshadowed by size disadvantages in equity performance of the same type found in studies of equity mutual funds. Consequently, the impact of scale on the performance of superannuation funds may depend on the extent to which they can mitigate or avoid the scale diseconomies associated with their equity investments.

There are several reasons why superannuation funds may capture economies of scale, which are not captured by equity mutual funds. One reason is the potential cost savings arising from greater negotiating power with external investment managers. Another reason that may be important is the ability of superannuation funds to shift resources from areas where there are diseconomies to areas where there could be scale-related benefits. For defined-benefit pension funds, Dyck and Pomorski (2011) find that funds react to changes in size by shifting towards asset classes for which scale and negotiating power matter — in

[1] Chen, Hong, Huang and Kubik (2004) argue that organisational diseconomies related to growing hierarchies, which slow down decision-making and reduce incentives, may also play a role in the documented diseconomies of scale for equity funds.

particular, by increasing their allocations to alternative investments such as private equity and real estate. They find this shift in allocation is associated with large positive economies of scale both in costs and in gross returns. Larger funds are likely to be able to negotiate more favourable fee schedules when investing in these asset classes. There may also be scale economies in gross returns if larger funds are able to retain more skilful managers or can negotiate better contractual protections. This paper tests whether larger superannuation funds have higher gross returns and lower investment expense ratios, for industry sectors that vary in the extent to which they invest in alternative asset classes.

Scale-related economies may also stem from the fixed costs required to operate a fund. The fixed costs for operating any fund include accounting and auditing, legal advice, fund compliance testing and IT infrastructure. While there are some variable components to these costs as funds become larger and more complex, these fixed expense items are required for all funds. For larger funds, economies are gained when these fixed costs are spread over more members and a larger asset base. Consistent with this proposition, this paper tests whether larger superannuation funds have lower operational expense ratios.

Methodology

Data and sample

This study focuses on 280 superannuation funds operating in Australia with at least twelve quarters of relevant data in the period from September 2004 to June 2010. These funds represent approximately 98 per cent of the assets in APRA-regulated superannuation funds. Quarterly data are obtained from APRA's statistical data collections on fund flows and income, net assets, directly held investments, expenses and taxes.[2] Annual collections data are also obtained on the age and gender of members, the average account balance, the number of investment options offered, the value of member funds in the default option and other fund characteristics.

The analysis is restricted to accumulation superannuation funds and hybrid superannuation funds.[3] Defined benefit funds with all members having defined benefits are

[2] Gross returns are total income before expenses and tax divided by cash flow adjusted net assets. Net returns are net earnings after expenses and before tax divided by cash flow adjusted net assets.

[3] An accumulation superannuation fund is a superannuation fund where the benefit a member receives is the total of specifically defined contributions to the superannuation fund plus earnings on those contributions, minus expenses and tax. A hybrid superannuation fund represents a superannuation fund which consists of a combination of both accumulation and defined benefit members.

excluded.[4,5] The data cover superannuation funds with total assets of at least $50 million at the end of their most recent year of income.[6]

All trustees of APRA-regulated superannuation funds have, from 1 July 2006, been required to hold a Registrable Superannuation Entity (RSE) licence. The trustees of many funds existing prior to that date decided not to apply for an RSE licence and made arrangements for the transfer and wind-up of the funds under their trusteeship. Industry consolidation has continued with a series of fund mergers initiated after the introduction of the new trustee licensing system. For the dataset in this study, transfers and wind-ups are identified and the wound-up fund and the successor fund for the transfer are combined into a single fund from the beginning of the quarter in which the transaction occurs. Specifically, fund flows and income, net assets, directly held investments, expenses and taxes of the wound-up fund and successor fund are summed to obtain the data for the combined fund. This approach ensures the results pertaining to the impact of fund size on fund performance are not driven by large merger transactions between funds.

This study uses realised fund investment returns, along with comparable returns for a selected set of asset classes, to infer the typical exposures of each fund to the asset classes and the fund's investment expense ratio. For this purpose, total return series for the principal asset classes customarily held by Australian superannuation funds were identified. The return series are described in Table 2.

Table 2

DATA SOURCES FOR ASSET CLASSES

Asset class	*Representation*	*Source*
Cash	UBS Bank Bill Index	Bloomberg
Fixed income	Australian Broad Investment-Grade Bond Index in local currency (AusBIG)	Citigroup
Australian shares	S&P ASX 200 Accumulation Index	Bloomberg
International shares	MSCI Total Return Net World ex-Australia Index in local currency	Bloomberg
Unlisted property	Mercer Unlisted Property Funds Index Pre-Tax	Mercer
Other investments	Australia Private Equity and Venture Capital Index	Cambridge Associates

4 A defined benefit superannuation fund is a superannuation fund where the formula for calculating the retirement benefit is specified, usually in terms of years of service with the employer and average salary level over the last few years prior to retirement. The employer sponsor/contributor to a defined benefit superannuation fund carries the investment risk.

5 Additional analysis is undertaken based on an enlarged sample that includes both defined contribution and defined benefit funds. The results are not materially different.

6 Approved deposit funds (ADFs), eligible rollover funds (ERFs), pooled superannuation trusts (PSTs), self-managed superannuation funds (SMSFs) and small APRA funds (SAFs) are excluded from the sample.

Fund asset allocations and investment expense

The APRA superannuation data do not include information about the underlying securities held by funds or the investment expense incurred by external managers.[7] Hence, the returns data are used to estimate the exposures of each fund to various asset classes and the fund's investment expense ratio. Superannuation funds allocate assets among many investment vehicles, each of which holds many securities. Ultimately, the exposures of a fund to key asset classes is a function of (i) the amounts that the fund has invested through the various investment vehicles and (ii) the exposures of each investment vehicle to the asset class. Following Sharpe (1992), the fund's historic exposures to asset class returns and the residual component of its returns are estimated using the constrained regression approach:

$$R_{i,t} = \lambda_i + \sum_{j=1}^{6} x_{i,j} R_{j,t} + \varepsilon_{i,t} \qquad (1)$$

$$\text{subject to } 0 \le x_{i,j} \le 1 \text{ and } \sum_{j=1}^{6} x_{i,j} = 1$$

where $R_{i,t}$ is the net return on investment of fund i, $R_{1,t}$ is the return on cash, $R_{2,t}$ is the return on fixed income, $R_{3,t}$ is the return on Australian shares, $R_{4,t}$ is the return on international shares (hedged), $R_{5,t}$ is the return on unlisted property and $R_{6,t}$ is the return on other investments in period t.[8] The resulting intercept coefficient, λ_i, can be interpreted as the fund's average investment expense ratio in the sample period.[9] The slope coefficients, $x_{i,j}$, can be interpreted as the fund's historic exposures to the asset class returns.[10] Each slope coefficient is constrained to lie between 0 and 1 and the sum of the slope coefficients is required to be 1.[11] These constraints are consistent with the notion that superannuation funds

7 Superannuation funds outsource most of their portfolios (on average, 92.0 per cent for not-for-profit funds and 95.4 per cent for retail funds) to external investment managers.

8 Net return on investment is defined as investment income minus investment expenses divided by net transactions adjusted total investments.

9 This intercept coefficient is a conservative measure of a fund's investment expense because it is reduced by the fund's security-selection return, defined as the difference between the fund's gross return before investment expense and that of a 'passive mix' (index tracker fund) with the same set of asset class allocations.

10 At least 12 quarters of data are required to estimate the fund asset allocations and investment expense ratio. The return components identified in this analysis are, in a sense, an average of potentially changing asset allocations and investment expense over the sample period.

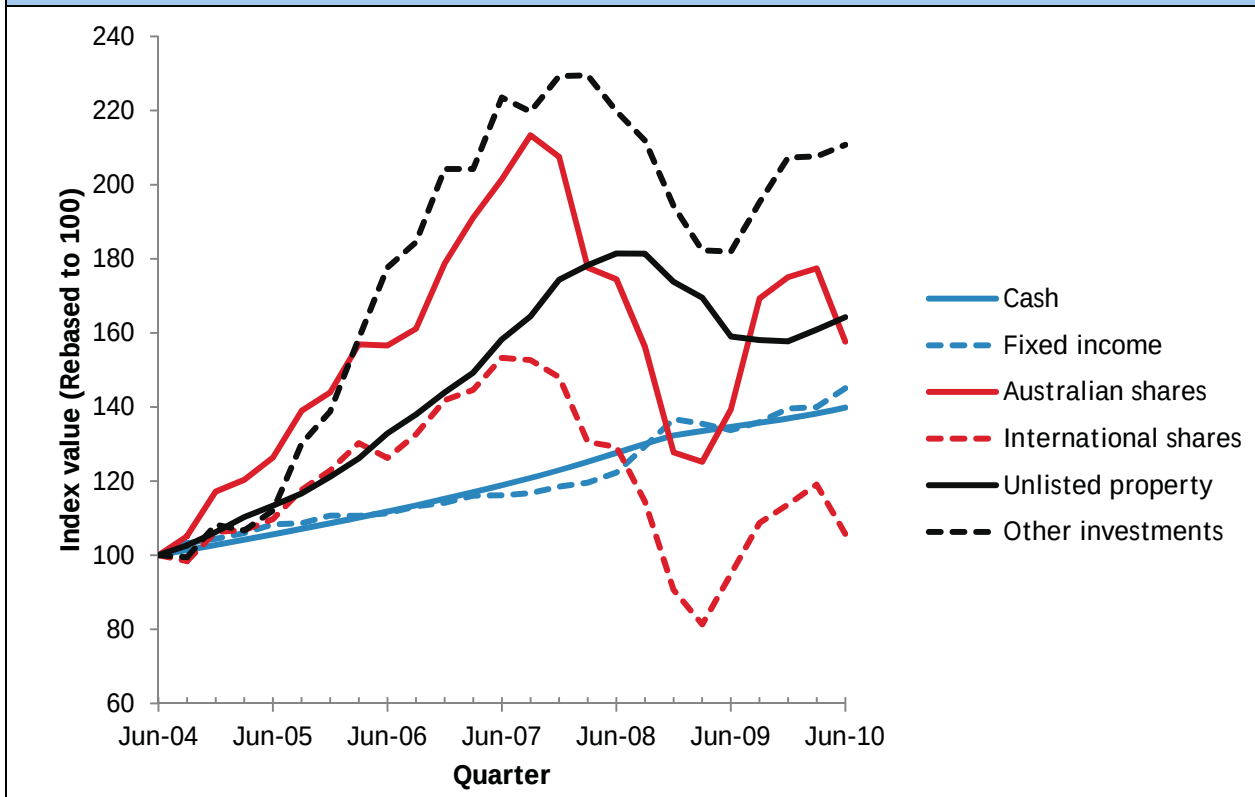
11 For this analysis, the presence of inequality constraints, $0 \le x_{i,j} \le 1$ for each asset class j, requires the use of a quadratic programming algorithm.

are not allowed to take short positions and the chosen asset classes are broadly representative of the investable universe.[12]

Figure 1 illustrates the total return of the asset classes over the sample period. During the period covered, a substantial portion of the quarterly variation in fund investment returns can be attributed to the concurrent returns on these asset classes. The average *R*-squared statistic obtained by applying the constrained regression given in equation (1) across all the sample funds is 90.52 per cent.

Figure 1

HISTORICAL PERFORMANCE OF VARIOUS ASSET CLASSES



[12] Section 67 of the *Superannuation Industry (Supervision) Act 1993* (SIS Act) prohibits superannuation funds from borrowing money, except in limited circumstances and for a short term to pay members' benefits or settle a transaction.

Results

Descriptive statistics

Table 3 presents descriptive statistics for not-for-profit funds (Panel A), retail funds (Panel B) and all sample funds as a group (Panel C).[13] The entire group is divided into quintiles based on their net assets of the previous quarter. These portfolios are rebalanced as funds enter and exit the sample each quarter. In addition to summary statistics for each fund type, summary statistics for each fund size quintile are also reported. For each data item (for example, internally managed investments), first the asset-weighted average across all funds for each quarter from September 2004 to June 2010 is calculated and then a simple time-series average of the cross-sectional averages is reported. Numbers in this table are presented in annual terms.

In each quarter, there are on average 249 funds comprising 157 not-for-profit funds and 92 retail funds. The average net assets of all sample funds is $2.4 billion. The average fund size is larger for retail funds ($3.2 billion) than for not-for-profit funds ($1.9 billion), although there is a wide range of fund sizes in both industry sectors. The average fund in the smallest fund size quintile has only $96 million in total assets, while the average fund in the largest fund size quintile has over $9 billion in total assets.

Not-for-profit funds have a younger membership than retail funds. The average proportion of members close to preservation age (aged 50 years and over) is 24.8 per cent for not-for-profit funds, compared with 38.2 per cent for retail funds.[14] The average member balance is $54,800 for not-for-profit funds and $68,500 for retail funds. For not-for-profit funds, the average member balance decreases with fund size.

Retail funds offer the largest number of investment choices to members, with an average of 248 options per fund. In comparison, not-for-profit funds have an average of eleven investment options per fund. Not-for-profit funds (41.8 per cent) hold a greater proportion of assets in the default investment strategy than retail funds (9.5 per cent).

[13] Retail funds are established by banks, fund managers and other superannuation providers and offer superannuation products to the public on a commercial basis. Not-for-profit funds include industry, corporate and public sector funds and are typically established by employer groups and trade unions to serve members in specific workplaces or industries.

[14] Preservation age is 55 years for people born before 1 July 1960 and increases incrementally to 60 years for people born after 30 June 1964.

Table 3

DESCRIPTIVE STATISTICS

Panel A: Not-for-profit funds

Data item	*Fund size quintile*					*Total sample*
	1 (small)	*2*	*3*	*4*	*5 (large)*	
Number of funds	37	30	34	31	25	157
Net assets $mil						
Mean	94	253	637	1,756	8,535	1,940
Min.	56	152	388	992	3,014	56
Max.	148	376	961	2,850	24,320	24,320
Total %	1.2	2.6	7.2	18.0	70.9	100.0
Preservation age %	29.4	27.5	25.9	23.8	24.6	24.8
Average balance $000	120.1	80.2	80.8	61.1	48.2	54.8
Fund age years	27	35	29	25	24	25
Investment choices	5	6	6	7	13	11
Default strategy %	18.9	25.8	39.9	53.3	40.1	41.8
Internally managed %	16.1	10.4	8.6	6.6	8.0	8.0
Fund flow %	3.0	4.1	4.6	6.9	7.2	6.8
Cash %	6.3	8.1	5.2	5.6	1.9	3.0
Fixed income %	24.5	24.0	23.0	21.1	26.2	24.9
Australian shares %	33.3	34.4	34.4	32.9	29.9	30.9
International shares %	23.1	19.1	17.3	17.5	17.0	17.2
Unlisted property %	7.0	8.1	14.5	15.2	17.8	16.7
Other investments %	5.9	6.4	5.5	7.8	7.3	7.2

This table presents the summary statistics for characteristics of not-for-profit funds (Panel A), retail funds (Panel B) and all funds (Panel C). The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million.

Table 3 *continued*

Panel B: Retail funds

Data item	*Fund size quintile*					*Total sample*
	1 (small)	*2*	*3*	*4*	*5 (large)*	
Number of funds	12	19	17	19	24	92
Net assets $mil						
Mean	102	260	674	1,825	9,870	3,156
Min.	62	159	403	1,012	3,008	62
Max.	145	366	949	2,846	37,792	37,792
Total %	0.4	1.8	3.9	11.9	82.0	100.0
Preservation age %	43.6	44.9	47.5	39.8	37.4	38.2
Average balance $000	72.2	72.2	60.2	58.3	70.8	68.5
Fund age years	13	14	16	16	14	14
Investment choices	126	128	58	118	280	248
Default strategy %	8.1	19.8	8.2	9.1	9.4	9.5
Internally managed %	22.1	11.0	8.6	3.1	4.4	4.6
Fund flow %	2.4	3.0	0.0	1.4	5.6	4.8
Cash %	14.8	8.7	11.1	5.1	2.6	3.4
Fixed income %	27.2	28.3	30.3	30.0	31.1	30.9
Australian shares %	32.9	37.3	30.8	36.1	38.6	37.9
International shares %	12.0	14.3	16.1	17.2	18.2	17.9
Unlisted property %	6.9	6.7	6.6	4.9	5.4	5.4
Other investments %	6.3	4.8	5.1	6.7	4.2	4.5

This table presents the summary statistics for characteristics of not-for-profit funds (Panel A), retail funds (Panel B) and all funds (Panel C). The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million.

Table 3 *continued*

Panel C: All funds

Data item	*Fund size quintile*					*Total sample*
	1 (small)	*2*	*3*	*4*	*5 (large)*	
Number of funds	49	50	50	50	50	249
Net assets $mil						
Mean	96	256	649	1,779	9,181	2,387
Min.	56	151	386	984	2,955	56
Max.	148	378	969	2,901	37,792	37,792
Total %	0.8	2.2	5.6	15.0	76.4	100.0
Preservation age %	33.3	34.4	33.1	29.9	31.0	31.0
Average balance $000	108.2	76.6	73.5	59.8	59.7	61.3
Fund age years	23	27	25	22	19	20
Investment choices	39	56	23	51	155	128
Default strategy %	16.0	23.3	29.1	35.8	23.3	25.5
Internally managed %	17.8	10.6	8.6	5.3	6.1	6.3
Fund flow %	2.6	3.6	3.1	4.9	6.4	5.9
Cash %	8.5	8.4	7.2	5.5	2.2	3.2
Fixed income %	25.2	25.7	25.5	24.4	28.8	27.8
Australian shares %	33.2	35.4	33.2	34.0	34.4	34.3
International shares %	20.2	17.3	16.9	17.4	17.6	17.6
Unlisted property %	6.9	7.5	11.9	11.3	11.3	11.2
Other investments %	6.0	5.7	5.4	7.4	5.7	5.9

This table presents the summary statistics for characteristics of not-for-profit funds (Panel A), retail funds (Panel B) and all funds (Panel C). The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million.

Smaller funds hold more cash, which suggests they have a greater reliance on working capital to continue their operations and satisfy upcoming payment obligations to members and beneficiaries. Among larger funds, retail and not-for-profit funds have exposure to different types of risky assets. Larger retail funds hold more domestic and international shares, while larger not-for-profit funds hold more unlisted property and other investments. For example, the average retail fund in the largest fund size quintile holds 38.6 per cent Australian shares, 18.2 per cent international shares, 5.4 per cent unlisted property and 4.2 per cent other investments, whereas the average not-for-profit fund in the same quintile holds 29.9 per cent Australian shares, 17.0 per cent international shares, 17.8 per cent unlisted property and 7.3 per cent other investments.

Financial performance of superannuation funds

In this section, fund performance is evaluated using two multi-asset benchmarks and the cross-sectional variation in fund performance by fund type and fund size is reported.

This section calculates benchmark return series for two multi-asset class market portfolios, representing the investment opportunity set of superannuation funds in Australia and worldwide, respectively. In the Australian market, the Citigroup Australian Broad Investment-Grade Bond Index in local currency, the S&P ASX 200 Accumulation Index, the Mercer Unlisted Property Funds Index Pre-Tax and the Cambridge Associates Australia Private Equity and Venture Capital Index are used to represent the return on fixed income, common stock, unlisted property and other investments, respectively. In the world market, the MSCI Total Return Net World ex-Australia Index in local currency is used to represent the return on overseas common stock (in addition to the four domestic indices). The aggregate value of investments in each asset class by managed funds is sourced from the Australian Bureau of Statistics. The multi-asset class market portfolio indices are formed by using the return series of each asset class, weighted by the asset class's proportion of the aggregate value of all asset classes at the beginning of each quarter. This creates a market return for CAPM regressions.

Following Chen, Hong, Huang and Kubik (2004), quintile rankings based on fund size are used to calculate loadings to the multi-asset class market portfolios. This approach allows for the possibility that funds of different sizes have different levels of exposure to market-wide risk. All sample funds are divided into five quintiles based on their net assets of the previous quarter. These portfolios are rebalanced each quarter. Equal-weighted quarterly returns are then computed for each quintile. The loadings of these portfolios to market-wide risk are

estimated by using two multi-asset class interpretations of the CAPM. Specifically, the Australian CAPM and the world CAPM are used. Ennis and Burik (1991) propose a multi-asset class interpretation of the CAPM to account for the diverse investment opportunity set of pension funds:[15]

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_p \times (MKT_t - r_{f,t}) + \varepsilon_{p,t} \quad (2)$$

where $r_{p,t}$ is the return on one of the five fund-size-sorted superannuation fund portfolios, $r_{f,t}$ is the 90-day bank bill interest rate and MKT_t is the return on the multi-asset class market portfolio index. For each quarter, each fund inherits the loading ($\hat{\beta}_p$) of the fund size quintile that it belongs to.[16] The expected fund return is then calculated by using this fund size quintile factor loading along with the realised returns on the risk-free asset and the multi-asset class market portfolio index. The risk-adjusted return for fund *i* is calculated as the difference between the realised fund return and the expected fund return:

$$\alpha_{i,t} = r_{i,t} - [r_{f,t} + \hat{\beta}_p \times (MKT_t - r_{f,t})] \quad (3)$$

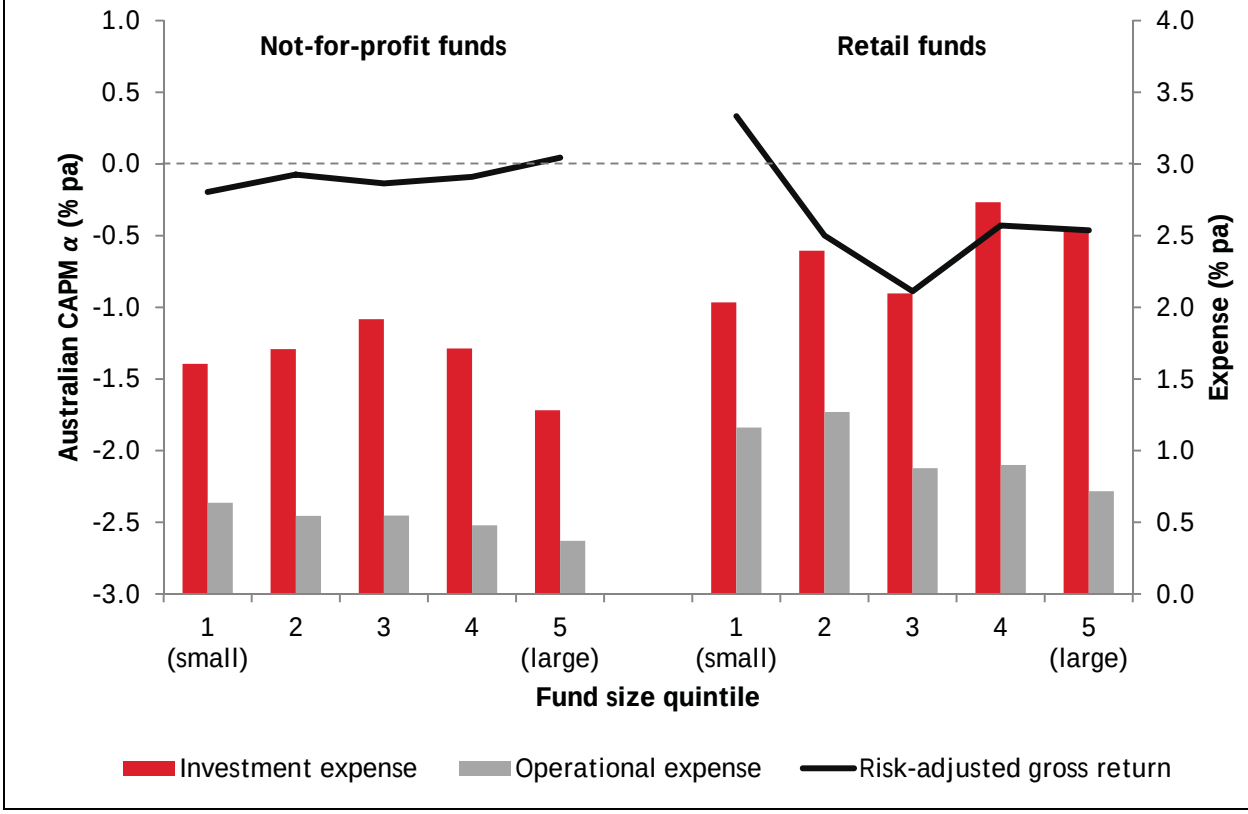
Figure 2 illustrates the risk-adjusted gross returns and expense ratios for funds in each size quintile. Table 4 reports summary statistics of gross returns, expense ratios and net returns after expenses are deducted for not-for-profit funds (Panel A), retail funds (Panel B) and all sample funds (Panel C). For each data item (for example, Australian CAPM alpha), first the asset-weighted average across all funds for each quarter from September 2004 to June 2010 is calculated and then a simple time-series average or time-series standard deviation of the cross-sectional averages is reported. Numbers in this figure and table are presented in annual terms.

[15] The regression model given in equation (2) is estimated for each superannuation fund portfolio using the entire time series of realised returns on the portfolio, the realised returns on the multi-asset class market portfolio and the risk-free rate. The estimated risk parameter ($\hat{\beta}_p$) obtained from this regression will understate the systematic risk of a portfolio if superannuation funds are able to forecast general market movements and adjust their asset allocations accordingly (see Jensen, 1968).

[16] Appendix 1 reports the loadings of the five fund-size-sorted superannuation fund portfolios using the Australian CAPM and the world CAPM.

Figure 2

PERFORMANCE OF FUNDS IN EACH SIZE QUINTILE



% pa	*Fund size quintile*				
	1 (small)	*2*	*3*	*4*	*5 (large)*
Not-for-profit funds					
Risk-adj. gross return	-0.20	-0.07	-0.14	-0.09	0.04
Investment expense	1.61	1.71	1.92	1.71	1.28
Operational expense	0.64	0.55	0.55	0.48	0.37
Retail funds					
Risk-adj. gross return	0.33	-0.50	-0.89	-0.43	-0.46
Investment expense	2.03	2.39	2.10	2.73	2.53
Operational expense	1.16	1.27	0.88	0.90	0.72

Table 4

OVERALL FUND PERFORMANCE

Panel A: Not-for-profit funds

Data item	*Fund size quintile*					*Total sample*
	1 (small)	*2*	*3*	*4*	*5 (large)*	
Gross return						
Mean %	7.33	7.42	7.30	7.41	7.49	7.44
Standard deviation %	10.35	9.87	9.64	9.53	9.09	9.22
Australian CAPM α %	-0.20	-0.07	-0.14	-0.09	0.04	-0.01
World CAPM α %	1.19	1.30	1.19	1.29	1.38	1.33
Sharpe ratio	0.16	0.17	0.16	0.18	0.20	0.19
Investment expense %	1.61	1.71	1.92	1.71	1.28	1.42
Operational expense %	0.64	0.55	0.55	0.48	0.37	0.41
Net return						
Mean %	5.09	5.17	4.83	5.22	5.83	5.61
Standard deviation %	10.41	9.86	9.67	9.54	9.09	9.22
Australian CAPM α %	-2.44	-2.33	-2.60	-2.28	-1.61	-1.84
World CAPM α %	-1.05	-0.95	-1.27	-0.90	-0.27	-0.50
Sharpe ratio	-0.05	-0.05	-0.08	-0.04	0.02	0.00

This table presents the summary statistics of returns and expenses for not-for-profit funds (Panel A), retail funds (Panel B) and all funds (Panel C). The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million. Fund returns are calculated before (gross) and after (net) deducting investment and operational expenses. These returns are adjusted using the Australian CAPM and the world CAPM. The Sharpe ratio is the average return in excess of the 90-day bank bill interest rate divided by the standard deviation of excess returns.

Table 4 *continued*

Panel B: Retail funds

Data item	*Fund size quintile*					*Total sample*
	1 (small)	*2*	*3*	*4*	*5 (large)*	
Gross return						
Mean %	7.86	7.00	6.54	7.07	6.98	6.98
Standard deviation %	8.48	9.22	8.33	9.87	10.16	10.03
Australian CAPM α %	0.33	-0.50	-0.89	-0.43	-0.46	-0.48
World CAPM α %	1.72	0.88	0.44	0.95	0.87	0.86
Sharpe ratio	0.25	0.14	0.10	0.14	0.13	0.13
Investment expense %	2.03	2.39	2.10	2.73	2.53	2.53
Operational expense %	1.16	1.27	0.88	0.90	0.72	0.76
Net return						
Mean %	4.66	3.34	3.57	3.44	3.73	3.69
Standard deviation %	8.40	9.17	8.35	9.84	10.15	10.01
Australian CAPM α %	-2.86	-4.16	-3.87	-4.06	-3.70	-3.76
World CAPM α %	-1.47	-2.79	-2.54	-2.68	-2.37	-2.43
Sharpe ratio	-0.11	-0.24	-0.24	-0.22	-0.18	-0.19

This table presents the summary statistics of returns and expenses for not-for-profit funds (Panel A), retail funds (Panel B) and all funds (Panel C). The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million. Fund returns are calculated before (gross) and after (net) deducting investment and operational expenses. These returns are adjusted using the Australian CAPM and the world CAPM. The Sharpe ratio is the average return in excess of the 90-day bank bill interest rate divided by the standard deviation of excess returns.

Table 4 *continued*

Panel C: All funds

Data item	*Fund size quintile*					*Total sample*
	1 (small)	*2*	*3*	*4*	*5 (large)*	
Gross return						
Mean %	7.46	7.29	7.05	7.29	7.17	7.18
Standard deviation %	9.80	9.57	9.18	9.60	9.58	9.56
Australian CAPM α %	-0.06	-0.21	-0.39	-0.21	-0.28	-0.27
World CAPM α %	1.33	1.17	0.94	1.16	1.06	1.07
Sharpe ratio	0.18	0.17	0.15	0.16	0.15	0.15
Investment expense %	1.72	1.98	1.98	2.11	1.94	1.96
Operational expense %	0.78	0.83	0.66	0.64	0.55	0.58
Net return						
Mean %	4.97	4.48	4.40	4.53	4.67	4.63
Standard deviation %	9.82	9.56	9.21	9.57	9.57	9.55
Australian CAPM α %	-2.56	-3.02	-3.03	-2.96	-2.77	-2.82
World CAPM α %	-1.16	-1.64	-1.70	-1.59	-1.43	-1.48
Sharpe ratio	-0.07	-0.12	-0.13	-0.11	-0.10	-0.10

This table presents the summary statistics of returns and expenses for not-for-profit funds (Panel A), retail funds (Panel B) and all funds (Panel C). The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million. Fund returns are calculated before (gross) and after (net) deducting investment and operational expenses. These returns are adjusted using the Australian CAPM and the world CAPM. The Sharpe ratio is the average return in excess of the 90-day bank bill interest rate divided by the standard deviation of excess returns.

For not-for-profit funds (Table 4, Panel A), the difference in net returns between funds in the largest fund size quintile and those in the smallest fund size quintile is 75 basis points per annum. This simple comparison could mask different exposures to risk. However, the standard deviation and Sharpe ratio suggest that risk does not drive this result. The standard deviation of net returns decreases monotonically with fund size, from 10.41 per cent per annum for the smallest funds to 9.09 per cent for the largest funds. This is consistent with larger not-for-profit funds being better diversified.

Alpha measures reported in Table 4 control more directly for market-wide risk. These measures show that not-for-profit funds in the largest quintile outperform those in the smallest size quintile. For example, using the Australian CAPM, the difference in risk-adjusted gross returns between not-for-profit funds in the largest quintile and those in the smallest quintile is 24 bps per annum. The largest not-for-profit funds also have lower investment and operational expense ratios. As a result, the difference in risk-adjusted net returns is considerably greater than the difference in risk-adjusted gross returns; the largest not-for-profit funds outperform the smallest not-for-profit funds by 83 bps per annum after allowing for expenses. In examining the results across the quintiles, the most substantial improvement in the performance of not-for-profit funds occurs when moving from the second largest to the largest quintile. Similar results hold based on the world CAPM alpha.

The results are not the same for retail funds (Table 4, Panel B). Retail funds in the largest quintile have lower and more volatile returns than those in the smallest quintile. Regardless of which alpha measure is used, retail funds in the largest size quintile underperform those in the smallest fund size quintile. For example, using the Australian CAPM, retail funds in the largest quintile have risk-adjusted gross returns which are 80 bps lower than those in the smallest quintile. The largest retail funds underperform by a similar margin based on net returns. While the largest retail funds have lower operational expense ratios, they have higher investment expense ratios than the smallest retail funds. Despite these differences, the risk-adjusted returns of retail funds are not monotonic by fund size.

Scale economies are not evident for all sample funds as a group (Panel C). Funds in the largest quintile have lower and slightly less volatile returns than those in the smallest quintile. Although the largest funds have slightly lower risk-adjusted returns than the smallest funds, no clear pattern emerges by fund size.

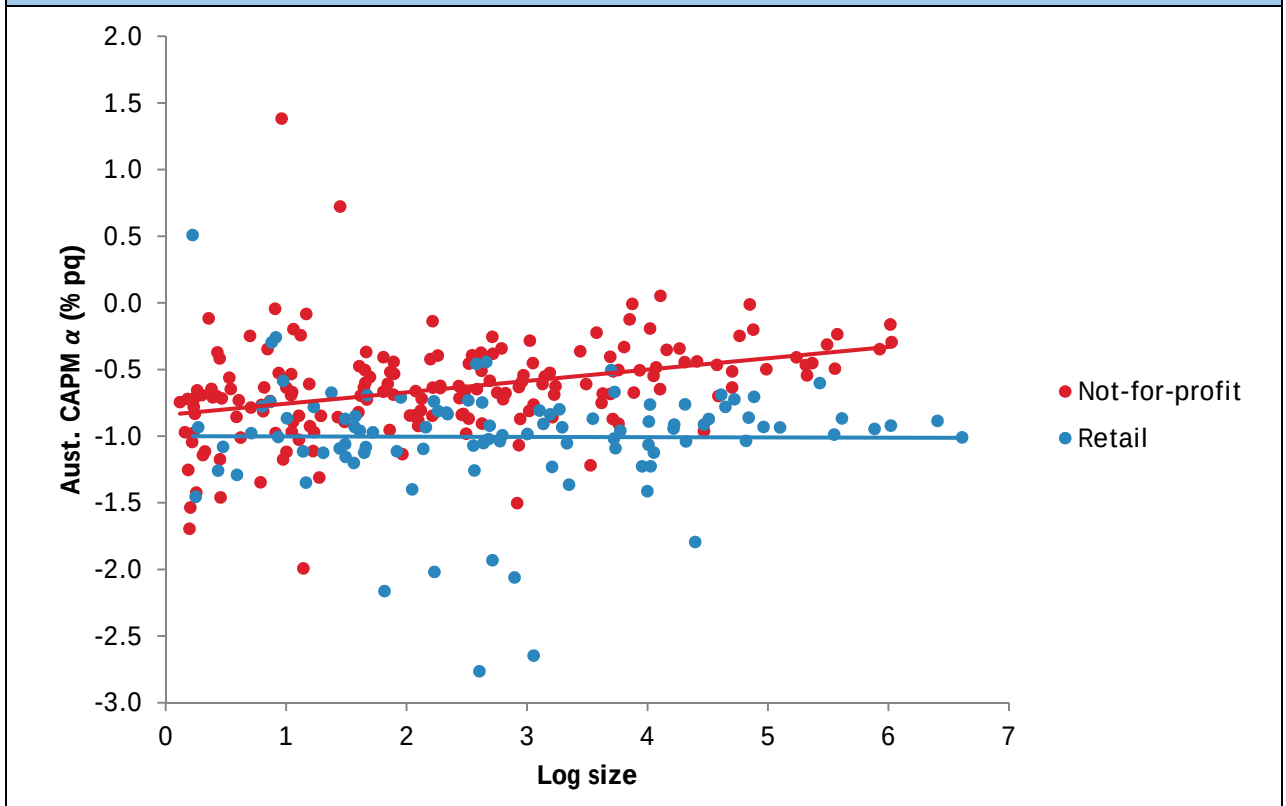
The effect of fund size on fund performance

In the empirical analysis in this section, a panel regression approach is used to examine the effect of fund size on fund performance. Specifically, one-quarter-ahead risk-adjusted fund returns (that is, alphas) are regressed on various fund characteristics including fund size. Using this approach mitigates a concern that the relation between fund size and performance may be driven by their mutual relations with other fund characteristics.

Figure 3 illustrates the relationship between fund size and fund performance, as measured by risk-adjusted net returns (using the Australian CAPM). It suggests there is a positive (upward sloping) relationship for not-for-profit funds, which is not present for retail funds. Based on the average risk-adjusted net returns reported in Table 4, the largest not-for-profit funds outperform the largest retail funds by 52 bps per quarter, which translates to 210 bps per annum.

Figure 3

RELATION BETWEEN FUND SIZE AND FUND PERFORMANCE



Mean % pq	*Fund size quintile*				
	1 (small)	*2*	*3*	*4*	*5 (large)*
Not-for-profit	-0.61	-0.58	-0.65	-0.57	-0.40
Retail	-0.72	-1.04	-0.97	-1.01	-0.93

These results do not measure the strength of the relationship between size and performance by fund type for two main reasons. First, funds with smaller member balances are overrepresented among larger not-for-profit funds, so the results with respect to the size of these funds could be attenuated by their average member balances. Second, there is a potential mechanical relationship in analysing contemporaneous size and performance, because funds that perform well will be larger. To address these issues, the panel regression analysis in this section controls for the average account balance by fund type and uses lagged fund size.

The specification of the panel regression is as follows:

$$\begin{aligned}\alpha_{i,t} = {} & \delta_{1,t} \times NFP_i + \delta_{2,t} \times RTL_i + \gamma_1 \times NFP_i \times LOGSIZE_{i,t-1} + \gamma_2 \times RTL_i \times LOGSIZE_{i,t-1} \\ & + \gamma_3 \times NFP_i \times LOGAAB_{i,t-1} + \gamma_4 \times RTL_i \times LOGAAB_{i,t-1} + \varepsilon_{i,t}\end{aligned} \tag{4}$$

where $\alpha_{i,t}$ is the risk-adjusted fund return (either gross or net), NFP_i is a zero-one dummy variable which equals one if the fund is a not-for-profit fund, RTL_i is a zero-one dummy variable which equals one if the fund is a retail fund, $LOGSIZE_{i,t-1}$ is the difference in logarithms between fund net assets and minimum net assets for sample funds of $50 million and $LOGAAB_{i,t-1}$ is the logarithm of the average account balance. Time-specific intercepts for each fund type capture any unobserved time effects not included in the model.

Table 5 reports the results. For not-for-profit funds, fund performance is positively related to lagged fund size.[17,18] The coefficients on the interaction term between *NFP* and *LOGSIZE* are larger and more statistically significant for net returns (after expenses) than for gross returns (before expenses). The effect of size on performance is also economically significant. For example (based on the Australian CAPM alpha), changing from the average not-for-profit fund in the smallest quintile to the average not-for-profit fund in the largest size quintile is associated with an increase in risk-adjusted net returns by 28 basis points per quarter, which translates to 112 bps per annum.[19] For retail funds, fund performance is negatively related to lagged fund size, although this result is statistically insignificant after allowing for expenses.

17 The regression analysis is replicated based on a reduced sample that excludes funds in the largest size quintile. Although the risk-adjusted net returns of not-for-profit funds remain significantly positively related to lagged fund size, the estimated coefficients (and *t*-statistics) are smaller. This suggests that the impact of size on fund performance is most pronounced among not-for-profit funds in the largest quintile.

18 This finding is in contrast to Coleman, Esho and Wong (2006), who find that fund size is not a significant determinant of the performance of Australian superannuation funds with assets of at least $60 million. However, there were fewer large not-for-profit funds (with assets greater than $3 billion) in the sample period for their study. This is the group for which we find the most significant size effects.

19 This represents $688 per annum in additional earnings for a member with the average account balance of $61,300.

Table 5

THE EFFECT OF FUND SIZE ON FUND PERFORMANCE

	Dependent variable			
	Gross return		*Net return*	
Independent variables	*Australian CAPM α*	*World CAPM α*	*Australian CAPM α*	*World CAPM α*
Not-for-profit × LOGSIZE	0.024**	0.022	0.062**	0.059**
	(2.01)	(1.79)	(5.20)	(4.94)
Retail × LOGSIZE	-0.045**	-0.047**	-0.034	-0.036
	(-2.48)	(-2.61)	(-1.58)	(-1.71)
Not-for-profit × LOGAAB	0.001	0.002	0.101**	0.102**
	(0.06)	(0.08)	(5.11)	(5.13)
Retail × LOGAAB	0.050	0.050	0.086**	0.086**
	(1.65)	(1.65)	(2.51)	(2.50)
Fund type × qtr intercepts	Yes	Yes	Yes	Yes
Fund intercepts	No	No	No	No
R^2	0.24	0.15	0.24	0.15
F	115.59**	46.70**	110.04**	45.83**
Funds	280	280	280	280
Observations	5,633	5,633	5,633	5,633
Effect of Q1 to Q5 change (% pq)				
Not-for-profit	0.11	0.10	0.28	0.27
Retail	-0.20	-0.22	-0.15	-0.17

This table examines the relation between fund size and fund performance. The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million. Robust *t*-statistics in parentheses are based on standard errors clustered at the fund level. ** indicates significance at the 5% level.

The positive relationship between fund size and performance for not-for-profit funds is consistent with research by Dyck and Pomorski (2011), who document substantial positive economies of scale for multi-asset class pension funds. Dyck and Pomorski find that pension funds respond to changes in size by shifting resources to where they have a comparative advantage — in particular, by increasing their allocations to alternative investments such as private equity and real estate. They find that funds realise significant economies of scale both in costs and in gross returns in these asset classes. A difference with the international evidence (which is based on defined-benefit funds) is that larger Australian superannuation funds do not manage more of their assets internally (see Table 3). Therefore, economies of scale in the sample for this study appear to be driven both by cost savings and by more effective monitoring/screening of external investment managers.

The nonexistence of scale economies for retail funds may be explained by the structure of many retail superannuation funds that operate as platforms. These funds have a platform of hundreds of investment options for investors (typically facilitated by financial planners) to choose from. The platform approach is that members create their own portfolio from this suite of products, rather than being directed into a portfolio where the asset allocation is determined by the fund trustees. The outcome of this approach is that a retail fund is often simply an aggregation of many separate investment choices, rather than a coherent investment strategy for a pooled set of assets. As such, the fund is not a 'portfolio' in the sense of having a strategic asset allocation for the whole fund across multiple asset classes and there is limited opportunity for the trustees of the fund to shift resources towards asset classes for which scale and negotiating power matter.[20]

In addition, fund performance is significantly positively related to the lagged average member balance, after allowing for investment and operational expenses. This finding applies to the risk-adjusted net returns of both not-for-profit and retail funds. The regression results imply that the outperformance of larger not-for-profit funds is moderated somewhat by their lower member balances. The average not-for-profit fund in the largest size quintile has an average member balance of $48,200, compared with $120,100 for that fund in the smallest size quintile (Table 3, Panel A). Based on the Australian CAPM alpha, this lower average balance is associated with a reduction in risk-adjusted net returns of 9 bps per quarter, or 37 bps per annum. Similar results hold based on the world CAPM alpha.

[20] This study finds that larger retail funds do not realise economies of scale with respect to investment returns. The negative relationship between fund size and the risk-adjusted returns of retail funds, reported in Table 5, does not imply that smaller retail funds outperform larger retail funds. Rather this result can be attributed to the different asset allocations of smaller retail funds during the study period.

In summary, there is strong and robust evidence of a positive relationship between fund size and the performance of not-for-profit defined-contribution superannuation funds. This evidence is consistent with Dyck and Pomorski (2011), who document substantial positive economies of scale for defined-benefit pension funds. These positive economies of scale are not evident among the retail superannuation funds in this study.

The role of investment and operational expenses

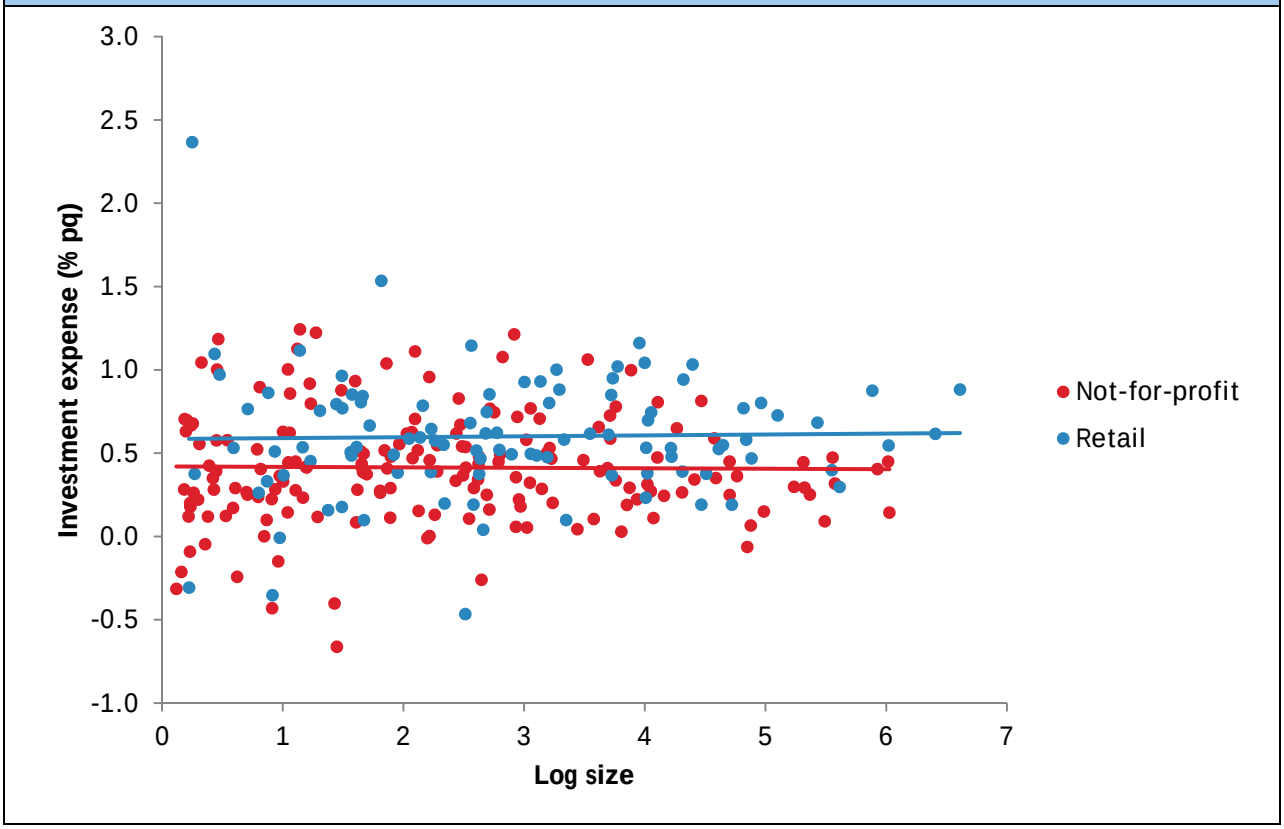
This section investigates the impact of scale on superannuation fund expense ratios.[21] To address this question, the investment and operational expense ratios are regressed against various fund characteristics including fund size. The fund's investment expenses analysed in this study take account of investment management fees, brokerage fees and other transaction costs, including those incurred by external investment managers which are passed through to the fund. The operational expenses reported by the fund take account of management (other than investment management), administration, marketing and directors/trustees fees.

The results reported in the previous section imply that larger superannuation funds realise substantial cost savings because of their scale; fund size has a more favourable effect on the net returns than on the gross returns of both retail and not-for-profit funds. Figures 4 and 5 illustrate the effect of size on funds' investment and operational expense ratios. The investment expense ratios do not exhibit any clear pattern across the range of fund sizes, except that the largest not-for-profit funds generally have lower investment expense ratios than average (Figure 4). However, a pattern emerges in the operational expense ratios, which decrease with size for both retail and not-for-profit funds (Figure 5). This downward-sloping relationship suggests that larger funds are able to spread their fixed operational costs over a larger membership base.

[21] The analysis of a fund's investment expense ratio in this section relies upon the fund's average investment expense ratio over the sample period estimated using equation (1).

Figure 4

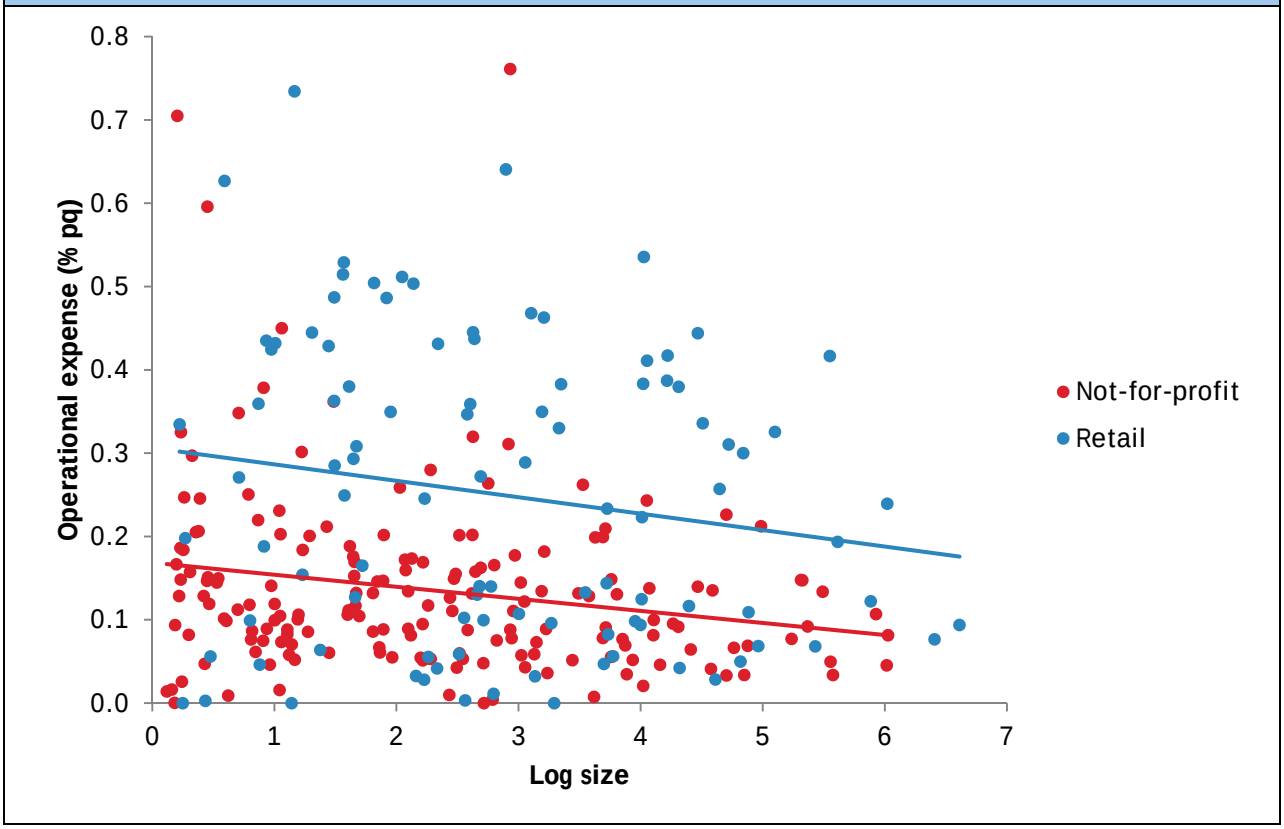
RELATION BETWEEN FUND SIZE AND INVESTMENT EXPENSE



Mean % pq	*Fund size quintile*				
	1 (small)	*2*	*3*	*4*	*5 (large)*
Not-for-profit	0.40	0.43	0.48	0.43	0.32
Retail	0.51	0.60	0.52	0.68	0.63

Figure 5

RELATION BETWEEN FUND SIZE AND OPERATIONAL EXPENSE



Mean % pq	*Fund size quintile*				
	1 (small)	*2*	*3*	*4*	*5 (large)*
Not-for-profit	0.16	0.14	0.14	0.12	0.09
Retail	0.29	0.32	0.22	0.23	0.18

Table 6 reports the effect of fund size on a fund's investment and operational expense ratios. Two regressions are reported for each expense ratio. The first regression examines the effect of fund size across the entire range of sizes, by including as explanatory variables the interaction terms between *NFP* and *LOGSIZE* and *RTL* and *LOGSIZE* (as defined in the previous section). The second regression examines whether the largest funds of each type have lower costs, by introducing a zero-one dummy variable, *SIZEQ5*, which equals one if the fund is in the fifth size quintile. Both regressions control for the average account balance by fund type.

The regression results show that fund size has an insignificantly negative effect on the investment expense ratio and a significantly negative effect on the operational expense ratio of not-for-profit funds.[22] The effect of size on the expense ratios is substantial in economic terms. For example, changing from the average not-for-profit fund in the smallest quintile to the average not-for-profit fund in the largest size quintile is associated with a decrease in investment expense of 7 bps per quarter (30 bps per annum) and a decrease in operational expense of 9 bps per quarter (38 bps per annum). The scale-related cost reductions from these two sources account for close to sixty per cent of the increase in risk-adjusted net returns experienced by the largest not-for-profit funds. Not-for-profit funds in the largest size quintile have significantly lower investment and operational expense ratios than those in the other quintiles.

In comparison, fund size has a significantly negative effect on the operational expense ratio and an insignificantly positive effect on the investment expense ratio of retail funds. Changing from the average retail fund in the smallest quintile to the average retail fund in the largest quintile is associated with a decrease in operational expense of 10 bps per quarter (41 bps per annum), that is cancelled out to some extent by an increase in investment expense of 5 bps per quarter (22 bps per annum). Nonetheless, the scale-related reduction in the operational expense ratio has a positive impact on the risk-adjusted net returns of the largest retail funds.

[22] The significantly negative effect of fund size on the operational expense ratios of both not-for-profit and retail funds is consistent with the strong scale economies in superannuation fund operating costs reported by Deloitte Actuaries and Consultants (2010: 20-7).

Table 6

THE EFFECT OF FUND SIZE ON FUND EXPENSE RATIOS

	Dependent variable			
	Investment expense		*Operational expense*	
Independent variables	*(1)*	*(2)*	*(1)*	*(2)*
Not-for-profit × LOGSIZE	-0.017 (-1.28)		-0.021** (-5.13)	
Retail × LOGSIZE	0.012 (0.51)		-0.023** (-2.06)	
Not-for-profit × SIZEQ5		-0.115** (-2.57)		-0.059** (-5.20)
Retail × SIZEQ5		0.005 (0.09)		-0.042 (-1.30)
Not-for-profit × LOGAAB	-0.051** (-2.40)	-0.050** (-2.37)	-0.049** (-4.76)	-0.047** (-4.44)
Retail × LOGAAB	-0.065** (-2.17)	-0.064** (-2.09)	0.029 (1.70)	0.028 (1.57)
Fund type × qtr intercepts	Yes	Yes	Yes	Yes
Fund intercepts	No	No	No	No
R^2	0.10	0.11	0.20	0.19
F	1.77**	23.13**	8.72**	8.55**
Funds	280	280	280	280
Observations	5,633	5,633	5,633	5,633
Effect of Q1 to Q5 change (% pq)				
Not-for-profit	-0.07		-0.09	
Retail	0.05		-0.10	

This table examines the relation between fund size and investment and operational expenses. The sample period is September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million. Robust *t*-statistics in parentheses are based on standard errors clustered at the fund level. ** indicates significance at the 5% level.

The results suggest that the largest not-for-profit funds pay lower percentage fees for asset allocation and investment management services. Moreover, the largest not-for-profit funds outsource a greater proportion of their portfolios to external investment managers than their smaller counterparts (see Table 3, Panel A). Thus, the results are consistent with the idea that the largest not-for-profit funds have greater bargaining power, which enables them to negotiate more favourable terms with external investment managers. The largest retail funds do not appear to obtain more favourable terms for investment management than smaller retail funds. However, the results suggest that larger funds (whether retail or not-for-profit) make substantial savings on operational costs, such as those on marketing, distribution and directors/trustees fees.

In addition, both the investment and operational expense ratios are significantly negatively related to the average member balance in not-for-profit funds. This finding is consistent with the idea that funds with large member balances may be able to reduce variable costs, such as those associated with member interface, investment transactions, back-office processing and insurance claims management. Investment and operational cost reductions of this nature explain almost all of the positive impact of the average member balance on not-for-profit fund performance. The investment expense ratio (though not the operational expense ratio) is significantly negatively related to the average member balance in retail funds.

Conclusion

This paper provides strong evidence that the performance of not-for-profit superannuation funds improves with fund size. In the sample period from September 2004 to June 2010, a member of one of the largest not-for-profit funds experienced risk-adjusted net returns which are typically around 112 basis points per annum higher than a member with a comparable balance in one of the smallest not-for-profit funds. The performance of retail funds does not improve with fund size.

There are three channels through which members could potentially benefit from scale: better gross investment returns, lower investment expenses and lower operating expenses. For not-for-profit funds, positive scale economies are evident through all three channels:

- Two-fifths of the overall impact of size on the performance of not-for-profit funds is realised in the form of higher gross returns. Consistent with Dyck and Pomorski (2011), larger not-for-profit funds have higher allocations to asset classes where

they are likely to have a size-related advantage, such as private equity, direct real estate and other alternative investments.

- One-quarter of the overall improvement is derived from lower investment expense ratios, which suggests that larger not-for-profit funds are able to negotiate more favourable terms with external investment managers.

- One-third is derived from lower operational expense ratios, suggesting that larger not-for-profit funds are able to spread fixed costs associated with administration and IT infrastructure over a larger asset base.

Based on this evidence, fund members are likely to benefit from further industry consolidation in the not-for-profit sector. The results of this study indicate that the greatest benefits accrue when not-for-profit funds grow to a multi-billion dollar size (the fourth and fifth quintiles) and are not exhausted at the largest Australian fund sizes.

The impact of scale on the performance of retail funds is mixed:

- Larger retail funds have lower gross returns. This finding may be explained by the structure of many retail funds which operate as platforms, on which members create their own portfolios from a suite of investment products. An implication of this approach is that there is limited opportunity for the fund trustees to optimise the investment allocation, at the whole-of-fund level, to benefit from larger size.

- No economies of scale are evident in the investment expenses of retail funds. One possible explanation for this result is that, because retail funds are more likely to outsource their investment management to related-party fund managers than not-for-profit funds (Liu and Arnold, 2010), larger retail funds may be forgoing the ability to negotiate more favourable terms on investment management contracts.

- Larger retail funds benefit from spreading fixed operational costs over a larger asset base. However, retail funds do not realise any reduction in variable costs from administering larger member balances.

While not-for-profit funds are able to realise economies of scale, this is not evident in the retail sector. The structure of retail funds, in the sourcing and offering of their investment products, is less conducive to capturing the benefits of scale. Consequently, the merits of industry consolidation are not evident in the retail sector.

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Appendix 1
Fund performance benchmarks

Table A1.1

LOADINGS CALCULATED USING THE CAPM

	Australian CAPM		*World CAPM*	
Portfolio	*Alpha*	*AMRF*	*Alpha*	*WMRF*
Panel A: Loadings estimated using gross returns				
1 (small)	-0.028	0.881**	0.319	0.772**
2	-0.055	0.870**	0.289	0.757**
3	-0.096	0.838**	0.236	0.728**
4	-0.077	0.871**	0.267	0.758**
5 (large)	-0.057	0.843**	0.276	0.732**
Panel B: Loadings estimated using net returns				
1 (small)	-0.656**	0.882**	-0.308	0.773**
2	-0.754**	0.870**	-0.411**	0.757**
3	-0.760**	0.840**	-0.428**	0.729**
4	-0.768**	0.868**	-0.425**	0.756**
5 (large)	-0.673**	0.842**	-0.340**	0.731**

This table reports the loadings of five (equal-weighted) fund-size-sorted superannuation fund portfolios on market factors. AMRF is the return on the Australian market portfolio in excess of the ninety-day bank bill rate. WMRF is the return on the world market portfolio in excess of the ninety-day bank bill rate. Loadings are calculated using the Australian CAPM and the world CAPM. The sample period is from September 2004 to June 2010. The sample excludes defined benefit funds and funds with net assets less than $50 million. Numbers in parentheses are *t*-statistics. ** indicates significance at the 5% level.

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