Measured Investment Inefficiency of the Australian Superannuation System

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Abstract

The public's positive impression of Australian superannuation comes from the rapid asset growth of the system and selective sampling inherent in focusing on performance of funds and options may over-estimate the performance of the whole system by two percent per annum due to survivorship bias. From 20 years of official data, it is shown that the poor performance of the system on average, at less than one percent over cash returns, has been masked by strong contribution flows and the exclusion of poorly performing funds in selective sampling.

By using robust methods of statistical analysis, the poor performance of the system has been largely attributed to *Retail* funds which are typically inefficient, profit-seeking operations, with excessive choices, high indirect costs, and conflicted governance. *Retail* fund members pay significant additional costs compared to *Industry* fund members due to higher investment and operational costs which are measured here for a recent three-year period.

Returns were lower (expressed as additional cost) by 1.1 percent per annum due to inferior choices of asset allocation, where the lower returns did not result in commensurate lower volatilities. Related-party service providers extracted revenue through additional indirect costs at 1.3 percent per annum. More complex operational structures of *Retail* funds cost another 0.3 percent per annum. The combined lowering of returns by 2.7 percent per annum of a *Retail* fund member compared to an *Industry* fund member, results in a nest-egg halved over a 45-year working life or a loss of about one million dollars. Better enforcement of the law on fiduciary duty of trustees is needed to improve the investment efficiency and to reduce cost of the system.

Key words: Superannuation, survivorship bias, investment inefficiencies, indirect costs, fiduciary duty.

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1. Introduction

In May 2018, just a few weeks of the Royal Commission (RC) hearings revealed far more about the financial system than did decades of numerous Government inquiries. In the case of superannuation, decades of academic and consultant research have not prepared the Government or the public for the reactions of shock and horror coming from RC revelations of fraud and deception. In other words, the free market economy in Australia is nothing like the utopia described in textbooks.

Since the 1981 Campbell inquiry, there have been decades of financial deregulation to create free and efficient markets. The first cognitive error is to assume that markets are already free and efficient – nothing is further from the truth. It is a confusion of the journey with the destination, which may never be reached. The second error is to use ideal models of the free market utopia to analyse the facts, data and observations to reach invalid conclusions about the real-world. Importantly, the third error is to blame the victims. Actual suboptimal outcomes for individuals, contrary to the expectations of the imagined utopia, are blamed on their alleged irrationality, behavioural biases or lack of education.

The free market utopia is supposed to be an economy in stable equilibrium where markets are efficient because participants are rational and well-informed, since information is assumed costless. The idea of equilibrium also leads to the assumption that fluctuations are normally distributed, with statistical significance easily measured by simple criteria (e.g. t-values, p-values etc.). Unfortunately, the assumption of a free market utopia in equilibrium has been proven dramatically false in the global financial crisis (GFC) where disequilibrium and information inefficiency were some of the proximate causes of dramatic economic collapses.

Decades of academic and consultant research based on inadequate data and flawed theories have produced over-optimistic and misleading impressions of the investment performance of the Australian superannuation system. In the next section, using most recent official data, we explain the false impressions by quantifying, for the first time, the significant level of survivorship bias in most assessments of superannuation performance.

In section 3, robust methods for calculating investment performance and costs are described. In section 4, the importance of aggregated data analysis for assessing systemic investment inefficiencies and cost is discussed. Section 5 summarises system and sector performances, which show *Retail* funds consistently and persistently under-perform *Industry* funds, without adequate compensation from lower return volatility.

Asset allocation data available in the past few years are used to construct benchmarks in section 6 in order to calculate effective cost or investment efficiency. Scale and risk-adjusted performance ranking of funds are discussed in section 7. By analysing cost in section 8, various investment inefficiencies of *Retail* funds relative to *Industry* funds have been quantified. Section 9 describes the conflicted governance structure which has allowed the transfer of member wealth to the financial industry for shareholder profit. Section 10 concludes that section 52 of the SIS Act should be enforced so that the sole-purpose of superannuation trustees is legally restricted only to perform fiduciary duty for members.

2. Survivorship Bias

The Productivity Commission has acknowledged (PC, 2018, p.116) the existence of various biases, but it has not quantified survivorship bias or indicated its direction. Generally, any current data collection should always produce an over-estimate of the actual performance of the superannuation system due to fraud, switching costs and other leakages, because the data samples do not normally capture such losses by individual members.

Through the *Financial Sector (Collection of Data) Act 2001*, the Australian Prudential Regulation Authority (APRA) has the legal power to compel superannuation entities to submit relevant data. The official data collected by APRA are the most complete and accurate, because they have been typically audited. Even so, the Productivity Commission (PC, 2018, p. 29) has discovered gaps, inconsistencies and other limitations in the APRA data, which are really Excel reports and not easily downloadable as databases. In the midst of several major government inquiries, APRA has now created a new website so that data are very difficult to find and some older data are no longer available.

Most published research is based on statistical analyses of samples of superannuation funds or investment options. The samples usually come from consultant research databases which are easier to use, but suffer from various sampling biases. The lack of legal compulsion to collect the data means there is self-selection bias, because poorly performing funds would not willingly disclose their results. Also, the need to have a reasonable track record of three, five or ten years leads to survivorship bias in the samples.

For the first time, this paper provides a quantitative estimate of the error due to the survivorship bias in extrapolating the investment performance of a sample of funds to the whole system. The most recent fund-level APRA annual data cover the period 2005-2017 inclusive. There were 111 *Large APRA* funds (with more than four members) which survived the whole 13-year period. These 111 funds are distributed among the four APRA sectors.

Table 1 shows yearly, the surviving funds as percentages of the populations.

Table 1: Survived funds as Percent of Population

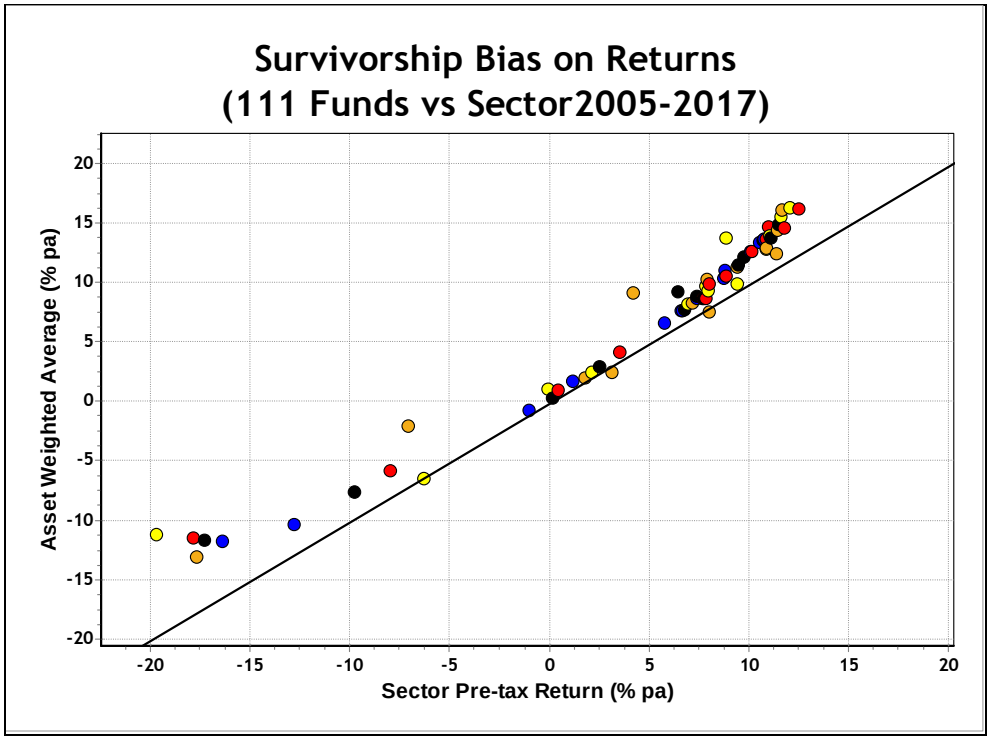
	Large APRA	Corporate	Industry	Public sector	Retail
Survivor Sample	111	13	38	11	43
Percentage representation of the population					
2005	20	5	54	55	22
2006	26	9	57	60	23
2007	30	14	58	55	24
2008	32	17	62	52	25
2009	36	22	66	52	28
2010	41	27	67	52	32
2011	47	36	73	50	40
2012	50	41	76	52	42
2013	53	45	83	55	42
2014	57	48	88	58	43
2015	58	57	90	58	43
2016	63	72	93	61	47
2017	68	76	95	65	52

Note that the dataset actually started with 1,078 distinct funds in 2005. There were 276 new funds created over the 13-year period and hence 1,354 different funds have existed at various times. Many have wound up. However, each year, many funds did not provide sufficient data to APRA because they were in the process of being created or being wound-up or were non-compliant. Of the full population of 1,078 in 2005, only 546 funds provided adequate data and hence the "population" refers only to those 546 funds which have adequate data to be included in APRA fund-level data. Of these, only 111 funds or about 10 percent of the original funds have survived the whole period.

Generally, the further back the data the less representative of the whole population are the surviving funds and the greater the bias to higher returns. For example, Table 1 shows that only 20 percent of *Large APRA* funds with data survived since 2005. The 2017 data should be close to 100 percent or fully representative of the population. The fact that it is not the case is partly due to attrition in 2017 and partly due to APRA not being able to collect adequate data. Note that *Retail* funds have only 52 percent data representation in 2017.

The method of estimating survivorship bias on reported investment performance is to compare, for each year, the performance of the surviving funds in any sector against their sector aggregate performance, using asset-weighted averages. From Table 1, it is evident that there are 65 data points of comparisons, which are shown graphically in Figure 1.

Figure 1: Survivorship Bias on Returns Comparison



The points are colour coded with *Large APRA* black, *Corporate* yellow, *Industry* red, *Public sector* orange and *Retail* blue. The points on the diagonal line would indicate the absence of survivorship bias. The fact that most data points lie above the diagonal line indicates that there is clear evidence of survivorship bias. The convexity of the deviations suggests that survivorship bias on investment returns is more pronounced in volatile markets and the performance differential can be substantial, sometimes exceeding 10 percent per annum.

An arithmetic average of 13 years of annual excess returns from survivorship bias provides measures of the average over-estimates in annual returns from survivorship bias. The results are summarised in Table 2.

Table 2: Survivorship Bias on Average Returns (2005-2017)

	Survivor Sample	Average % of Population	Average Return Bias (% pa)
Large APRA	111	45	2.0
Corporate	13	36	2.4
Industry	38	74	2.2
Public sector	11	56	2.2
Retail	43	36	1.8

Evidently, survivorship bias leads to over-estimates of system or sector returns by around two percent per annum. In Table 2, the averages of survivor samples as percentages of their populations (column 2) indicate the rates of turnover of funds which refer to new entries and exits of funds over the period. Lower percentages indicate greater turnovers, showing that *Corporate* and *Retail* sectors have lowest proportions of surviving funds.

Note the survivorship bias calculated here is much higher than the 0.7 percent estimated by the Productivity Commission (2018, p.94) when it compares SuperRatings data with APRA data. Selection bias is probably a significant factor there. Since APRA fund-level data do not include all funds, there are already selection and survivorship biases in the "full" list of APRA funds. The above calculation compares the fullest possible list of APRA funds against the aggregate data of all funds including those which are not on the list. A fuller study will be reported in the future.

It may seem surprising that the *Retail* sector has returns which are less biased from survivorship. Normally, only funds with higher returns tend to survive – hence the name: survivorship bias. However, several large Australian *Retail* funds with poor returns belonging to large financial conglomerates have also survived and even thrived in the superannuation system. The system has been inefficient in recognizing under performance and has allowed poorer performers to survive – this inefficiency has reduced the measured survivorship bias.

In conclusion, survivorship bias from limited samples of fund performances could lead to significant over-estimates of system performance. The situation is even worse for research firm data which are normally even more limited subset samples of those considered here. For example, SuperGuide (2018) reported a median return for growth investment options of 10.8 percent for calendar year 2017, whereas *Large APRA* sector return was 8.9 percent. Hence for assessing the investment efficiency of the system as a whole, it is important to use aggregated data of audited quality for the whole system and the sectors.

3. Robust Methods

The purpose of this paper is to establish significant facts about the investment performance of the Australian superannuation system so that we can develop theories to explain those facts. Hence it is generally inappropriate, and indeed illogical, to use theory to establish facts. Moreover, modern finance theory (MFT) including the efficient market hypothesis (EMH), modern portfolio theory (MPT) and capital asset pricing model (CAPM), has made so many unrealistic assumptions that it is to be avoided. In particular, it is inconsistent to use a theory which assumes markets are efficient and "costless" to investigate investment inefficiencies which we measure as costs.

On performance measurement, a Nobel Laureate of MFT, Sharpe (1991) stated:

> *The best way to measure a manager's performance is to compare his or her return with that of a **comparable passive alternative**. The latter-often termed a "benchmark" or "normal portfolio" – should be a **feasible** alternative identified **in advance** of the period over which performance is measured.*

Our method of measuring cost or investment efficiency is to develop "costless" or low cost benchmark portfolios, which are constructed generally from allocations to capital-weighted indices. Investment inefficiency or cost, or accurately "effective cost", is then defined by

$$Effective\ cost = Benchmark\ return - Actual\ return \tag{1}$$

Note that in the presence of costs, many of the assumptions of MFT need not hold. For example, there may not be a positive correlation between investment return and risk (or return volatility). Consequently, assumptions about the existence of an "efficient frontier" or optimal portfolio or "market portfolio" or concepts of alpha and beta all have to be abandoned. Instead, most real-world observations about investment markets are explained by the "Cost Matters Hypothesis" (Bogle, 2005) and the "Cost Matters Theorem" (Sy, 2009).

The method of calculating investment returns is the common standard specified by the Chartered Financial Analysts Institute (CFA Institute, 2005). Essentially, multi-period returns are time-weighted returns (geometrically compounded) of one-period money-weighted returns defined by

$$Return = \frac{Investment\ earnings}{Starting\ total\ assets + \frac{1}{2} Net\ cash\ flow} \tag{2}$$

Therefore, the method of assessing the investment efficiency of the superannuation system consists of estimating the system cost in obtaining actual system returns using equation (1). Having established different costs for different datasets, we can investigate and develop theories for the causes of the variations in cost.

Investment performance of the system can be broadly gauged from the main cumulative fund flows, as shown in Table 3 for 1997-2016.

Table 3: System Aggregate Fund Flows (1997-2016)

Flow Quantity	Aggregates over 1997-2016 ($ billion)
Starting total assets	344
Total contributions	1,697
Net cash flow (after payouts)	869
Net earnings	833
Ending total assets	2,046

The sum of starting total assets in 1997 and total contributions over the period happens to equal approximately ending total assets in 2016, at just over two trillion dollars. This observation suggests that the asset growth of the superannuation system is largely due to contributions. This has happened because substantial cumulative net payout has approximately equalled net earnings from investments totalling $833 billion.

Annual returns calculated from equation (2), when compounded over the period, produce an average system net return, after all costs and taxes, of 4.1 percent per annum. Since most of the taxes paid are contribution tax, they should be added back to the net returns to obtain a *Pre-tax* return which is more reflective of investment performance, giving a return of 5.5 percent per annum. Considering that comparable returns from cash instruments (Bank bills) over the period was about 4.8 percent, the system investment performance, at less than one percent over cash return, has been poor, for the risks taken.

The recent Productivity Commission draft report (2018) is beginning to reach similar conclusions of poor systemic performance discovered earlier (Sy, 2011), but ignored so far by other researchers. The Productivity Commission (2018) has been reluctant to draw obvious conclusions (see below) or to make suggestions on how to fix the problems.

4. Aggregate Performance

The importance of the aggregate data of the system and sectors is not understood even by APRA which was given the task of collecting the audited data. The implication for macro-prudential regulation is enormous and the lack of appreciation of these data is serious. For example, in an authorless article published in *APRA Insight* (APRA, 2017), rate of return (RoR) calculations according to equation (2) have been deprecated as being not very useful:

> *Fund level RoR is not reflective of the outcomes achieved for members as it does not accurately reflect the variation in cash flows and asset values that occurs within the fund. Within most RSEs, members participate in one or more different products. That means that assets generating earnings at the RSE level are the combination of assets held for MySuper products, choice investment products, pension products and also for fund reserves. These different segments typically have very different investment strategies, and hence asset allocations, that reflect their different purposes and risk/return targets. They are also likely to have different fees and costs.* ***This significantly diminishes the utility of the RoR calculation for assessing the quality of***

outcomes for members, and hence whether or not an RSE licensee is meeting its ongoing duty to act in the best interests of beneficiaries.

Emphasis has been added here. On the contrary, it is precisely because of the complexity of a superannuation fund or a registrable superannuation entity (RSE) that RoR calculations are very useful. With so many different structures, products, cash flows, strategies and asset allocations, and so on, what products or aspects should one pick to evaluate the performance of the RSE? For which members or beneficiaries should outcomes and interests be measured? Should we pick the product with the largest assets? Should we only pick the best, or the worst, performing product? If there are several measures how do we weight them? The costs for switching between options are also not included in the assessments.

The usual excuse is to seek like-for-like, apples-to-apples comparisons. This is strictly impossible, because all products, for example so-called growth or balanced options, are different in some way. With thousands of potentially arguable like-for-like comparisons, what conclusions could possibly be drawn about an RSE? The answer for a RSE is either strictly no conclusion or any conclusion one chooses – another smoke-screen to avoid comparison and competition.

It is important to understand the RoR of a superannuation fund is the asset-weighted RoR of all products, regardless of their asset allocation, cash flow etc. (Sy, 2009). Therefore, the RoR of a superannuation fund is the fairest possible assessment of the performance of the RSE, taking into account the various circumstances of all products. Fund level RoR *is reflective* of the outcomes achieved for the asset-weighted performance of all members in the fund.

Without aggregate data it would have been impossible to measure selection biases such as the survivorship bias discussed previously in section 2. The market would be confused by inaccurate and conflicting impressions created by different selections of products and funds in published reports. This has been the situation for far too long in Australia and elsewhere in the world.

It is understandable that academics and commercial firms have tended to focus their research and analysis on specific products (e.g. growth or balanced funds) to help individuals making decisions. Even though product information appears more directly relevant, assessments such as ranking and return comparisons may be plagued by statistical noise and survivorship bias. That is, past performance of products is not a reliable predictor of future performance, as the standard disclaimer warns. Unpredictability comes from shifts in the underlying factors responsible for the investment performance, such as changes in strategy or manager.

For an individual to make the right decision in selecting a high performing product, it is necessary to understand the factors causing past high performance and to be confident that those factors are persistent into the future. Over short periods, the performances of investment products are notoriously plagued by random noise due to market volatility. To be confident that one is not “fooled by randomness”, a high level of statistical significance requires a data history timespan often longer than the typical product lifespan.

Performances of individual products are likely to be less persistent than the performances of their funds, simply because it is much easier to change how a product is managed than how a fund is managed. The factors which are persistent relate to operational structure and management characteristics such as: public offer or non-public offer, for profit or not-for-profit, large or small size, the types of directors of trustee boards and different fund policies. Over the long-term, persistent factors lead to persistent performance characteristics (Sy, 2018a; 2018b). Hence even though individuals ultimately choose products, it is just as important to choose sector and funds based on persistent characteristics.

The tendency of APRA, the regulator and the financial services industry to focus more and more on individual products is counter-productive because they are really not helping individuals, but merely shifting attention away from systemic issues. There is already an abundance of research on individual products by academics and research firms. The data show that this research has not helped most individuals to make better decisions and it has not helped to lift systemic investment performance.

For individuals and for the regulator which is tasked with macro-prudential responsibilities, the aggregate performances of groups of funds into sector performances are more important than it is commonly realised. In fact, the RoR, on its own, when applied to suitable aggregates, is very important and easily accessible, and provides a single measure of investment performance. The RoR is what we call Pre-tax return (before contribution tax) and what APRA and the Productivity Commission call net return. Net return is a key measure for the efficiency of the superannuation system (PC, 2016, p.7):

> *Maximising net returns (after fees and taxes) is the most important way in which the superannuation system contributes to adequate and sustainable retirement incomes.*

It has been proved mathematically (Sy, 2009) that the asset-weighted average *net returns* of all individual account balances is equal to the net return of the whole superannuation system.

5. System and Sector Performance

Time and space limitations permit only a summary of the major findings reported in two lengthy papers (Sy, 2018a, 2018b). The first paper in this series is based on annual data for the 19-year period 1997-2016 and showed that the under-performance of the *Retail* sector versus the rest of the system was consistent and persistent, suggesting that the result is due to enduring high-cost factors in the operation of *Retail* funds. The second paper uses quarterly data from 2004 and asset allocation data from 2013 to attribute costs to fund operations involving factors such as choice, portfolio construction and indirect costs from poor *Retail* fund governance.

The aggregate performance of APRA regulated institutional funds (with more than four members) called collectively *Large APRA* is the asset-weighted measure of institutional funds with different operational structures and characteristics. Distinct groups of funds have been classified into sectors.

With a few exceptions, the *Corporate* sector and *Public sector* funds are non-public-offer, not normally open to public membership, while *Industry* and *Retail* sector funds are open and they compete for membership. It is inappropriate to shy away from a focus on the rivalry between the public-offer sectors because a choice of those two sectors is most relevant and important for the vast majority of workers.

Lobbying from those competing sectors has created a certain amount of acrimony, but it should be the duty of the regulator to reduce the dispute of facts by publishing objective reports. Without truthful information, individuals and policy makers remain in the dark and the market remain inefficient, as evident by the poor investment performance of the superannuation system. The current Productivity Commission inquiry, like other inquiries before it, has to discover the truth for itself, climbing a steep learning curve in a relatively short time.

The compound average geometric returns (CAGR) for the sectors from annual APRA data are displayed in Table 4.

Table 4: Average returns for sectors (CAGR) 1997-2016

	Corporate	Industry	Public sector	Retail	Large APRA
Net investment return (after costs)	6.1	7.2	6.6	5.4	6.1
Operating expenses rate	0.4	0.6	0.3	0.9	0.6
Pre-tax return (after all costs)	5.7	6.7	6.3	4.6	5.6
Super tax rate	3.6*	0.4	0.6	1.0	0.9
Net return (after all costs and taxes)	2.1*	6.3	5.8	3.6	4.6

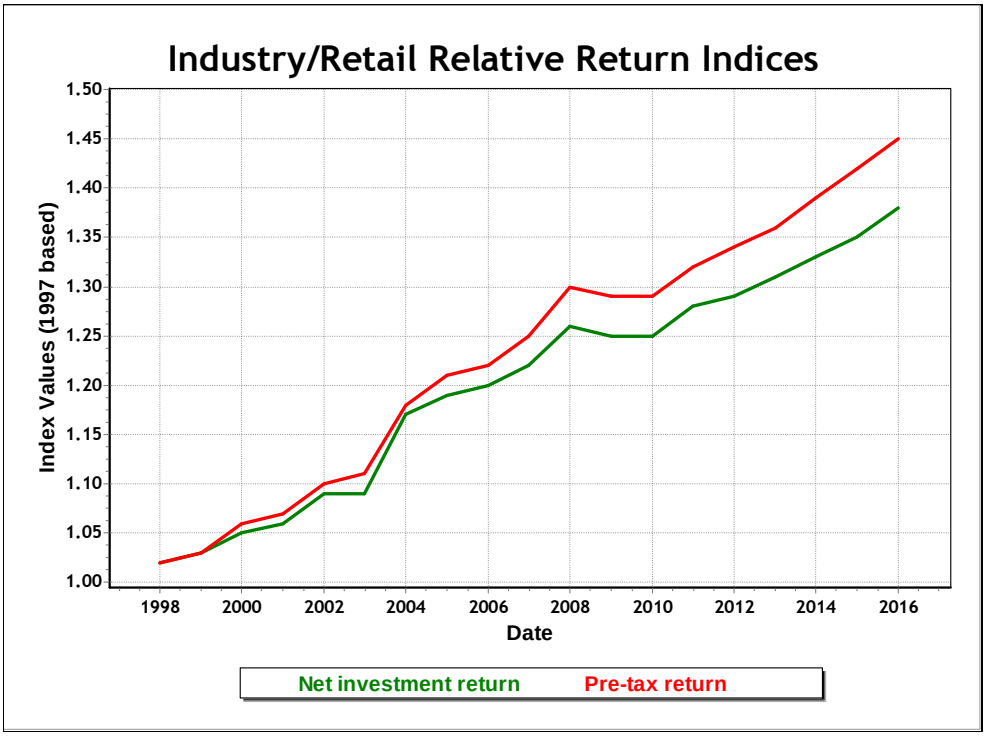
Note instead of institutional *Large APRA* funds getting 5.6 percent per annum average return as calculated here, survivorship bias estimated in Table 2, could increase the Pre-tax return to, a more respectable but erroneous, 7.6 percent or higher in other studies using limited sample selections.

The investment performance of the superannuation system (Sy, 2018a, p.18) has been influenced substantially by the *Retail* sector, because it has had historically highest share of cumulative total contributions ($503 billion) and the highest share of institutional assets reaching $545 billion in 2016.

Over the period, the inefficiency of the superannuation system can be attributed significantly to the consistent and persistent under-performance of *Retail* funds relative to *Industry* funds by an average of 2.1 percent per annum (after all costs but before taxes). The *Retail* sector returned 4.6 percent compared to 6.7 percent of the *Industry* sector and 6.3 percent of the rest of the system respectively. At March 2017, *Retail* sector assets were $577 billion; if the *Retail* sector had performed in line with the *Industry* sector, then the outcome of the whole system would have improved by over $12 billion per annum.

The relative performance between *Industry* and *Retail* sectors can best be illustrated by a relative return index, which removes fluctuations caused by market volatility which affects both sector returns. The relative return index is defined and calculated here by dividing the *Industry* sector return index by the *Retail* sector return index, as shown in Figure 2.

Figure 2: Industry vs Retail Funds Relative Performance



The steadily rising lines in the figure demonstrate consistent (low volatility) and persistent (almost monotonic) out-performance of *Industry* funds against *Retail* funds. The bottom curve is due to sector differences in average *Net investment return,* which is the investment return received by the funds after all fees and all investment related taxes.

The top curve represents sector differences in average *Pre-tax return (*net of all costs), which is *Net investment return* minus operating costs associated with fund administration. The gap between the top and bottom curves is attributed to the 0.3 percent per annum in differential *Operating expenses* between the sectors.

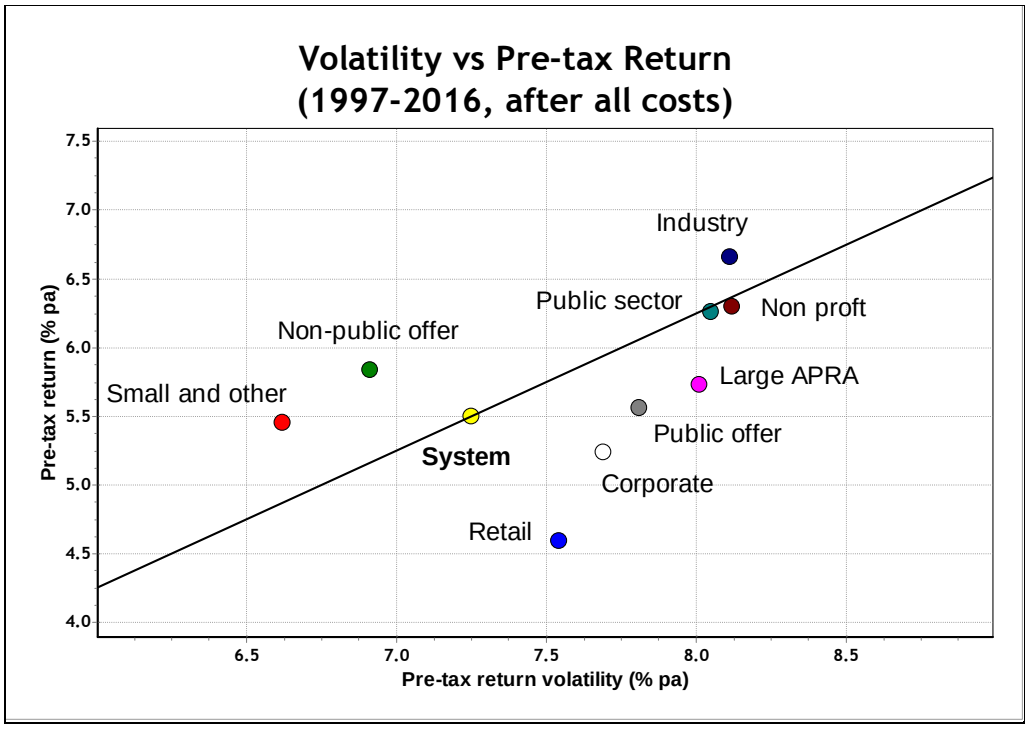
It is well-known that *Retail* funds have higher *Operating expenses* due to more complex operational structures from offering many more choices of investment options. The 0.3 percent per annum increase in *Operating expenses* may be regarded as an estimate of one component of investment inefficiency due to excessive choice (ISA, 2017). More choices also increase the need and the cost of financial advice which typically subtracts from *Net investment return*.

Due to an abundance of choices, *Retail* fund members are effectively making their own asset allocations. To the extent that they have to pay for financial advice (which they often do not realise or understand that they are paying for advice), they are actually paying for asset allocation and portfolio construction as an additional cost to themselves. In contrast,

most *Industry* funds, by making simple and limited choices for members, are effectively providing services of asset allocation and portfolio construction, without additional cost to them, as an integral part of their trustee duty.

In absolving themselves of their fiduciary duty, *Retail* fund trustees have blamed lower *Net investment returns* on their members for making suboptimal decisions on asset allocations. There is empirical evidence that *Retail* funds do have lower return volatility, presumably from more defensive asset allocation, as Figure 3 shows.

Figure 3: Risk/Return Trade-off (Annual 1997-2016)



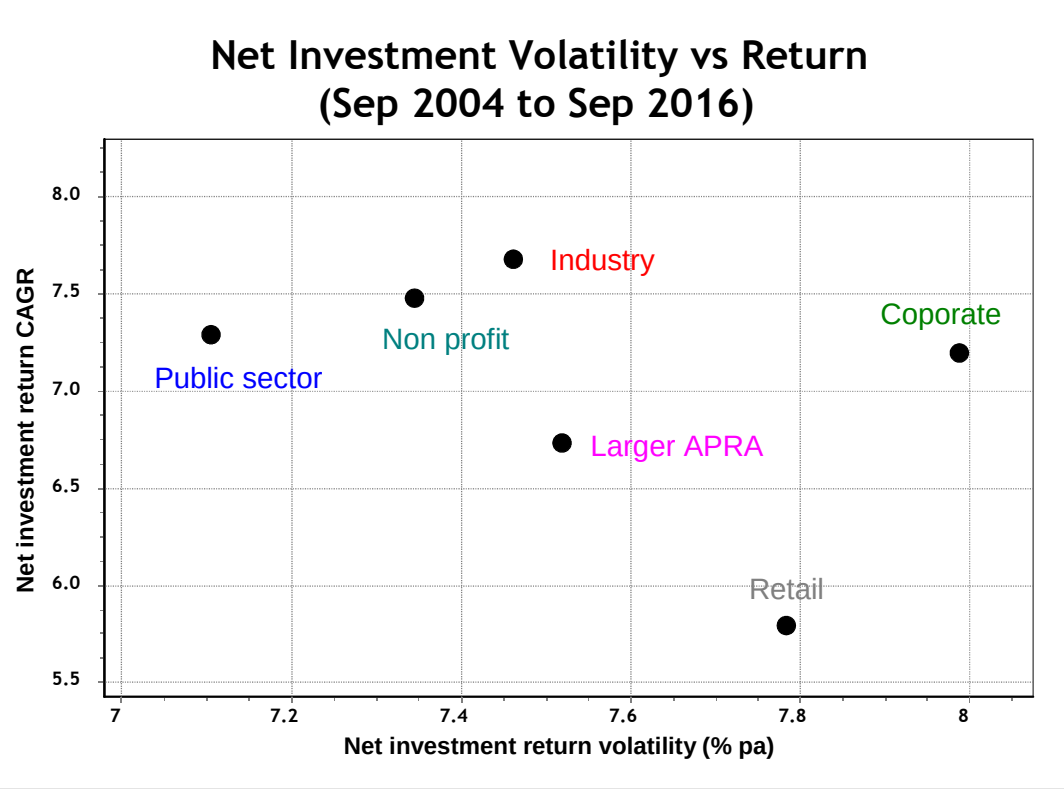
The diagonal line is a 45-degree line (distorted by the aspect ratio of the chart) representing equal increments in volatility and *Pre-tax return*, representing risk-return trade-off. The line is drawn through the point for the whole superannuation system, which is taken to be the benchmark for peer comparison. All points along the reference line represent equal risk-return efficiency relative to the system as a whole.

Figure 3 shows that *Retail* funds did have lower investment volatility (averaged over the 19-year period) than other institutional funds, but they also had substantially lower average returns. The resulting risk-return inefficiency indicates poor trade-offs for *Retail* members.

Evidence suggests that the market is inefficient because the correlation between risk and return is relatively poor, which we attribute to costs. Risk or return volatility determined by asset allocation is not a sufficient explanation for the poor returns achieved by *Retail* funds. From Figure 3, if the market were efficient without significant costs, the returns from *Retail* funds would be at least one percent higher, bringing the risk-return trade-off closer to textbook expectations.

The impact of asset allocation as a main explanation for the poor performance of *Retail* funds is even more questionable in some dataset. Quarterly APRA data have been available since September 2004, with more frequent data collection. The twelve years (48 quarters) risk/return comparison to September 2016 is shown in Figure 4.

Figure 4: Risk/Return Trade-off (Quarterly Sep 2004 - Sep 2016)



The quarterly data from 2004 to 2016 show risk aversion of *Retail* funds, as evident from more defensive asset allocation data (see below), had failed to achieve benefits, because lower returns and higher costs of *Retail* funds did not benefit members with lower risk (see Figure 4). Instead of lower volatility, the lower *Retail* returns came with higher volatility, contrary to academic theories which ignore costs, as mentioned earlier.

Various studies (Sy, 2018a, 2018b) have indicated that *Retail* funds on average cost two to three percent per annum more than *Industry* funds. If the return of *Retail* funds were increased by two percent (adding back the wealth extracted through indirect costs), then the risk/return trade-off would be consistent with the assumptions of ideal modern portfolio theory (MPT). This observation provides the evidence to suggest that the market is not efficient and non-conformal to theory because of costs.

6. Asset Allocations and Benchmarks

Following the recommendations of the Super System Review (2010), APRA started to collect asset allocation data and published them since September 2013. Over the three-year period

of available data, sector asset allocations appear relatively stable (Sy, 2018b, Appendix). A snapshot of sector asset allocations in September 2016 is shown Table 5.

Table 5: Asset Allocation (%) to Major Asset Classes, September 2016

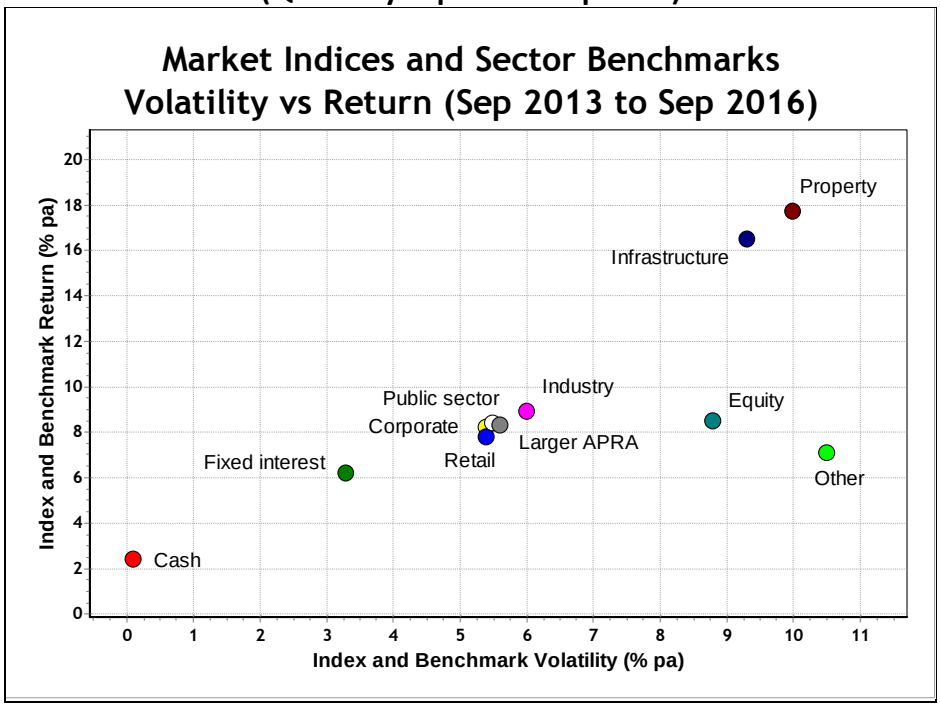
Sector	Corporate	Industry	Public sector	Retail	Large APRA
Cash	9	10	12	15	13
Fixed income	27	17	22	23	21
Equity	48	50	47	50	49
Property	9	11	9	7	9
Infrastructure	4	9	5	2	5
Other	2	3	5	4	4

Public sector and *Corporate* sectors have overall defensive assets similar to those of the *Retail* sector, with 34-38 percent allocations to cash and fixed income. However, earlier findings demonstrate these sectors have consistently better *Net investment returns* than *Retail* funds (see Table 4), thus discounting the impact of asset allocation on returns.

Instead of defensive assets, the *Industry* sector has the highest exposure (at 20 percent allocation) to Property and Infrastructure, which are mostly unlisted and illiquid assets. Choice and encouragement of "engaged" *Retail* members to switch options increase costs and prevent *Retail* funds from investing in illiquid assets.

Using standard benchmark indices (Sy, 2018b, p. 19) and available asset allocation data for sectors, sector benchmarks are calculated and compared with market indices in Figure 5.

Figure 5: Volatility/Return of Benchmarks and indices (Quarterly Sep 2013 - Sep 2016)



In the grand scheme of things, sector asset allocations and benchmarks are not so dramatically different (being bunched together in the middle of the chart). The relatively minor differences result in similar benchmark characteristics when compared to the wide dispersion in characteristics of market indices. The *Retail* and *Corporate* benchmarks have the theoretically equal lowest volatilities of 5.4 percent per annum compared to the highest of 6.0 percent.

In aggregates, compared to outcomes of market indices, the consequences of asset allocations on performance are not substantially different between sectors. Therefore, large performance differences in sector returns are unlikely to be explained predominately by asset allocation.

When reasonably chosen, benchmark returns (before costs) normally exceed *Net investment* returns (after costs), because it is virtually impossible for large portfolios net of investment costs to beat benchmarks (Sy, 2009). In equation (1), cost is defined by benchmark return minus actual return and value added is defined as negative cost. A risk-adjusted investment performance measure can be defined by using the benchmark volatility as a risk measure. Risk-adjusted performance ranking can be achieved by the risk-adjusted value added (RAVA) metric defined by (Sy and Liu, 2009):

$$RAVA(\%) = 100 \times \frac{Value\,added}{Benchmark\,volatility} \tag{3}$$

Value added (negative cost) for each sector is calculated in Table 6. The RAVA metric is also shown for a risk-adjusted ranking of the sectors in the bottom row.

Table 6: Sector Value Added and *RAVA*
(% pa, 3 Years to Sept 2016)

	Corporate	Industry	Public sector	Retail	Large APRA
Net investment return	7.5	8.9	8.3	6.5	7.7
Benchmark return	8.2	8.9	8.4	7.8	8.3
Value added	-0.7	0	-0.1	-1.3	-0.6
***RAVA* (%)**	-13	0	-2	-24	-11

Evidently, *Industry* funds have minimized costs, while *Retail* funds have incurred the highest costs. At top RAVA rank, *Industry* sector was evidently marginally ahead of the *Public sector*, while the *Retail* sector was at the bottom for the three year period to September 2016.

7. Scale and Risk Adjusted Performance

The *Industry* sector has some of the largest individual funds in Australian superannuation. This fact has often been assumed to be the main explanation for the observed comparative under-performance of the *Retail* sector, because it has many more funds of smaller size.

The Government, through APRA, attempted to legislate that sufficient scale be a criterion to decide whether a Registrable Superannuation Entity (RSE) be allowed to operate a default fund (Super Amendment, 2012). However, we pointed out (Sy, 2012) empirical data did not support scale as an essential criterion for efficiently operating *all* funds. The evidence for economies of scale benefiting members was obtained only for *Industry* funds and not *Retail* funds. The Productivity Commission (2012) has also rejected scale as a criterion in fund selection for default superannuation. In principle, the requirement of sufficient scale can create a barrier to entry to prevent innovation and market competition and to entrench oligopoly.

With asset allocation data from APRA officially available for individual funds since June 2014, individual benchmarks for each fund can be constructed to measure fund-level investment efficiency on a risk adjusted basis, according to the RAVA metric given in equation (3) above. To assess investment efficiency in this paper, three-year averages of benchmark returns are compared with corresponding three-year actual returns of individual funds.

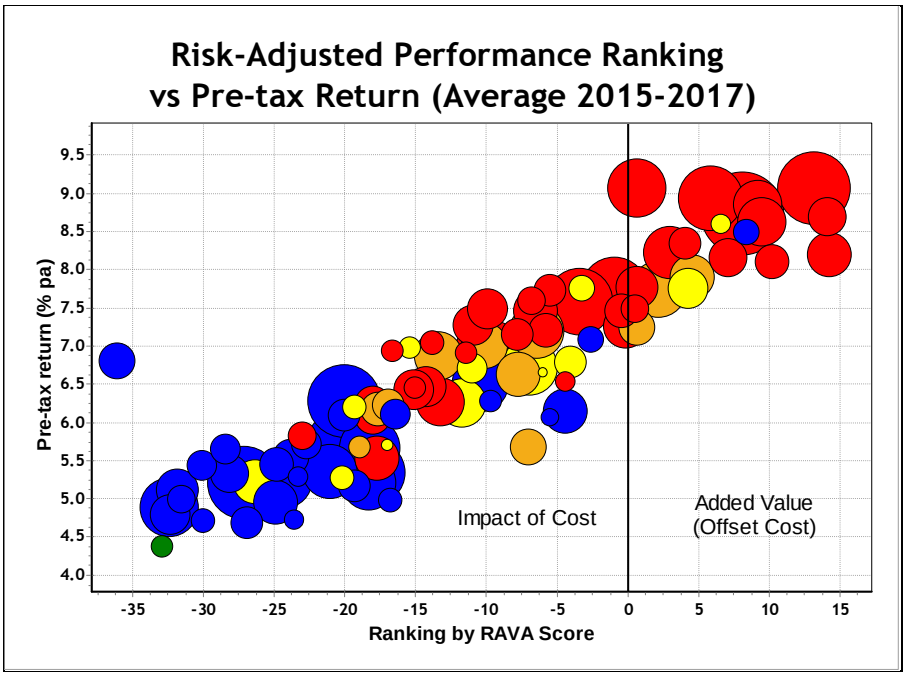
The fullest sample of funds available has distribution of *Total asset* sizes which is highly skewed and non-normal, ranging from $23 million to $103 billion in 2017. To give a qualitative impression of the impact of size, we define a "point size" for graphics by

$$Size = 0.01[Log_{10}(Total\ assets)]^4 \qquad (4)$$

There is no deep significance of this size transformation, which is entirely determined by visual appeal circumscribed by graphics software in order to convey the correct impression.

In Figure 6, fund performances are represented by data points of varying sizes defined by equation (4). On a risk-adjusted basis, investment efficiency improves monotonically to the right of the bottom axis.

Figure 6: Risk-Adjusted Investment Efficiency (2015-2017)



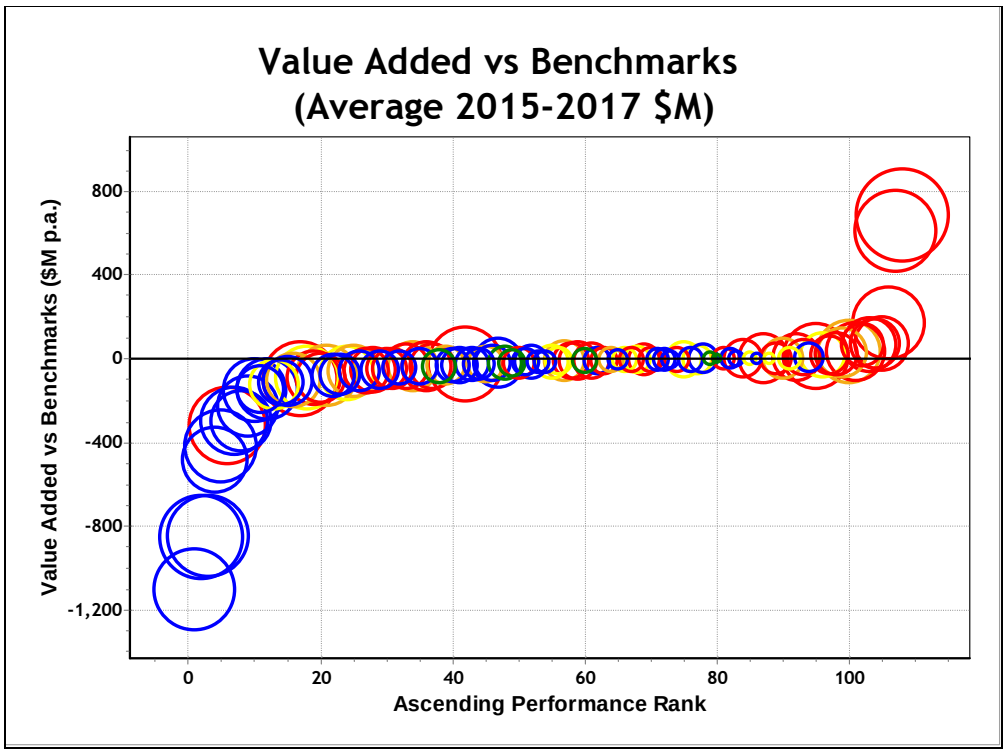
The points are colour coded with *Corporate* yellow, *Industry* red, *Public sector* orange, *Retail* blue and *Retail ERF* green. A few outliers at the extreme lower end have been ignored. The actual Pre-tax returns, shown on the left axis, are positively and linearly correlated with RAVA scores, as risk-adjusted performance. This fact shows that realized *Pre-tax* returns are already a good indicator of investment efficiency, even allowing differences in asset allocation and risk, as measure by return volatility.

Gross benchmarks have been used to measured absolute costs. If a one percent per annum cost budget is allowed to implement net benchmark portfolios, then the number of funds underperforming their net benchmarks was 55 out of 108 funds or 51 percent of sample of funds. Of the 55 underperformers, 37 are *Retail* funds (six ERFs), nine *Industry*, five *Corporate* and four *Public sector* funds.

One this evidence, investment performances have a "bar-bell" distribution, with most assets concentrated at the two ends of the performance spectrum. *Retail* funds, particularly large ones, have been least investment efficient, while large *Industry* funds have been most investment efficient. The result confirms that scale cannot be used simply as a criterion for fund selection. Economies of scale apply to *Industry* funds, but not to *Retail* funds.

Expressed in dollars, how individual funds contribute to overall performance of the superannuation system, the value added (negative of cost, see equation (1)) ranking in ascending order is shown in Figure 7.

Figure 7: Dollar Value Added as Measure Investment Efficiency (2015-2017)



The average value added over 2015-2017 in percent per annum is multiplied by 2017 *Total assets* to give an indicative yearly cost in dollars. Note that one large *Retail* fund (BT

Retirement Wrap) costs about $1.1 billion per annum to operate, while AustralianSuper adds $680 million above its gross benchmark return. Of the bottom ten performers, all are *Retail* funds except only one *Industry* fund (REST); the other nine include the five from four major banks, AMP, Macquarie, IOOF and Mercer (not in order). Evidently poor performances of large *Retail* funds contribute most of the cost of the superannuation system, while this cost is offset by value added by some large *Industry* funds, notably AusSuper, Unisuper and CBUS.

The fact that large amounts of assets have been captured and remained with poorly performing funds suggests there is a lack of market competition in the *Retail* sector and in the superannuation system. The data provide a possible explanation for why smaller *Retail* funds have resisted merging because smaller *Retail* funds are competitive with larger *Retail* funds. Also, active management favoured in the *Retail* sector is more likely to succeed with smaller funds. These observations are not meant as a recommendation for active management or for smaller *Retail* funds.

Despite differences in scale, asset allocation and risk, the empirical results confirm that differences in investment efficiency and performance are determined largely by costs (Sharpe, 1991; Bogle, 2005; Sy, 2009).

8. Attribution of Costs

The *Retail* sector has had a major influence on investment performance of the superannuation system (Sy, 2018a, p.18), because it has had historically the highest share of total assets and the highest share of total contributions. Only recently has *Retail* sector size dominance among *Large APRA* funds begun to wane relative to the *Industry* sector. Hence, the poor investment performance of the Australian superannuation system is largely attributable to the *Retail* sector, which performed worst against the expectations of the benefits from market-driven competition.

To investigate the sources of the investment inefficiency of the *Retail* sector, its performance is compared with the other public-offer sector: the *Industry* sector. Over the three years to September 2016, an attribution of costs and their differences between the sectors are shown in Table 7.

Table 7: Public Offer Pre-tax Return Attribution (% pa, 3 Years to Sept 2016)

	Industry	Retail	Difference
Benchmark return	8.9	7.8	1.1
Investment cost	0	1.3	1.3
Operational cost	0.5	0.8	0.3
Pre-tax return	8.4	5.7	2.7

Over the three-year period, the under performance of the *Retail* sector at 2.7 percent per annum is even greater than the 19-year average of 2.1 percent per annum (see Table 4). Over the period, relative to *Industry* funds, suboptimal asset allocation decisions cost *Retail*

fund members 1.1 percent per annum, additional investment costs (both direct and indirect) 1.3 percent and more complex operational structure costs 0.3 percent. All these cost differentials add up to 2.7 percent in relative under-performance for *Retail* fund members.

Consider the following illustrative scenario where the averages of various economic variables over 45 years for a typical worker are given by Table 8. The average *Pre-tax* return of an *Industry* fund is assumed seven percent, while that of a *Retail* fund is 4.3 percent or 2.7 percent less, similar to historical performances.

Table 8: Compare the Pair Scenario (averages over 45 years)

Quantity	Value
Starting salary ($)	50,000
Inflation (% pa)	3
Cash rate (% pa)	5
Real wage growth (% pa)	1
Contribution rate (% pa)	10
Contribution tax rate (% pa)	15
Net investment premium over cash (% pa)	2
Excess *Retail* cost (% pa)	2.7

After 45 years of work, the nest-egg of a member in an *Industry* fund would be $2.083 million, while the nest-egg of the same member in a *Retail* fund would be $1.107 million, which is about half or exactly 47 percent less – a loss of nearly one million dollars. In its draft report, with a different case study, the Productivity Commission has reached similar conclusions of substantial losses in retirement nest-eggs over working lives (PC, 2018, p.117). On average, making the wrong decision about the sector from which an individual chooses their superannuation fund or option can have devastating consequences for their retirement.

9. Governance

Both the *Industry* and *Retail* sectors are dominated by several funds with large total assets. The top ten public-offer funds have $510 billion in total assets which are split equally between *Industry* and *Retail* sectors with five funds in each sector. However, substantially more than 50 percent of the assets of large *Industry* funds are invested directly, providing opportunities to benefit from economies of scale, while large *Retail* funds have little direct investments and thus afford themselves fewer opportunities to reap the benefits of scale.

The large *Retail* funds mostly belong to vertically integrated financial conglomerates: AMP and the four major Australian banks. In a 2006 APRA governance survey, Sy et al. (2008) found that *Retail* trustee directors are different from other directors of non-profit funds.

Retail trustee directors have less “skin in the game”, as fewer of them are stakeholders (Sy, et al., 2008):

> Directors of *Corporate*, *Public Sector* and *Industry* funds are largely (59 per cent to 75 per cent) drawn from stakeholders such as employer–sponsors and fund members, and to a lesser extent (3 per cent to 33 per cent) from industrial unions and government. In contrast, only 20 per cent of *Retail* directors are drawn from particular stakeholders or official bodies, a majority (66 per cent) representing none of those interests.

Retail trustee directors also often work for related-party service providers (Sy, et al., 2008):

> *Retail* directors are mainly (93 per cent) senior executives and directors, whose primary employers are often (33 per cent) service providers. Over 60 per cent of *Retail* directors have one or more associations with service providers. This is more than twice as frequent as directors of *Corporate* funds and about three times as frequent as those of *Public sector* or *Industry* funds.

More recently, Liu and Ooi (2017) have confirmed that *Retail* funds outsource to service providers which are predominately related parties. Conflicted directors could make decisions which benefit their related service providers at the expense of members of their own superannuation funds (Liu and Ooi, 2017).

Empirical evidence shows that instead of having their own interests aligned with members of their funds, *Retail* trustee directors interests are aligned with shareholders of their profit-making organizations and their related service providers. This breaches the fiduciary duty required by Section 52 of the *Superannuation Industry (Supervision) Act 1993* (SIS Act) to protect the interests of fund beneficiaries. In effect, *Retail* superannuation funds are primarily to make profits for shareholders as commercial concerns, which sell investment products to their members as customers, at highest possible prices allowed by a competitive market place, as seen from a free market perspective.

Industry funds generally have much higher rates of compliance in reporting and disclosure of information, including those on costs and governance (e.g. PC, 2018, p.31). Yet, there has been an attempt by the Government and APRA to legislate superannuation governance of *Industry* funds to be based on the *Retail* model with more "independent" and skilled directors (Sy, 2017). Such a reform is counter-productive and would further damage the investment performance of the Australian superannuation system.

Retail funds have conflicted governance structures primarily designed to make profit for shareholders. This is to the detriment of fund members who are assumed, by neoliberal policy, to be fully informed consumers rationally choosing retail superannuation products in a free market utopia. Along with others, global pension expert Ambachtsheer (2018) explains the dysfunction of financial markets as follows:

> *In my view, the answer lies in the 'asymmetric information' thesis of Nobel Prize Laureate George Akerlof. He posits that in markets where buyers know less about what they are buying than sellers know about what they are selling, buyers will pay a too high price for too little value. It is hard to think of larger markets around the world where this is the case than the markets for financial services.*

Superannuation members need to be protected from exploitation resulting from information asymmetry which has been created by *Retail* funds through confusing choices of complex superannuation products. The Government and APRA need to prevent, rather than aid and abet (Sy, 2017), the conflicted governance structures that have resulted in looting the wealth of beneficiaries.

10.Conclusion

The poor investment performance of the Australian superannuation system has been masked by large contribution flows over the years and by erroneous statistical analysis caused, among other things, by survivorship bias of data samples. The optimistic impressions of reasonable investment performance of the system have been misleading.

The poor performance of the system can be attributed substantially to the *Retail* sector, which had the largest share of total assets and the largest contributions over the years and yet was the worst performer, lagging other public-offer funds in net return (after all costs) by an average of two to three percent per annum. The level of under-performance cannot be justified on a risk-adjusted basis by asset allocation, because the lower returns are largely due to hidden indirect costs associated with making profits for shareholders.

The measured investment inefficiency of the system caused by inefficient profit-seeking operations of the *Retail* sector, estimated conservatively, costs Australians currently between $12 billion to $16 billion per annum. Essentially, *Retail* fund members are unaware that they are subject to wealth extraction through many indirect costs, called “hidden fees” by Ted Benna (2017), who has admitted fathering a “monster” (Olshan, 2016) in creating US 401(k) plans, the equivalent of *Retail* funds here.

Evidently, the competitive forces among *Public-offer* funds have not worked well over time, because the *Retail* sector has had the largest contribution flows, but the worst long-term investment returns (before taxes), averaging 4.6 percent per annum since 1997. In many cases, *Retail* fund members do not even know what costs they are paying and what investment returns they are getting, let alone understand their products – information asymmetry is rife as explained by Ambachtsheer (2018).

One simple and effective reform to improve the investment performance of the Australian superannuation system is to enforce a “sole-purpose law” of fiduciary duty of superannuation trustees. For-profit trustees with outside shareholders are not working for the sole-purpose of performing fiduciary duty obligated to superannuation beneficiaries as required by the SIS Act (see Section 52, (2)(d)):

> *(d) where there is a conflict between the duties of the trustee to the beneficiaries, or the interests of the beneficiaries, and the duties of the trustee to any other person or the interests of the trustee or an associate of the trustee:*

> *(i) to give priority to the duties to and interests of the beneficiaries over the duties to and interests of other persons; and*
>
> *(ii) to ensure that the duties to the beneficiaries are met despite the conflict; and*
>
> *(iii) to ensure that the interests of the beneficiaries are not adversely affected by the conflict; and*
>
> *(iv) to comply with the prudential standards in relation to conflicts;*

Almost the same requirements apply to trustee directors. While the law does not explicitly exclude or ban situation of conflicts of interest arising from profit-making, it does require that "*the interests of the beneficiaries are not adversely affected by the conflict*". The empirical evidence collected here and elsewhere has shown that beneficiaries have been adversely affected by the activities of conflicted trustees. Therefore the law of fiduciary duty has been breached due to mismanagement of the conflicts of interest.

An effective enforcement of fiduciary law would require that for-profit trustees be banned from superannuation. For the same reason, top ranking countries in pension management such as Denmark and the Netherlands have only allowed non-conflicted and non-profit trustees as the world's best practice (Ambachtsheer, 2018).

The enforcement of a sole-purpose law for trustees will have minimal structural impact on the $160 billion per annum (in 2017) Australian financial services industry, which will continue to provide services to superannuation funds. The main change is neither more regulation nor deregulation, but correct enforcement of the existing regulation to improve the function of markets closer to the free market utopia of Adam Smith. Competitive fees will be set openly in free markets rather than monopolistic fees being set covertly by vertically integrated oligopolies.

Australia, its superannuation funds and millions of members will benefit enormously from an annual reduction of between $12 billion and $16 billion, in unnecessary costs from wasteful financial activities associated with wealth transfer to executives and shareholders. Current discussions about wealth re-distribution by tax and pension payments to redress the problem of retirement income inequality will be helped substantially by our proposal to eliminate an original source of significant wealth inequality which has been occurring in the operation of Australian superannuation.

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