Australian Government
Productivity Commission

Investment performance methodology and analysis

Superannuation: Assessing Efficiency and Competitiveness
Draft Report
Technical Supplement 4

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The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

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Technical supplement 4: investment performance methodology and analysis

This technical supplement expands on analysis presented in chapter 2 (investment performance). It covers three areas. First, it details the different data sources used, including their strengths and weaknesses. Second, it provides detail on the methods and assumptions adopted (the construction of benchmark portfolios (BPs) in particular). And third, it presents supporting analysis. This includes sensitivity tests flagged in chapter 2 in relation to:

- results over different time periods
- alternative assumptions about administration fees applied to BPs
- alternative assumptions about tax applied to BPs
- alternative assumptions about asset allocation
- different methods for calculating returns.

The supporting analysis is structured in the same order as the analysis in chapter 2. The assumptions and data underlying all investment performance analysis relative to the benchmarks presented in the draft report and this supplement are summarised in table 4.1. Broadly, time periods and tax adjustments were the more sensitive of the inputs employed, while asset allocation assumptions had less material effects on the results.

The data selected, and methods, assumptions and analysis employed by the Commission are the result of extensive consultation processes from stage 1 and stage 3. These processes included two technical workshops during the stage 1 study and much consultation with industry experts. The Commission is seeking further feedback (particularly on BP inputs) via submissions (box 4.1, information request 2.1), and will likely hold a technical workshop on investment benchmarking prior to the final report.

Box 4.1 **Feedback sought on the draft report analysis**

The Commission is seeking input from inquiry participants on whether the assumptions underpinning the Commission's benchmark portfolios are appropriate and, if not, how they should be revised and what evidence would support any revisions.

Specifically, feedback is sought on:

- data sources used in the analysis (including the indexes), their limitations, and how the Commission has dealt with those limitations
- the methodology used to estimate net returns, including discussion about alternative methods such as account-weighted and money-weighted returns
- the construction of benchmark portfolios, including assumptions made, the evidence supporting those assumptions and limitations
- sensitivity testing of key inputs and assumptions.

4.1 Data

The Commission's analysis of investment performance made use of data from regulators and private research firms. More information on all the data used by the Commission can be found in appendix B.

Regulator data

APRA data offer the most comprehensive view of the system as APRA-regulated funds make up a substantial portion of the superannuation system. System- and fund-level data are available back to 1997[1] (although the data are only in a usable form for the Commission's analysis from 2004 because different calculation and collection methods were used prior to 2004). The Commission received additional data from APRA on a confidential basis, which included more detail than datasets publicly available (appendix B). However, aspects of APRA's current reporting framework only commenced in 2013, and thus the Commission has had to work around a degree of discontinuity. For example, asset allocation reporting dramatically changed between 2013 and 2014.

1 Generally, a single year cited reflects a financial year ending June of that year. In this case, 1997 represents financial year 1996-97.

Table 4.1 **Summary of investment performance analysis[a,b,c]**

Investment performance analysis of system (in chapter 2 and tech. supp. 4)

		Actual returns				*Benchmarks*				
Analysis	*Figures/tables*	*Unit of analysis*	*Data*	*Time periods*	*Bias*	*BPs used*	*Tax rate*	*Admin expenses*	*Asset allocation*	*Other sensitivity testing*
Time series of annual returns	Figure 2.2	APRA funds and SMSF funds	Regulator data	1997 -2016	None	System BP1, BP2 (for 2005–2016)	System median (APRA funds)	(APRA-regulated) system median	BP asset allocation data: APRA Unlisted/listed allocation: System Domestic/ international property allocation: System	Investment returns (gross of admin fees) Member weighted returns
Long-term annualised returns	Figures 2.3, 2.7, 4.15, Tables 4.15, 4.20	APRA funds and SMSF funds	Regulator data	2006–2015 2008–2015 2011–2015 2005–2016 2009–2016 2012–2016	None	System BP1, BP2	System median (APRA funds), 5%			
Long-term standard deviation	Figures 4.8, 4.14	APRA funds and SMSF funds	Regulator data	2006–2015 2005–2016	None	System average asset allocation & 70:30 System BP1, BP2	System median (APRA funds)			
Long-term returns of options by option type (asset band)	Figures 2.4, 4.9, Table 4.16	APRA fund asset band segments	SuperRatings data	2005–2016 2009–2016 2012–2016	Selection bias	Asset band BP1, BP2	System median (APRA funds), 5%			
Long-term returns by asset class	Figure 4.12, Table 4.18	APRA fund asset class	Fund survey	2008–2017	Selection bias	Asset class indices and international benchmarks				

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Table 4.1 (continued)

		Actual returns				*Benchmarks*				
Analysis	*Figures/tables*	*Unit of analysis*	*Data*	*Time periods*	*Bias*	*BPs used*	*Tax rate*	*Admin expenses*	*Asset allocation*	*Other sensitivity testing*
Long-term returns of Choice/MySuper	Figures 2.6, 4.13, Table 4.19	APRA fund option segment returns	SuperRatings data, Rainmaker data	2005–2016 2009–2016 2012–2016	Selection bias	Segment tailored BP1, BP2	System median (APRA funds)	MySuper and Default investment options: Bottom quartile (APRA funds) Choice: SuperRatings choice segment median	BP Asset allocation data: SuperRatings/ Rainmaker Unlisted/listed allocation: System Domestic/ international property allocation: System	
Long-term returns of retirement/ accumulation	Figures 2.8, 4.18, Table 4.22		SuperRatings data, Rainmaker data	2005–2016 2009–2016 2012–2016	Selection bias	Segment tailored BP1, BP2	System median (APRA funds), 5%	SuperRatings segment medians		
Long-term standard deviation of retirement/ accumulation	Figure 4.17		SuperRatings data	2005–2016	Selection bias	Segment tailored BP1, BP2	System median (APRA funds)	SuperRatings segment medians		

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Table 4.1 (continued)

		Actual returns				*Benchmarks*				
Analysis	*Figures/ tables*	*Unit of analysis*	*Data*	*Time periods*	*Bias*	*BPs used*	*Tax rate*	*Admin expenses*	*Asset allocation*	*Other sensitivity testing*
Long-term returns of for profit and not for profit	Figures 2.7, 4.20, Table 4.15	APRA fund segment returns	Regulator data	2005–2016, 2009–2016, 2012–2016	None	Segment tailored BP1,BP2	System median (APRA funds), 5%	Segment median (APRA funds)	BP Asset allocation data: APRA Unlisted/listed allocation: Fund type Domestic/international property allocation: Fund type	Investment returns (gross of admin fees) Member weighted returns Only current funds With static 2016 asset allocation
Long-term standard deviation of for profit and not for profit	Figure 4.14	APRA fund segment returns	Regulator data	2005–2016	None	Segment average asset allocation and 70:30 System BP1, BP2	System median (APRA funds)	Segment median (APRA funds)	BP Asset allocation data: APRA Unlisted/listed allocation: Fund type Domestic/international property allocation: Fund type	
Long-term returns of options by option type (asset band) and fund type	Figure 4.16, Table 4.21	APRA fund options by asset band and fund type	SuperRatings data	2005–2016	Selection bias	Asset band tailored BP1, BP2	System median (APRA funds), 5%	Segment median (APRA funds)	BP Asset allocation data: APRA Unlisted/listed allocation: System Domestic/international property allocation: System	

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Table 4.1 (continued)

		Actual returns				*Benchmarks*				
Analysis	*Figures/tables*	*Unit of analysis*	*Data*	*Time periods*	*Bias*	*BPs used*	*Tax rate*	*Admin expenses*	*Asset allocation*	*Other sensitivity testing*
Long-term fund level returns	Figures 2.9, 4.19, Tables 4.23, 4.24	Individual fund returns	Regulator data	2005–2016	Selection and Survivor bias	Fund BP2	Individual fund tax, 5%	Individual fund, system median (APRA funds)	BP Asset allocation data: APRA Unlisted/listed allocation: Fund level Domestic/international property allocation: Fund type	With static 2016 asset allocation
Short- and Long-term MySuper product returns	Figures 2.11, 2.12, Tables 4.25, 4.26	Individual MySuper product returns (from APRA and SuperRatings)	Regulator data, SuperRatings data	2014–2017 2008–2017	Selection bias (for long-term)	MySuper segment BP2	System median (APRA funds), 5%	Bottom quartile (APRA funds)	BP Asset allocation data: SuperRatings/Rainmaker Unlisted/listed allocation: System Domestic/international property allocation: System	
Long-term Choice option returns	Figures 2.13, 4.20, Tables 4.27, 4.28	Individual Choice option returns	SuperRatings data	2005–2016	Selection and survivor bias	Option BP1	System median (APRA funds), 5%	SuperRatings Choice segment median, fund-type segment median (APRA funds)	BP Asset allocation data: SuperRatings Domestic/international property allocation: System	

a Investment fee assumptions are not listed as they do not vary by analysis (table 4.14). **b** All APRA asset allocation data used in benchmarks are adjusted for the default investment asset allocation and use Rainmaker data for 'other' apportioning (section 4.2). **c** Only analysis which used benchmarks are included in this table.

Further, while all APRA-regulated funds are covered in APRA data, there were patches of poor reporting. For example, a large number of (typically retail) funds reported zero investment expenses in some years (tech supp. 5). Another key limitation is that fund-level data typically represent an aggregation of numerous investment options, and therefore may not necessarily reflect an actual member experience.

APRA also publishes MySuper product-level data from 2013, in both a quarterly and annual form. The Commission has used both, depending on which is best suited to a given purpose. While these datasets are comprehensive (covering the entire default segment), the time period is too short for meaningful long-term analysis.

APRA fund-level and MySuper data are the only audited data with full APRA segment coverage available to the Commission. As such, despite the limitations, the Commission has drawn on APRA data as its primary source.

APRA data do not cover SMSFs. To address this gap, the Commission drew on data provided by the ATO for 2006–2015. However the Commission was only provided with aggregated data (across the SMSF segment, or by brackets, such as size brackets). This limited the scope of the Commission's analysis. Analysis was further limited by the fact that ATO data are not comparable to APRA data, as further outlined below.

Research firm data

The Commission purchased data from superannuation research firms SuperRatings and Rainmaker to undertake investment performance analysis. Research firm data offer more granular insights into individual products and investment options (as opposed to funds) in the system, which is closer to the member experience.

The key limitation of these data sources is that they only cover a subset of investment options in the system. These are typically options with relatively high numbers of member accounts, which gives rise to selection bias issues. If many smaller (and potentially poorer performing) options are not covered, the dataset may present a more positive assessment of the overall system than is actually the case.

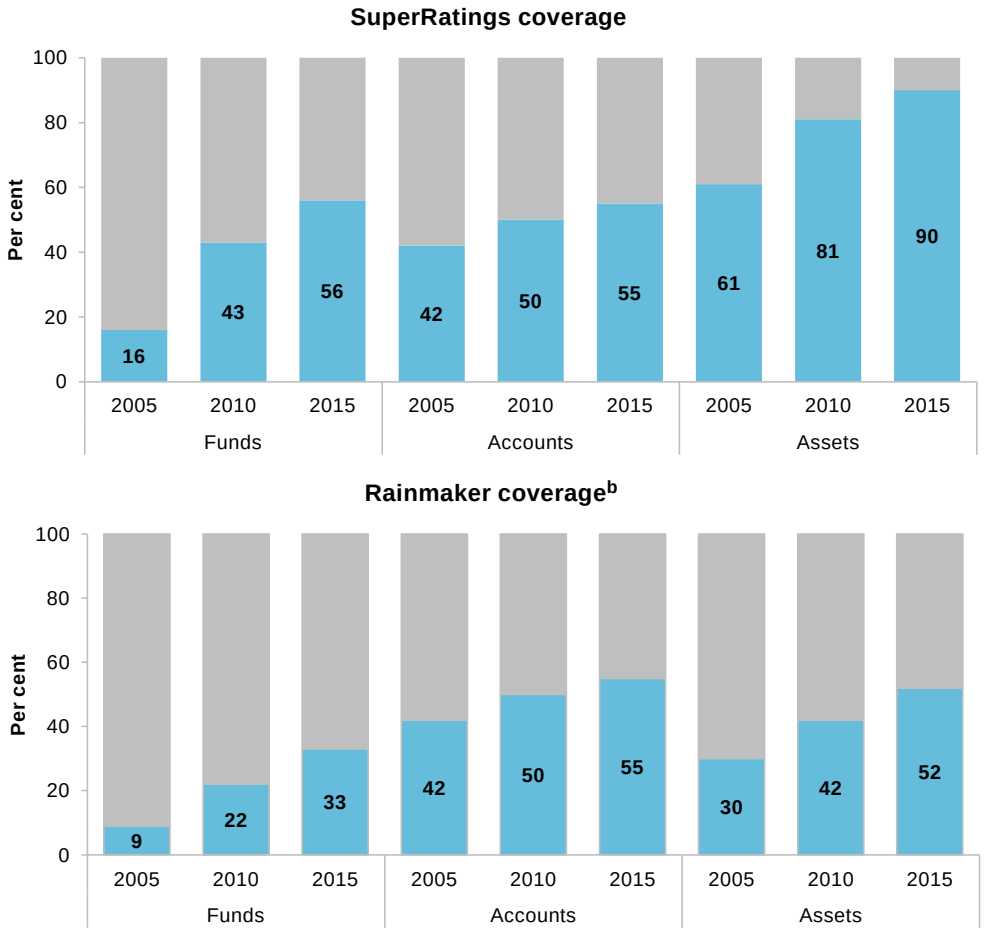
Further, data from these research firms are not primarily designed for a thorough historical investigation of the system. The Commission had to undertake its own matching and linking of investment options over time and across datasets. Further details are provided below.

The Commission also purchased data from CEM Benchmarking of Canada on the net returns to individual asset classes achieved by pension funds in other countries. The Commission's intention was to compare these returns with Australian data collected from the Commission's funds survey. As discussed in chapter 2, the poor response rate to the funds survey has prevented the Commission from making this comparison in the draft report. However, the Commission will write to fund CEOs to seek this data again in time for the final report.

Selection bias

In order to measure any potential selection bias in research firm data, the Commission compared these data to APRA data on the full population of APRA-regulated funds. The Commission counted an entire fund's assets and accounts as being present in a research firm dataset if at least one product or option from that fund appears.[2] Effectively, this approach produced an 'upper bound' of coverage. While the coverage has improved over time, large gaps remain (figure 4.1).

Figure 4.1 **Research firm data coverage[a]**



a Coverage is measured as a per cent of the system of APRA-regulated funds. **b** Approximately 9000 out of 29 000 (about 33 per cent) of the option-year combinations in the Rainmaker dataset could not be matched to funds in the APRA data (based on the ABN), meaning the Rainmaker coverage 'upper bound' is underestimated.

Sources: PC analysis of APRA confidential fund-level data, Rainmaker data and SuperRatings data.

2 Due to the lack of correspondence between fund and product/option data SuperRatings collect, the Commission assumed a fund was present in SuperRatings' product/option-level data if the fund was present in SuperRatings' fund information dataset.

The fact that research firm data are a subset of the broader population does not imply selection bias in itself. To assess whether the sample is biased, the Commission assessed representation by[3]:

- fund type (figure 4.2) — industry funds are much better represented in both datasets than other fund types, and corporate and retail funds are generally poorly represented
- fund size (table 4.2) — funds missing from research firm databases are typically much smaller
- fund returns (table 4.2) — funds missing from research firm databases typically have lower returns.

Overall, analyses using research firm data are likely to be subject to selection bias in terms of fund type, fund size, and fund returns. The combination of these factors is likely to produce a positive bias. That is, investment performance may appear 'better' than is actually the case. And further, while overall coverage improves over time, this selection bias persists over time.

Table 4.2 **Research firm data coverage[a]**

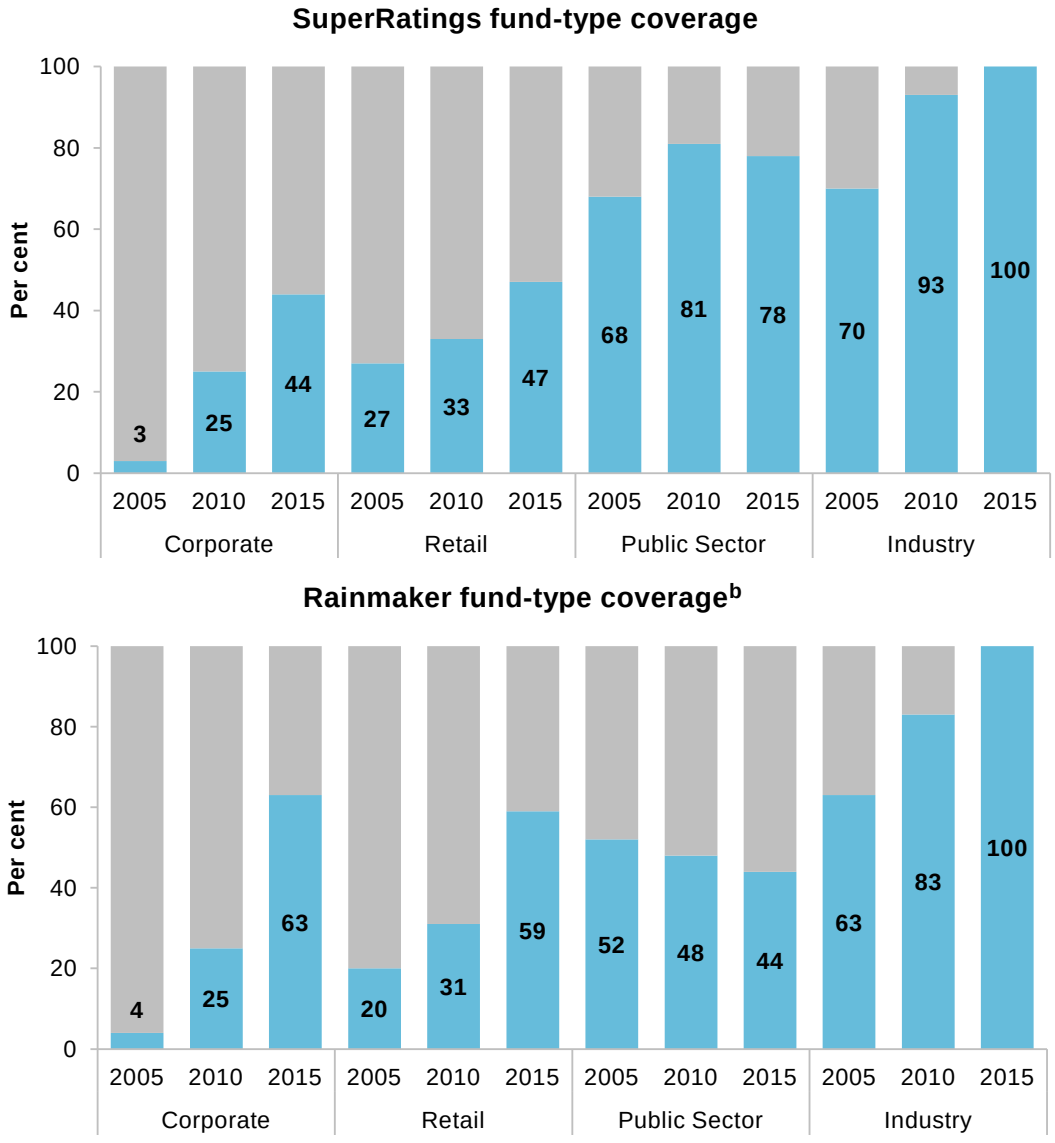
	2005	*2010*	*2015*
SuperRatings			
Median return of funds in both (%)	12.2	8.6	8.1
Median return of funds in APRA only (%)	11.8	9.1	6.8
Median assets of funds in both ($b)	0.80	1.30	2.70
Median assets of funds in APRA only ($b)	0.01	0.06	0.09
Rainmaker[b]			
Median return of funds in both (%)	13.0	9.0	8.6
Median return of funds in APRA only (%)	11.8	8.8	7.1
Median assets of funds in both ($b)	0.80	1.40	2.60
Median assets of funds in APRA only ($b)	0.02	0.14	0.40

a Coverage is measured as a per cent of the system of APRA-regulated funds. **b** Approximately 9000 out of 29 000 (about 33 per cent) of the option-year combinations in the Rainmaker dataset could not be matched to funds in the APRA data (based on the ABN), meaning the Rainmaker coverage 'upper bound' is underestimated.

Sources: PC analysis of APRA confidential fund-level data, Rainmaker data and SuperRatings data.

3 Fund type, fund size and fund returns data are always from APRA data. For the purposes of the selection bias assessment, research firm data are only used to break up APRA data into the two groups; 'Funds represented in research firm data' and 'Funds not represented in research firm data'.

Figure 4.2 **Research firm data coverage[a]**



[a] Coverage is measured as a per cent of the system of APRA-regulated funds. [b] Approximately 9000 out of 29 000 (about 33 per cent) of the option-year combinations in the Rainmaker dataset could not be matched to funds in the APRA data (based on the ABN), meaning the Rainmaker coverage 'upper bound' is underestimated.

Sources: PC analysis of APRA confidential fund-level data, Rainmaker data and SuperRatings data.

Matching and linking of options

A key aspect of the Commission's assessment was to assess the long-term performance of individual products or options, both in the default and choice segments.

For the default segment, product-level analysis with SuperRatings data[4] necessitated linking current MySuper products with pre-2013 precursor products. 66 of 108 current MySuper products were linked backwards to produce 10 years of data. For most products, this process was relatively simple as the pre- and post-2013 product names were very similar. This linking was done with the support of SuperRatings where requested.

Rainmaker data are sourced from funds' annual reports, Product Disclosure Statements and other public information. Many options in the Rainmaker dataset see slight variations in names across years. The Commission has transformed the data and undertaken its own linking of investment options over time. This was necessary to undertake individual product- and option-level analysis.

In both these processes, the Commission was conservative, only matching options over time where there were obvious links (for example, minor rewording of option names). Inevitably, there are likely to be many products in both datasets that have existed for the relevant period but were not able to be linked due to being substantively renamed.

4.2 Methods and assumptions

The Commission's analysis of investment performance can broadly be decomposed into two parts — calculating the actual returns produced by (and within) the system, and calculating the benchmarks used to assess these returns. This section details the methods and assumptions involved in both parts.

Net returns and investment returns

As in chapter 2, most returns analysis is on a 'net of everything'k basis — all administration fees, investment fees and tax. However, in analyses using SuperRatings returns data, the returns are reported crediting rates which are returns net of investment fees, tax and *implicit* asset-based administration fees. This means that fixed administration fees (separately levied on a member's account) are not factored in, and asset-based administration fees are only counted in the case that a fund reports a crediting rate that is net of asset-based administration fees. This latter point represents an inconsistency the Commission was unable to overcome. For consistency with the rest of the chapter, the Benchmark Portfolios (BPs) are calculated net of all administration fees, investment fees and tax.

In some cases, pure investment performance is of interest and the Commission has estimated net *investment* returns (net of investment fees but not administration fees or taxes).

4 Similar analysis was attempted with Rainmaker data but SuperRatings had superior coverage.

Rate of return and return on assets

There are different ways to calculate both a simple annual return and an annualised average return. Calculating a simple annual return is complicated by the fact that the level of underlying assets can change during the year due to contributions. The ATO and APRA use different methods to adjust for this. APRA's standard one-year rate of return (ROR) measure is:

$$ROR = \frac{Net\ earnings\ after\ tax}{Cashflow\ adjusted\ net\ assets}$$
$$= \frac{Net\ earnings\ after\ tax}{Net\ assets\ at\ start\ of\ year + \frac{1}{2}(Net\ members\ flows + Net\ insurance\ flows)}$$

The ATO's standard one-year return on assets (ROA) measure[5] is:

$$ROA = \frac{Net\ earnings\ after\ tax}{Average\ assets\ over\ the\ period}$$

The Commission has tested the impact of these different methods (figure 4.3), using advice provided by ATO. This entailed calculating ROA for APRA-regulated funds using the ATO's formula. This results in a fall in the 10-year return for APRA funds (using the same data) and implies that SMSF returns may appear higher if measured using APRA's ROR method. Advice provided by ATO suggests that there are a number of other differences with the calculations that neither the Commission or ATO can test for, as the data collected by ATO and APRA are fundamentally different.

Geometric returns

From these one-year returns, the Commission calculated annualised returns as a geometric average. This takes account of compounding returns over time. Geometric returns were calculated as follows:

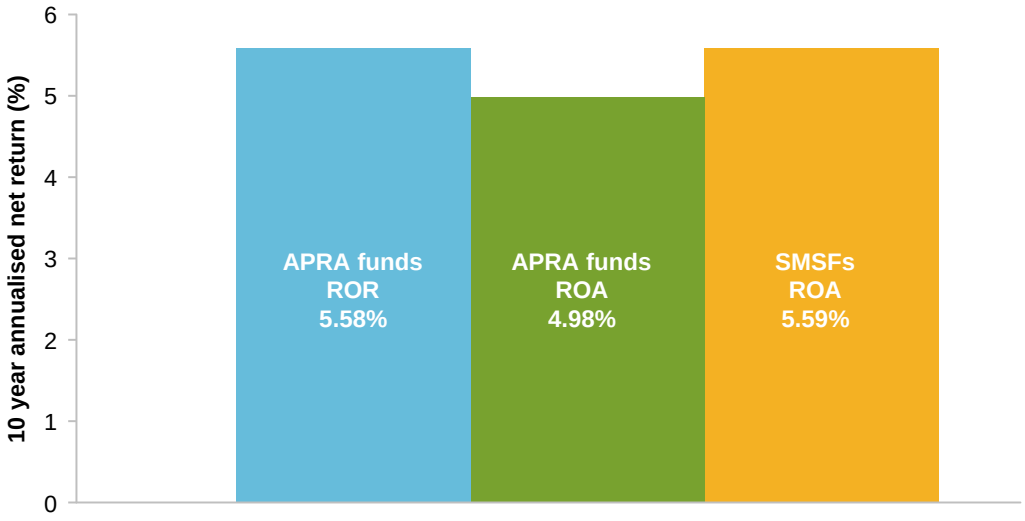
$$R_{iT} = \left(\prod_{t=1}^{T}(1 + r_{it})\right)^{\frac{1}{T}} - 1$$

Where:

- R_{iT} = the annualised return to system/segment/fund/option i across T years
- r_{it} = the return to system/segment/fund/option i in year t

5 Note that average assets over the period is simply the average of the assets at the start of the period and assets at the end of the period.

Figure 4.3 **Comparison of alternative return methods**
2006–2015, Rate of return (ROR) and return on assets (ROA)



Sources	PC analysis of APRA confidential data, ATO confidential data and financial market index data (various providers).		
Coverage	All APRA-regulated funds and SMSFs. Excludes exempt public sector superannuation schemes, eligible rollover funds and insurance-only superannuation funds.		
Survivor Bias	No.	**Selection Bias**	No.

Time-weighted and money-weighted returns

In stage 1, the Commission (PC 2016a) considered using money-weighted returns in its assessment framework. Money-weighted returns are also known as internal rates of return and are often used in the context of evaluation of prospective investments by a firm. Money-weighted returns are the discount rate that equates the present value of outflows with the present value of inflows. Implicit in this calculation is an allowance for the timing of when inflows and outflows are incurred.

APRA's annual rate of return is a money-weighted return, as it accounts for inflows and outflows. Thus, a large portion of the Commission's measurement of returns was therefore a combination of the two — money-weighted *annual* returns and time-weighted (geometric average) *annualised average* returns.

However, the Commission did not use money-weighted measures of annualised average performance for several reasons. First, many assumptions would need to be made. Second, with the exception of APRA data, the Commission does not have the data required to compute money-weighted returns. Third, the available benchmarks are time-weighted.

Asset-weighted and account-weighted returns

In most cases, the Commission weighted returns by assets, meaning larger funds have a larger impact on system- or segment-level averages. This is consistent with the inquiry being an assessment of the *system*. Conceiving the system as a large stock of money under management, asset weighting allows for an assessment of the overall return this aggregate stock produced. However, for analysis of distributions (for example, at the fund or product level), calculating returns at the individual unit level meant no weighting was necessary.

An alternative to weighting by assets is to weight by the number of member accounts. Such a measure could be more reflective of member experiences. The Commission has avoided use of member-weighted returns in the draft report as data on the number of member accounts are both patchy in APRA data and non-existent in most research firm data.

Constructing benchmark portfolios

In the stage 1 study, the Commission flagged that one of the key methods used to assess system- and segment-level performance would be the comparison of realised returns with BPs (PC 2016b). The conceptual basis of using BPs received broad support, though there were some differences in views on the implementation of the approach (box 4.2).

In this stage 3 inquiry, the Commission has further refined the conceptualisation of BPs. The refinement drew on feedback received during stage 1 from submissions and two technical workshops, and further consultation with industry experts.

BPs are the primary measure used in the Commission's analysis to evaluate the system and segment performance. They aim to account for the many influences on investment markets that are beyond funds' control, while providing insights into the efficiency by which funds add value for members.

In chapter 2, the Commission used two types of BPs. One is based on listed asset classes only — BP1 — and the other blends listed with unlisted asset classes — BP2.

- BP1 was designed to reflect what the system (or segment/fund/option) could have achieved by enacting a purely listed, passive investment strategy.
- BP2 was designed to more closely represent how asset allocations are implemented in practice. This means it was designed to represent (as closely as possible) the *expected* return from the system's (or segment/fund/option) actual asset allocation, including by investing in unlisted assets.

In this technical supplement, the Commission also presents a BP with a fixed 70 per cent growth allocation.

Box 4.2 Participant views on the use of benchmark portfolios

ASFA (sub. 47, pp. 6–9) suggested the application of different benchmark portfolios (BPs) for different groups of products (MySuper, Choice, SMSFs, accumulation, retirement). ASFA also outlined its views on the construction of BPs, including that it would be appropriate to derive them based on average asset allocations for the different segments, and to draw on indexes for listed asset classes. It also noted the challenges in incorporating fees and taxes into BPs.

AustralianSuper (sub. 43) recommended that a BP be used that reflected the asset allocation of the average/median default fund, with index returns for each major asset class, adjusted for taxes.

CIFR (sub. 10 to stage 1, p. 6) recommended using a simple 70/30 growth/income assets portfolio to compare MySuper balanced products to. CIFR (sub. DR57 to stage 1, p. 5) also argued that a BP should comprise an investible and passive portfolio that reflects a static strategic asset allocation to the product-class in question.

Hartley (sub. DR82 to stage 1, pp. 3–4) argued that the BP asset allocation should be one that matches the overall volatility of returns that have been generated by the industry. Rice Warner (sub. DR112 to stage 1, p. 16) suggested something similar — constructing a number of BPs on the risk/return spectrum.

Mercer (sub. 57, p. 3) submitted that to measure the system-wide performance a BP would need to be:

- representative of the industry segment to be benchmarked
- investable, replicable and relevant for a large Australian institutional investor
- applicable to the member demographics; and be easy to understand, explain and measure.

Mercer (sub DR104 to stage 1, pp. 59–60) also suggested calibrating a selection of BPs to various CPI + X targets, given different members have different investment goals.

Rice Warner (sub 56, pp. 3, 17, 6) suggested that:

- system-level asset allocation should be used as the basis for the BP
- unlisted investments could be benchmarked against a listed equivalent if that is the most reflective index
- taxes could be netted from the BP at 15 per cent, but that would be giving trustees credit for optimising the tax position of the portfolio (via holding assets for the capital gains tax discount or overweighting to assets with franking credits)
- the fees from passive products such as ETFs could be used adjust BPs.

PwC (sub. 62, p. 4) agreed that indexed reference portfolios provide a good measure of the lowest cost option for executing 'an investment strategy'. However, it noted that given such an approach is simply measuring the weighted average performance of individual asset classes, the Commission may do better to focus on individual asset class returns.

These BPs are weighted averages of financial market index returns, with the weights determined by the asset allocation of the unit under analysis. Since most index data are reported gross of fees and taxes, adjustments were made to subtract fees (both investment and administration) and tax from the benchmarks (box 4.3).

Box 4.3 Calculating benchmark portfolio returns

The formula for a given year is as follows:

$$b_t = \left[\sum_{i=1}^{I}(r_{it} - f_{it})a_{it} - x_t \sum_{i=1}^{I} r_{it}a_{it}\right] - d_t$$

where:

- b_t = the return to the BP in year *t*
- I = the total number of asset classes in the BP
- a_{it} = the allocation to asset class *i* in year *t*
- r_{it} = the return to the relevant index for asset class *i* in year *t*
- f_{it} = the fee associated with asset class *i* in year *t*
- x_t = the applicable tax rate in year *t*
- d_t = the total (including both asset-based and fixed) administration fee year in *t.*

Computing an annualised average return follows as:

$$B_T = \left(\prod_{t=1}^{T}(1 + b_t)\right)^{\frac{1}{T}} - 1$$

where:

- B_T = the annualised BP return across T years.

This methodology implicitly assumes that no expenses are tax deductible.

The Commission encountered many challenges in constructing BPs. Most of these were driven by the lack of high quality, representative and publicly available data. The BPs constructed for use in this report therefore reflect the Commission's best efforts at the analysis to date. These efforts were guided by transparency and a conservative approach in order to afford funds the benefit of the doubt. That is, where there was considerable uncertainty regarding an input into the BPs, the Commission has tended towards inputs that would *reduce* the overall level of the BP returns (and thus provide a lower benchmark for the system).

Further to this, as outlined in chapter 2, the Commission defines underperformance as falling below BP2 by 0.25 percentage points. This acknowledges the uncertainty in some inputs, and allows a margin of error.

The Commission intends to further refine the BPs for the final report, and is requesting information from participants to enable this. Participant input on the assumptions set out below is welcome. Further, the Commission will likely hold a technical workshop on investment benchmarking following release of the draft report, once submissions on the draft report have been received.

Indexes

BP returns are sensitive to the specific financial indexes used. The Commission used index data from AVCAL, Bloomberg, FTSE Russell, MSCI and S&P. The decision about which indexes to use was informed by participant feedback in stage 1 and stage 3. Total return indexes (that is, returns inclusive of dividends as well as capital gains) are always used where applicable. Table 4.3 shows the application of indexes to asset classes. Annualised returns for each index are presented in section 4.3.

The Commission is particularly interested in feedback on the indexes used and *workable* alternatives where there is disagreement. Many indexes did not have a long enough time series, and assumptions or alternatives were used to allow for 12-year assessments (2005–2016).

- For listed international property, the FTSE EPRA NAREIT (Hedged) index only covers annual returns going back to 2006. The Commission assumed that the annual return for this index in 2005 was the same as the return for 2006. A simulated proxy for this index return in 2005 showed that assumption is likely to understate the returns for the index in 2005.[6] The proxy index delivers a return of 28.9 per cent in 2005 and 24.3 per cent in 2006. Further, the Commission was unable to obtain an AUD unhedged index.
- For unlisted property, the Mercer/IPD/MSCI Australia Property Fund Index Core Wholesale index only goes back to 2008. To allow for a 12-year assessment, the Commission constructed an illiquidity premium by taking the average difference over 2008–2016 between the Mercer/IPD/MSCI Australia Property Fund Index Core Wholesale index and the weighted average of the listed domestic and international property indexes (weighted by the domestic and international listed property split for the system or fund type). The unlisted index returns for the years 2005–2007 were then calculated as the weighted listed property index plus the illiquidity premium. Further, the Commission was unable to obtain an international unlisted property index.
- For listed infrastructure, several inquiry participants suggested the use of the FTSE global core or FTSE developed core infrastructure index. The Commission was unable to source these indexes with a suitable time series. The Commission settled on using the S&P global infrastructure index, however this index was only available in Australian dollars (hedged or unhedged) from 2008 onwards. To address this gap, the Commission used the index in US dollars from 2005–2007.
- The Commission was unable to obtain an international unlisted infrastructure index.

6 The simulated proxy is a simulated local currency FTSE EPRA NAREIT Developed index.

Table 4.3 **Indexes used in benchmark portfolios[a]**

Asset class	*BP1 (listed)*	*BP2 (blended)*
Cash	Fund level and higher: RBA cash rate (30%) / Bloomberg AusBond Bank Bill Index (70%) Products and options: Bloomberg AusBond Bank Bill Index	Fund level and higher: RBA cash rate (30%) / Bloomberg AusBond Bank Bill Index (70%) Products and options: Bloomberg AusBond Bank Bill Index
Australian fixed income	Bloomberg AusBond Composite Index	Bloomberg AusBond Composite Index
International fixed income	Bloomberg Barclays Global Aggregate Index (80% hedged / 20 % unhedged)[b]	Bloomberg Barclays Global Aggregate Index (80% hedged / 20 % unhedged)[b]
Australian listed equity	S&P/ASX 300 Index	S&P/ASX 300 Index
International listed equity	MSCI World ex-Australia (30% hedged/70% unhedged custom)[c]	MSCI World ex-Australia (30% hedged/70% unhedged custom)[c]
Unlisted/private equity	S&P ASX Small Ordinaries Index[d]	AVCAL Australia Private Equity and Venture Capital Index
Domestic listed property	S&P/ASX 300 A-REIT Index	S&P/ASX 300 A-REIT Index
International listed property	FTSE EPRA/NAREIT Developed (100% hedged)	FTSE EPRA/NAREIT Developed (100% hedged)
Domestic unlisted property	S&P/ASX 300 A-REIT Index	2008 onwards: Mercer/IPD/MSCI Australia Property Fund Index Core Wholesale
International unlisted property	FTSE EPRA/NAREIT Developed (hedged)	2005–2007: Weighted (by dom/int split) listed property index plus illiquidity premium
Domestic listed infrastructure	S&P Global Infrastructure Index (80% AUD Hedged/ 20% AUD Unhedged)	S&P Global Infrastructure Index (80% AUD Hedged/ 20% AUD Unhedged)
International listed infrastructure	2005–2007: S&P Global Infrastructure Index (USD) 2008 onwards: S&P Global Infrastructure Index (80% AUD Hedged/ 20% AUD Unhedged)	2005–2007: S&P Global Infrastructure Index (USD) 2008 onwards: S&P Global Infrastructure Index (80% AUD Hedged/ 20% AUD Unhedged)
Domestic unlisted infrastructure	2005–2007: S&P Global Infrastructure Index (USD) 2008 onwards: S&P Global Infrastructure Index (80% AUD Hedged/ 20% AUD Unhedged)	MSCI IPD Australian Unlisted Infrastructure[e]
International unlisted infrastructure	2005–2007: S&P Global Infrastructure Index (USD) 2008 onwards: S&P Global Infrastructure Index (80% AUD Hedged/ 20% AUD Unhedged)	MSCI IPD Australian Unlisted Infrastructure[e]
Other (such as commodities)	50% S&P/ASX 300 Index 50% MSCI World ex-Australia (30% hedged/70% unhedged custom)	50% S&P/ASX 300 Index 50% MSCI World ex-Australia (30% hedged/70% unhedged custom)

[a] All indexes are total return indexes, which are inclusive of dividends. [b] The annual Bloomberg Barclays Global Aggregate index contains index levels on 31 December as opposed to 30 June. [c] The MSCI World ex-Australia index is a net of tax index. [d] AVCAL (sub. 33) suggested the ASX Small Ordinaries Index tracked listed companies of a comparable size to that of PE-backed companies. [e] The annual MSCI IPD Australian Unlisted Infrastructure index contains index levels on 1 June as opposed to 30 June.

In some cases, there was ambiguity about the specific index to use, such as the appropriate domicile (domestic or international) and whether to use currency hedged or unhedged indexes, or a specific weighted combination of the two.

- For cash, the Commission understands that cash investments by funds may include both assets that are highly liquid to service members' needs, and assets that are less liquid, but form part of a diversified investment strategy. Therefore, at the fund, segment and system level, the Commission used a cash benchmark that consists of a 30 per cent weight on the RBA cash rate, and 70 per cent weight on the cash index. Since different investment options may represent different types of members, it is not clear if it makes sense to apply this blend of indexes to product and option benchmarking.
- The Commission had difficulty finding evidence to support the application of specific hedging ratios (to international domiciled asset classes), and has based these inputs from a survey of superannuation funds (National Australia Bank 2015). The Commission notes that the BPs are quite sensitive to the hedging ratios assumed.
- The Commission constructed a benchmark for the 'other' asset class using 50 per cent S&P/ASX 300 and 50 per cent of the custom 30/70 hedged/unhedged MSCI international equities index.

The Commission's ability to conduct sensitivity testing is limited by the lack of readily accessible alternative indexes. The Commission is thus seeking feedback on:

- whether the Commission has used the most representative set of indexes for Australian super funds, and if not, how best to achieve that
- preferred methods when index series do not have a long enough time series
- whether the assumptions on cash are reasonable, and if not, what would be a preferable alternative
- evidence on hedging ratios applied to each asset class in the super system.

Asset allocation

Regulator asset allocation data

Asset allocation data (from APRA[7] and research firm data) were used to determine the asset allocation of system, segment, fund and products to then apply the BPs. In the case of SMSFs, ATO asset allocation data are largely inconsistent with the available indexes. Therefore, SMSFs are benchmarked against the system-tailored BPs that have asset allocations built from APRA data, though the Commission recognises that this is a problematic comparison.

[7] There are problems with asset allocations that some funds report to APRA in some years. For example, there are cases where funds have reported all assets being in 'other' assets or all assets being in cash. As these allocations are impossible to verify, but have been audited and reported by funds, the Commission considers it reasonable to include these asset allocations in its analysis.

Much of the analysis in chapter 2 was subject to a 'break' in APRA asset allocation data occurring in 2013. This break has two key components. First, APRA data on asset allocation prior to 2014 only covers assets in each fund's default investment option. Using these data to create BPs for any unit under analysis would prove problematic if overall asset allocation differed from the default asset allocation. Second, the pre-2014 asset allocation data are much less granular than the post-2014 data. In particular, there are no separate categories for infrastructure (either listed or unlisted) or private equity.

Across all APRA data available, neither listed nor unlisted property is split between domestic and international domiciles.

Research firm asset allocation data

While research firm asset allocation data were useful for addressing gaps in APRA asset allocation data (such as the lack of domestic and international property asset allocation) and constructing benchmark portfolios for segments such as default and choice, the unaudited nature of the asset allocation data meant the quality of it is questionable in some cases. For example, for some options in some years, the asset allocation summed to well below 100 per cent despite a comprehensive set of asset classes allowed for. In some cases 'other' assets occupied an unusually large proportion of an investment option's reported assets. The Commission has applied adjustments when asset allocations do not sum to 100 per cent as specified later.

Default investment option asset allocation and adjustments

To address the gaps in APRA asset allocation reporting prior to 2014, the Commission has assumed that the asset allocation of MySuper products in later years are broadly representative of the default investment options of funds. On the basis of this assumption, the magnitude of this issue was examined and corrected for.

The Commission has also explored the sensitivity of BPs to changes in asset allocation (section 4.3). This analysis finds that BPs with more conservative asset allocations do not necessarily have lower returns than their more aggressive counterparts. To some extent, this suggests that the BPs are less likely to be sensitive to asset allocation than other factors over the period of analysis. Some sensitivity testing of distributional analysis has also been conducted (figure 4.19 in section 4.3).

System, segment and fund asset allocations were generally more conservative than the asset allocation for MySuper counterparts (tables 4.4 and 4.5). Over 2014–2016, MySuper asset allocations had almost 6 percentage points more in growth assets[8] than for whole-of-fund asset allocations, for all the funds considered (those with MySuper products) on an

8 Asset classes which are considered to be defensive are cash and fixed interest. All other asset classes are considered to be growth.

asset-weighted basis. Similarly, the average difference at the fund level was 6.7 percentage points more in growth assets for MySuper products than the whole of fund asset allocation.

Table 4.4 **Comparison of whole-of-fund asset allocation to MySuper asset allocation**

Additional proportion of assets in growth for default investment options (%), system and segment level, 2014-2016

Fund type	*2014*	*2015*	*2016*	*Average over 2014–2016*
For profit	-8.9	+1.7	+3.8	-1.1
Not for profit	+10.0	+8.9	+8.1	+9.0
All APRA-regulated funds	+3.9	+6.6	+6.8	+5.8

Source: PC analysis of APRA confidential fund-level data.

Table 4.5 **Comparison of whole-of-fund asset allocation to MySuper asset allocation**

Additional proportion of assets in growth for default investment options (%), 2014-2016

Min	*1st quartile*	*Median*	*Mean*	*3rd quartile*	*Max*
-16.9	+4.0	+7.4	+6.7	+11.5	+21.7

Source: PC analysis of APRA confidential fund-level data.

There are, however, issues in the comparison of funds between their MySuper and whole-of-fund asset allocation. First, this comparison does not capture funds that do not currently have a MySuper product. If such funds have quite different asset allocations when comparing the whole-of-fund and default investment option asset allocation, then the comparisons presented in tables 4.4 and 4.5 may not be fully representative. Moreover, these comparisons rely on MySuper asset allocation being a proxy for default investment option asset allocation. This need not be true as funds may offer multiple products that have default investment options with quite different asset allocations from a standard balanced MySuper product.

An alternative method of considering the differences between the default investment option allocation and whole-of-fund asset allocation is to consider the asset allocation reported by funds in 2013 compared to the asset allocation reported by funds in 2014 (when the reporting framework changed). This comparison addresses both of the concerns noted above, but comes with its own set of problems. It is impossible to identify how much of the change in asset allocation is due to the difference in whole-of-fund asset allocation and default investment option asset allocation or other differences, such as responses to an individual fund's assessment of the market between 2013 and 2014.

Nevertheless, this comparison shows that the reduction in proportion of growth assets was 1.6 percentage points between 2013 and 2014 for all APRA-regulated funds when weighted by assets (table 4.6). The median individual fund decrease of 1.7 percentage points is much smaller (table 4.7).

Table 4.6 **Comparison of pre and post reporting regime fund asset allocation**

System and segment level change in allocation to growth assets, 2013-2014

Fund type	*Percentage points*
For profit	+2.3
Not for profit	-3.8
All APRA-regulated funds	-1.6

Source: PC analysis of APRA confidential fund-level data.

Table 4.7 **Comparison of fund asset allocations before and after APRA reporting changes**

Fund level change in allocation to growth assets, percentage points, 2013-2014

Min	*1st quartile*	*Median*	*Mean*	*3rd quartile*	*Max*
-76.0	-9.5	-1.7	+2.0	+5.7	+76.0

Source: PC analysis of APRA confidential fund-level data.

Taken together, the direction of the difference in asset allocation between the default investment option and whole-of-fund asset allocation is broadly consistent across both methods and suggests the need for an adjustment. The Commission has chosen the difference between whole-of-fund and MySuper asset allocation as the basis for the adjustment. At the system level, this adjustment results in a more conservative asset allocation for the benchmarks in years prior to 2014.

Default asset allocation adjustments have been applied at the system, fund-type segment and fund levels. This assumes that the relative allocation of defensive and growth asset classes (within the set of all defensive and growth asset classes, respectively) remains unchanged between the default investment option and whole-of-fund asset allocation. For example, if the adjustment results in a higher proportion of defensive assets, then cash, domestic and international fixed interest are given more weight, but the relative allocations between these assets are the same (but not the same against growth assets). Also, if the adjustment causes an allocation to exceed 100 or go under 0 per cent, the allocation is capped at 100 per cent or 0 per cent respectively.

An alternative (but inferior) approach is to assume that each fund's asset allocation in all years prior to 2016 is the same as its 2016 asset allocation. This static assumption allows for every APRA-regulated fund to be assessed as it does not require the fund to have a MySuper product (section 4.3). However, it is likely to be less realistic as fund-level asset allocations would be expected to vary a lot over this time period, which includes the GFC.

When the asset allocation does not sum to 100 per cent

The Commission has used research firm data for segment-level benchmarking. However, research firm asset allocation data do not sum to 100 per cent for some products in some years. The Commission has thus assumed that the asset-weighted asset allocation by segment is representative of the relative allocations between asset classes. Scaling factors were then applied to ensure the weighted segment asset allocation sums to 100 per cent while maintaining the relative allocation to each asset class.

For option-level distributional analysis (for example figure 4.21), the Commission has not made similar adjustments. Whereas at a segment level the asset allocations were not too far from 100, at the option level, there are many instances where the asset allocation falls far short of 100, potentially due to non-reporting for some asset classes. In these cases, scaling the reported assets to 100 per cent would not necessarily be accurate. This approach of no adjustment means that some options may be treated generously by the analysis as the benchmark option's benchmark would place a zero weight on non-reported assets, meaning that the benchmark portfolio would only be constructed on the basis of a proportion of the option's returns. This is consistent with giving funds the benefit of the doubt where there are significant uncertainties.

Imputation of more granular APRA asset allocation data

As noted above, APRA asset allocation data does not contain separate categories for private equity or infrastructure. Further, listed property is not split between domestic or international property.

In these instances, splits and asset allocations are imputed using the most directly applicable data source. For the imputation of private equity and infrastructure asset allocation prior to 2014 in APRA data, the Commission used Rainmaker option-level asset allocation data to apportion 'other' assets into infrastructure, private equity and a new class of 'other' assets (including commodities and other assets not commonly invested in). Rainmaker asset allocation data was used as it allowed for more accurate mapping to APRA's 'other' asset class prior to 2014 than other data sources.

The year-by-year proportions of infrastructure, private equity and the new class of other assets in the aggregated other asset class in Rainmaker data was then calculated and these proportions were used to apportion APRA's 'other' asset class prior to 2014 into infrastructure, private equity and the new class of other assets. For fund-level and fund-type

APRA analysis, the proportions were allowed to differ by fund type. Notably, all retail options included in Rainmaker's asset allocation data did not include any infrastructure or private equity assets prior to 2014, so for this segment, the adjustment does not have an impact. Similarly, infrastructure allocations are only reported from 2011 onwards. This means that prior to 2011, any infrastructure asset will still be included in 'other' assets.

In all other benchmarks constructed using APRA data (such as for system-level analysis), the proportions were calculated over the system. Ideally, the proportions would differ by a fund's individual circumstances for fund-level analysis, however the data were too patchy to allow for this. The proportions used are reported in table 4.8.

Table 4.8 **Apportioning out the 'other' asset class[a]**

Segment	*Asset class*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
System	Infrastructure	–	–	–	–	–	–	12.5	12.8	14.4
	Private equity	57.3	34.8	34.8	34.8	34.8	34.8	34.8	44.9	44.3
	Other	42.7	49.6	48.7	43.5	45.0	42.6	42.6	42.2	41.3
Corporate	Infrastructure	–	–	–	–	–	–	2.4	2.6	2.5
	Private equity	30.5	38.4	34.8	45.2	46.5	40.7	45.4	39.5	39.1
	Other	69.5	61.6	65.2	54.8	53.5	59.3	52.3	57.8	58.4
Industry	Infrastructure	–	–	–	–	–	–	19.9	20.5	22.7
	Private equity	64.1	60.1	54.4	57.5	61.9	62.5	42.8	42.1	42.5
	Other	35.9	39.9	45.6	42.5	38.1	37.5	37.3	37.4	34.8
Public sector	Infrastructure	–	–	–	–	–	–	–	–	0.9
	Private equity	50.4	30.7	48.1	57.1	43.3	51.0	49.1	50.8	48.4
	Other	49.6	69.3	51.9	42.9	56.7	49.0	50.9	49.2	50.6

a Retail funds are 100 per cent 'other' in all years. – Nil or rounded to zero.

Sources: PC analysis of APRA confidential fund-level data and Rainmaker data.

While the apportioning of 'other' assets allows all infrastructure assets to be broken out from other assets in APRA fund-level asset allocation data prior to 2014, Rainmaker asset allocation data are particularly patchy regarding the shares of listed and unlisted infrastructure. Therefore, the Commission used APRA-level asset allocation data from 2014–2016 to impute the proportions of listed and unlisted infrastructure assets out of all infrastructure assets for funds over 2014–2016 and (table 4.9). These proportions were then averaged over the 3 years and applied to all years going back. This implicitly assumes that the listed and unlisted infrastructure splits have been relatively stable over time. The Commission does not have any evidence to examine the validity of this assumption, but this was the only way in which unlisted infrastructure could be factored into the benchmarks. These proportions were calculated at the system level, and allowed to vary by individual fund for fund-level analysis, by fund type for fund-type segment analysis.

Table 4.9 **Apportioning infrastructure into unlisted versus listed**

Segment	*Per cent allocation to unlisted*
System	74.0
Corporate	75.9
Industry	81.1
Public sector	69.0
Retail	18.7

Sources: PC analysis of APRA confidential fund-level data and Rainmaker data.

Although APRA asset allocation data distinguish between unlisted property and listed property, there are no domicile breakdowns. The Commission has assumed all unlisted property is domestic as the Commission was unable to acquire international unlisted property indexes. For listed property, the Commission has used SuperRatings option-level asset allocation data (which have better coverage than Rainmaker data).

The domicile splits are calculated and applied in a similar way as for the apportioning of other assets into infrastructure, private equity and another class of other assets (table 4.10). In particular, proportions of domestic and international listed property are calculated with the denominator being all listed property assets. For fund-level and fund-type APRA analysis, the splits were allowed to differ by fund type. In all other benchmarks constructed using APRA data (such as system-level analysis), the splits were calculated over all APRA-regulated funds. Ideally, the Commission would have allowed the splits to vary by individual fund for fund-level analysis, but the data were not sufficiently complete to allow for this.

Table 4.10 **Apportioning out property into international versus domestic**
Per cent allocation to international property

Segment	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*
System	52.7	50.3	63.4	48.8	51.1	50.6	51.5	46.8	50.0	57.3	56.6	50.0
Corporate	45.2	38.0	45.0	47.1	35.9	59.9	68.5	86.8	71.0	34.2	20.3	17.1
Industry	42.0	14.1	39.0	45.2	52.6	46.2	32.5	29.4	34.0	50.5	43.6	54.8
Public sector	61.3	44.3	22.3	46.8	72.1	61.6	51.8	–[a]	46.7	90.4	100.0	100.0
Retail	55.3	70.9	73.5	49.5	50.8	50.8	53.3	48.2	50.9	56.6	56.2	48.5

[a] The public sector options that reported on property in this year only had investments in domestic property.
– Nil or rounded to zero.

Sources: PC analysis of APRA confidential fund-level data and Rainmaker data.

Asset allocation and benchmark portfolios

In chapter 2, the Commission has used benchmark portfolios constructed from average asset allocations (weighted by assets) or the asset allocation of segments, individual funds or options. In this technical supplement the Commission has also used benchmark portfolios which fix the asset allocation of the portfolio towards growth assets at 70 per cent, with the remainder in conservative asset classes (a 70:30 benchmark portfolio). This was suggested by some participants in stage 1 as one of many benchmarks that could be drawn on.

To construct these benchmark portfolios, the Commission drew on the asset allocation of balanced investment options as a starting point — many balanced options have growth orientations of approximately 70 per cent. The average asset allocation (to individual asset classes) amongst these options was calculated. Similar to other adjustments the Commission then scaled growth and defensive assets accordingly so that the average asset allocation in each year was fixed at being comprised of 70 per cent growth assets. Rainmaker option asset allocation data were used for this. These benchmark portfolios are useful in some cases for exploring the ability of funds to manage their asset allocation over time.

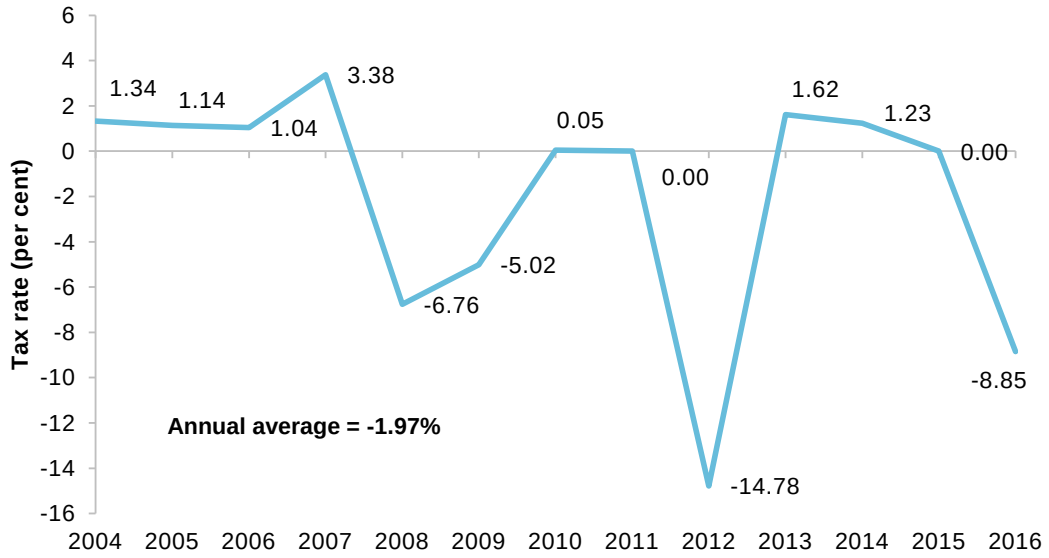
Tax

Superannuation funds are taxed at 15 per cent on investment income and capital gains. However, there are numerous factors that mean a lower tax rate should be used in the BPs, including the one-third capital gains discount for assets held by superannuation funds for more than one year, the effect of imputation credits, and the tax-free status of assets in the retirement phase. In addition, assets may accrue a capital gains tax liability that is not realised in the time period of the analysis (as the assets are not sold). Inquiry participants noted such difficulties associated with adjusting BPs for tax (ASFA, sub 47; AustralianSuper, sub. 43; PwC, sub. 62, p. 4).

Developing after-tax benchmarks is a complicated task, and has accordingly led to proprietary methods being developed (for example, GBST (2018)). The Commission has used a simple approach — using the median actual tax paid at a fund-level (as reported to APRA) to subtract from BP returns (figure 4.4). It was not possible to impute a tax rate paid on investment earnings using ATO data due to the way these data are collected and reported (tax liabilities are calculated on all contributions and investment income).

While this may be an imperfect solution, it is a product of the lack of useful data available to the Commission to develop a more sophisticated approach. A key issue is that the APRA data used represents actual tax paid, and not unrealised accrued tax liabilities. This will not bias benchmarking for APRA fund-level analysis because the returns reported to APRA are calculated using the rate of actual tax paid.

Figure 4.4 **Median tax rate paid by APRA-regulated funds**
2004–2016



Source: PC analysis of APRA confidential fund-level data.

However, it may skew results using product-level data from research firms because these returns are often derived from crediting rates to member accounts (or unit prices) that embed accrued tax liabilities that have not yet been realised by the fund. As such, a fund that holds a portion of its assets for longer than the time period under analysis may report product-level returns that embed a higher average tax rate than in fund-level returns reported to APRA (since unrealised capital gains tax liabilities would be reflected in product-level returns but not fund-level returns).

Acknowledging this, the Commission has tested a flat 5 per cent tax rate (higher than the median actual tax rate paid by funds in all years (section 4.3)), and found some sensitivity to results. This rate was based on consultation with inquiry participants and are consistent with the implied tax rates on some existing passive managed fund products (though these products are generally not subject to the same concessional tax rates as superannuation). For example the implied tax rate for a super fund investing in Vanguard's balanced index fund is around 5 per cent for the 10 years to April 2018 (2018).

The Commission also conducted analysis with a flat 7.5 per cent tax rate. Naturally, this produced magnified versions of the results from analyses using a 5 per cent rate. These results are not presented in this technical supplement for brevity.

However, the difference between actual and accrued tax liabilities should 'wash out' over the long term to some degree. Given the majority of the Commission's investment performance analysis is over the long term, the disparity between accrued and actual tax liabilities outlined above may be relatively immaterial (as tax liabilities are unlikely to go

unrealised over the long term), and the Commission's sensitivity test should be considered a 'worst case' scenario.

The Commission would welcome feedback on how best to incorporate tax into the benchmark portfolios, to ensure the most like-for-like comparisons with the returns data used.

Investment fees

With the exception of the use of some unlisted asset classes in BP2, the BPs represent a diversified passive market return. To reflect this, investment fees in line with passive investment products have been subtracted from the benchmarks. Fees charged for passive management should be lower on average than those charged by superannuation funds (who typically engage in active management). Accordingly, the fees that are deducted from the BPs are generally lower than those charged by superannuation funds — a conservative assumption.

Fees charged on exchange-traded funds (ETF) currently offered on the Australian Stock Exchange (ASX) are used for the *current* fee level for each listed asset class in the benchmarks. The Commission opted for the largest ETF for each asset class (by funds under management). An investment fee did not need to be calculated for the property and infrastructure indexes since these are reported net of fees. A fee of 1.6 per cent was used for private equity, based on participant input (AVCAL, sub. 33).

The Commission is aware that the passive fees large superannuation funds would pay are likely to be lower than those in the BP. While comparisons of the chosen ETF fees with advertised wholesale fees for (some) similar asset classes did not uncover material differences, this does not account for the fact that most superannuation funds will be able to negotiate discounts on advertised wholesale fees. Therefore, the Commission's use of ETF fees in the BPs is conservative. The Commission is also aware that not all funds are likely to channel passive investment through ETFs. However, it is the *level* of fees in the benchmarks that matters, not the source.

Since time series data on retail ETFs are not available for the full period, the investment fees in the benchmark are adjusted upwards by 5 per cent year-on-year going backwards (table 4.11). This accounts for the fact that passive investment fees have fallen in recent years. The magnitude of the adjustment is based on data from the US (given the lack of information specific to Australia) (box 4.4). While fees may be higher on average in Australia, it is not obvious that the relative historical trend should be materially different to that observed in the US.

Table 4.11 **Investment fees in the benchmark portfolios[a,b]**

Actual current fees levels (2017), and backwards projections (2004-05 to 2015-16), by asset class

	Projections												*Actual*	
Asset class	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*Source*
Cash	0.14	0.13	0.12	0.12	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07	BlackRock iShares Core Cash ETF
Domestic fixed interest	0.48	0.45	0.43	0.40	0.38	0.36	0.34	0.32	0.30	0.28	0.27	0.25	0.24	SPDR S&P/ASX Australian Bond Fund
International fixed interest	0.52	0.49	0.46	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.28	0.26	BlackRock iShares Core Global Corporate Bond (AUD hedged) ETF
Domestic equity	0.28	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	Vanguard Australian Shares Index ETF
International equity	0.60	0.56	0.53	0.50	0.47	0.45	0.42	0.40	0.38	0.36	0.34	0.32	0.30	SPDR S&P World ex Australia Fund
Private equity (BP1)	0.99	0.94	0.89	0.84	0.79	0.75	0.70	0.67	0.63	0.59	0.56	0.53	0.50	SPDR S&P/ASX Small Ordinaries Fund
Private equity (BP2)	3.18	3.00	2.83	2.68	2.53	2.39	2.25	2.13	2.01	1.90	1.79	1.69	1.60	AVCAL (sub. 33)
Domestic listed property	0.46	0.43	0.41	0.38	0.36	0.34	0.32	0.31	0.29	0.27	0.26	0.24	0.23	Vanguard Australian Property Securities Index ETF
International listed property	0.99	0.94	0.89	0.84	0.79	0.75	0.70	0.67	0.63	0.59	0.56	0.53	0.50	SPDR Dow Jones Global Real Estate Fund
Listed infrastructure	0.95	0.90	0.85	0.80	0.76	0.72	0.68	0.64	0.60	0.57	0.54	0.51	0.48	BlackRock iShares Global Infrastructure ETF

a All fees are for both BP1 and BP2 unless otherwise stated. **b** Unlisted property and unlisted infrastructure have fees built into the index returns.

Box 4.4 **Adjusting passive fees historically**

The Commission had difficulty locating accurate, historical data on passive investment fees. Most publicly available analysis originates in the US.

- The Investment Company Institute estimated that expense ratios for US equity ETFs dropped nearly a third between 2009 and 2016. A fall of a third over eight years roughly implies average annual falls of 5 per cent.
- Morningstar found that asset-weighted expense ratios for passive funds declined from around 0.30 to 0.20 per cent over the period 2008–2014. Again, this fall is roughly consistent with 5 per cent year-on-year falls.

Sources: Rawson and Johnson (2015); Vlastelica (2017).

An additional amount was deducted from BP returns to reflect indirect costs, including custodian, valuation and search costs — 0.15 per cent for BP1 and 0.4 per cent for BP2. These values were based on consultation with experts, as discussed above.

The Commission is seeking evidence and feedback on the Commission's assumptions about asset class investment fees and the application of indirect costs to the BPs.

Administration fees

The BPs are intended to represent a counterfactual investment opportunity for superannuation members. As such, there would be administration costs incurred in undertaking this investment opportunity, and administration expenses are deducted from BP returns. In most cases, the administration expense used is the median administration expense ratio[9] (when APRA fund-level data have been drawn on) or reported administration fees by funds (when SuperRatings data has been drawn on) for the relevant unit under analysis (such as system, segment, fund type or fund) (table 4.12).

9 In APRA data, administration expenses are distinguished from advice expenses. The Commission has included advice expenses when calculating administration expense ratios.

Table 4.12 **Administration fee adjustments in the benchmark portfolios[a,b]**

Medians by segment (per cent of assets under management)

Analysis	*Expense ratio or fee*	*Segment*	*Year end June*											
			2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*
System	Expense ratio	System	0.80	0.80	0.60	0.60	0.60	0.70	0.70	0.65	0.80	0.71	0.60	0.56
Investment stage	Fee	Accumulation	0.54	0.63	0.64	0.64	0.68	0.66	0.65	0.65	0.60	0.60	0.59	0.59
	Fee	Retirement	1.79	1.16	0.81	0.77	0.76	0.73	0.70	0.69	0.68	0.68	0.67	0.66
Default/Choice	Expense ratio	Default / MySuper[c]	0.40	0.40	0.30	0.30	0.30	0.40	0.40	0.40	0.40	0.37	0.33	0.31
	Fee	Choice	0.54	0.63	0.64	0.64	0.68	0.66	0.65	0.65	0.66	0.66	0.65	0.64
Profit status	Expense ratio	For profit	1.10	1.20	1.10	1.10	1.05	1.10	1.10	1.00	1.20	1.18	1.08	0.93
	Expense ratio	Not for profit	0.70	0.60	0.50	0.40	0.50	0.50	0.50	0.50	0.60	0.49	0.43	0.39
Fund-type	Expense ratio	Industry	0.70	0.60	0.60	0.50	0.60	0.60	0.60	0.60	0.60	0.56	0.48	0.43
	Expense ratio	Corporate	0.80	0.70	0.50	0.40	0.50	0.50	0.50	0.45	0.45	0.46	0.35	0.34
	Expense ratio	Public sector	0.40	0.40	0.30	0.30	0.30	0.30	0.30	0.35	0.40	0.32	0.27	0.23
	Expense ratio	Retail	1.10	1.20	1.10	1.10	1.05	1.10	1.10	1.00	1.20	1.18	1.08	0.93

a Some analysis uses a more granular, tailored administration expense ratio which is not amenable to presentation (for example, the individual fund-level benchmarking). **b** Individual option-level analysis used segment-level administration fee adjustments due to data limitations. **c** For default, as MySuper did not exist prior to 2014, the Commission drew on the APRA-regulated fund bottom quartile administration expense ratio, which was commensurate with fees from MySuper products in SuperRatings data for 2014–2016 where MySuper fees data were available.

Source: PC analysis of APRA confidential fund-level data.

CPI + X benchmark (MySuper)

In assessing MySuper performance over three years (2014 to 2017), the Commission used the median MySuper target as an additional benchmark. Funds set their MySuper product target returns as a goal over rolling 10-year periods, meaning this benchmark has only limited interpretative value for this time period.

Funds set these targets as a percentage point return above CPI (a *real* target). As returns data are nominal, the annual CPI rate was calculated for each year under observation and added to the median target. From this a three-year geometric average was calculated as the 'implied' target (table 4.13).

Table 4.13 **Median CPI + X MySuper benchmarks**

Year	*CPI (%)*	*Median target (% above CPI)*	*Implied target*
2014-15	1.6	3.7	5.3
2015-16	1.1	3.7	4.8
2016-17	1.9	3.7	5.6
Three year geometric average			**5.2**

Sources: ABS (*Consumer Price Index, Australia, June 2017, Cat. no. 6401.0*); APRA (2018).

4.3 Supporting analysis

This section sets out analysis and outputs, including sensitivity testing, to support the results provided in chapter 2 of the draft report. This section is structured in the same order as the analysis in chapter 2.

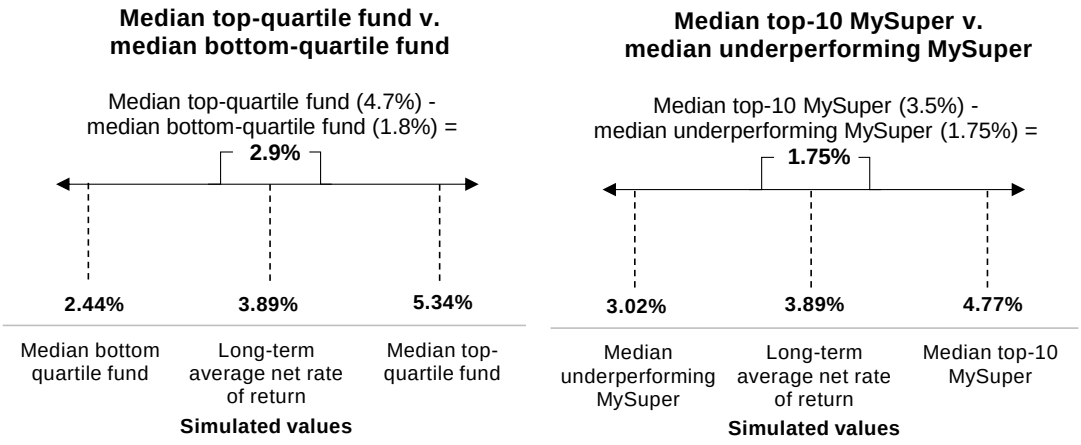
Cameo simulations

Chapter 2 contained three simulations from the Commission's cameo model that illustrated the impact of different rates of return over a lifetime. The base case assumptions for the cameo model are set out in chapter 1.

- Cameo 2.1 showed the effect of a 5 per cent gross real rate of return instead of 6 per cent.
- Cameo 2.2 showed the effect of receiving the returns associated with the median bottom quartile fund (over 12 years to 2016) instead of those associated with the median top quartile fund, over a member's entire accumulation stage.
- Cameo 2.3 showed the effect of receiving the returns associated with the median underperforming MySuper products (over 10 years to 2016) instead of those associated with the median top-10 product (where underperformance is defined as returns more than 0.25 percentage points below BP2).

In these latter two cases, the real rates of return being compared were heavily affected (downwards) by the GFC. As such, the Commission 'normalised' the returns around the long-term average net real rate of return of 3.89 per cent used in the cameo model.[10] This involved taking the dispersion between the 'high' and 'low' returns being compared, and distributing it evenly either side of this long-term average (figure 4.5).

Figure 4.5 **Cameo simulations with altered rates of returns[a]**
Normalising to the model's long-term average



[a] All returns are real.

Sources: ABS (*Consumer Price Index, Australia, June 2017, Cat. no. 6401.0);* PC analysis of APRA confidential fund-level data and SuperRatings data.

The draft report also contains a simulation for a 55 year old individual (using the same returns as the left-hand panel above). Two different assumptions were made for this simulation. First, a starting wage of $46 800 was assumed (the median income for all 55 year olds in 2016) (ABS 2017a). Further, a starting balance of $129 000 was assumed (the median balance for 55-64 year olds in 2016) (ABS 2017b).

Index returns

Investment returns (net of fees[11] but not tax) to each index (as outlined in table 4.3) over the 12 years to 2016 are plotted in figure 4.6. To understand how these indexes come together in a BP and the sensitivity of BPs to asset allocation, the Commission has conducted simulations of (listed) BPs under different hypothetical asset allocations (figure 4.7).

10 Note that chapter 1 outlines a 5 per cent long-term gross real rate of return. 3.89 is the average real net return (less fixed and variable charges) over the accumulation stage.

11 These benchmark portfolios also do not include the indirect investment fees as discussed in section 4.2.

To construct these simulations, the Commission considered the set of all possible BPs which:

- consist of at most 10 listed asset classes as shown in table 4.14
- have asset allocation 'increments' of 5 per cent (for example, 0 per cent, 5 per cent, 10 per cent, and so forth) for each asset class, with the maximum and minimum possible allocation provided in table 4.14. The maximum and minimum possible allocations were chosen on the basis of APRA actual fund-level asset allocation data[12]
- have a total allocation summing to 100 per cent.

For example, one possible BP could be 50 per cent private equity and 50 per cent Australian listed equity, and another could be 50 per cent private equity, 25 per cent domestic listed property and 25 per cent Australian listed equity. In total, the Commission constructed 6 509 532 hypothetical listed BPs.

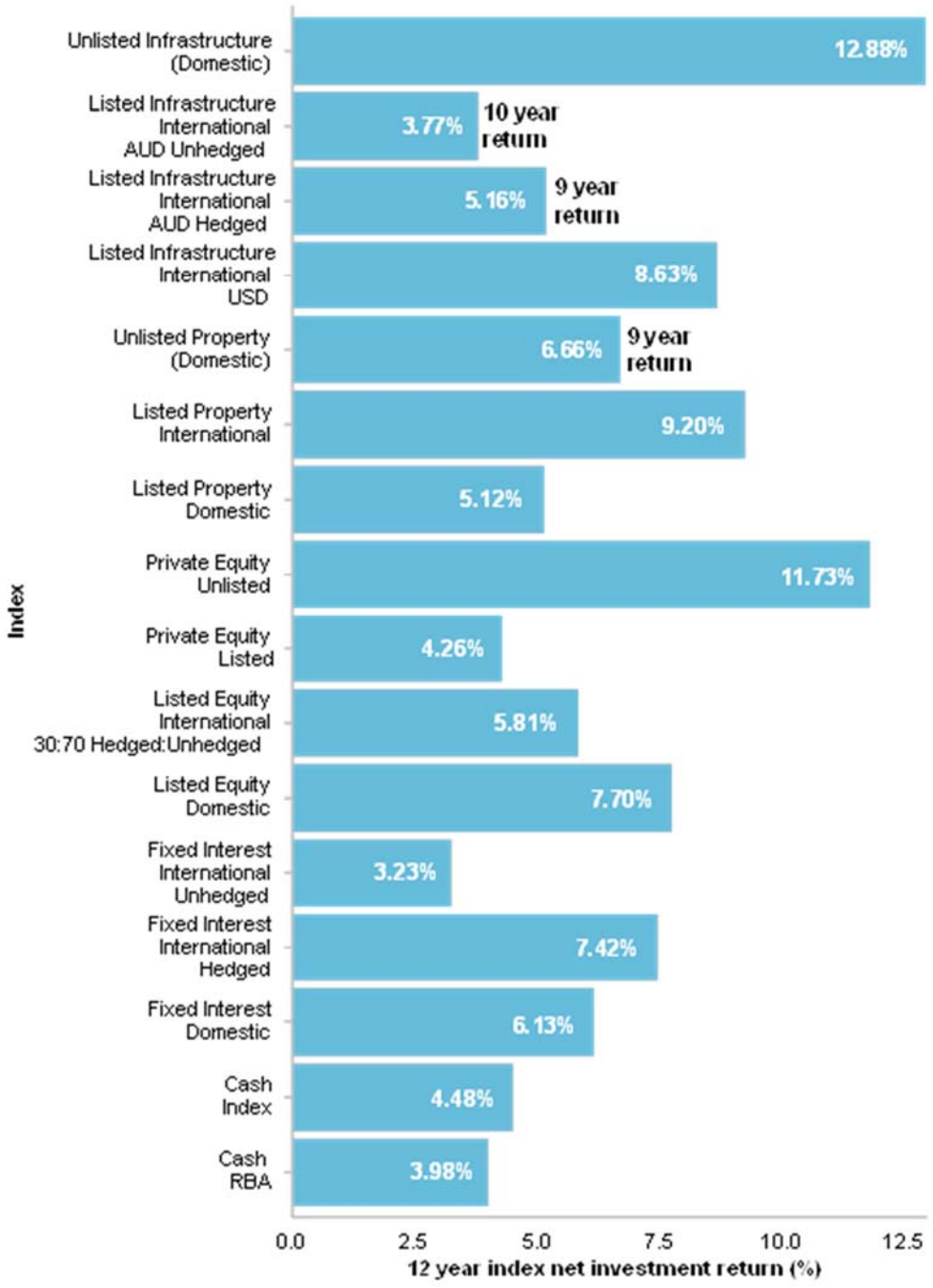
Table 4.14 **Asset classes and ranges used for simulations**

Asset class	*Index*	*Min allocation (%)*	*Max allocation (%)*
Cash	Fund level and higher: RBA cash rate (30%) and Bloomberg AusBond Bank Bill Index (70%)	0	35
Australian fixed income	Bloomberg AusBond Composite Index	0	55
International fixed income	Bloomberg Barclays Global Aggregate Index (80% hedged / 20 % unhedged)	0	35
Australian listed equity	S&P/ASX 300 Index	0	90
International listed equity	MSCI World ex-Australia (30% hedged/70% unhedged custom)	0	50
(listed) Private equity	S&P ASX Small Ordinaries Index	0	50
Domestic listed property	S&P/ASX 300 A-REIT Index	0	50
International listed property	FTSE EPRA/NAREIT Developed (100% hedged)	0	50
Listed infrastructure (international)	2005–2007: S&P Global Infrastructure Index (USD) 2008 onwards: S&P Global Infrastructure Index (80% AUD Hedged/ 20% AUD Unhedged)	0	15
Other	50% S&P/ASX 300 Index 50% MSCI World ex-Australia (30% hedged/70% unhedged custom)	0	25

[12] The Commission looked at the maximum and minimum asset allocations in the data. In some cases these could be taken directly. In other cases discretion was applied where there were clear outliers or potential misreporting.

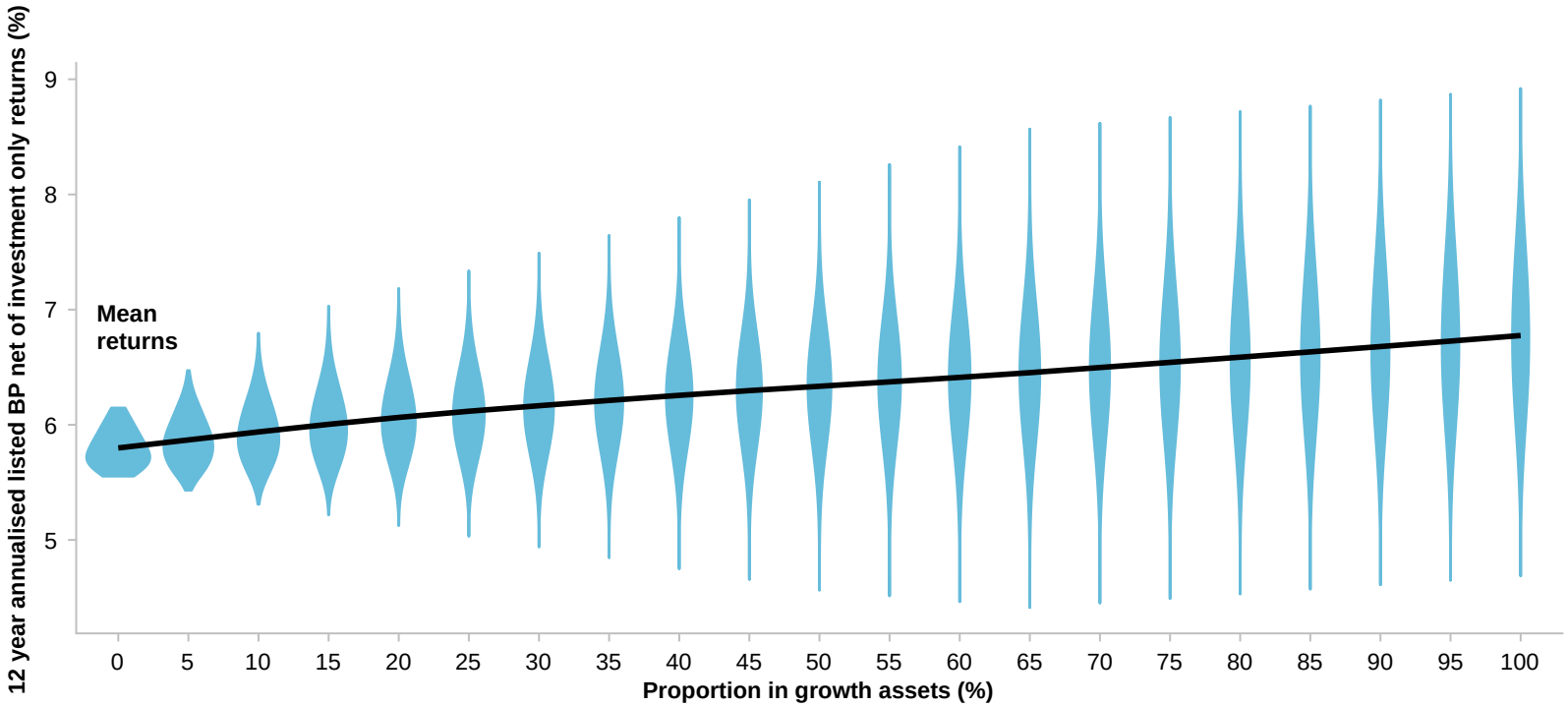
Figure 4.6 **Returns to indexes**

Nominal returns, 2005-2016



Sources: PC analysis of financial market index data (various providers).

Figure 4.7 **Simulated benchmark portfolio returns**
2015-16



Source: PC analysis of APRA confidential data and Financial market index data (various providers).

The results are presented for groups of BPs, based on the proportion of growth assets in each BP (figure 4.7). There is one 'band' for each of the possible 5 per cent increments of growth assets. Each band represents the distribution of the BP returns for the group of BPs with the same proportion of growth assets. For example, the first band at 0 per cent growth assets represents all BPs with only defensive assets. The second band represents all BPs with 5 per cent of growth assets and so on. The y-axis represents the proportion of simulations delivering a given investment return. Accordingly, by construction, the chart shows the change in average asset returns and volatility as the riskiness of the portfolios increases.

The outcomes are most starkly revealed through comparisons of the least risky (the first band) and the most risky portfolio groups (the last band).The minimum return for the first band is 5.56 per cent and the maximum 6.15 per cent. Volatility in outcomes is modest, as shown by the narrow bounds on asset returns. In contrast, the highest risk portfolios have a higher average return, but also highly volatile outcomes.

Figure 4.7 shows that over the specific 12 year period under analysis.

- Most benchmark portfolios irrespective of their asset allocation would have achieved investment returns of at least 5.5 per cent
- More conservative asset allocations would not necessarily have delivered lower investment returns compared to asset allocations with more growth assets over the time period of analysis. Even a benchmark portfolio with 0 per cent growth assets could have achieved investment returns commensurate with a large proportion of benchmark portfolios with 100 per cent growth assets
  - It should be noted, however, that this result is for a particular 12 year horizon, which includes the GFC. The representativeness of these results depend on how representative the 2005–2016 period is in terms of the frequency and fluctuations of the business cycle, of the longer term (for example, 40 years).
- To the extent that the mean portfolio return varies by no more than 0.5 per cent over the spectrum of allocations to growth assets, the Commission's results and benchmark portfolios are likely to be relatively insensitive to the Commission's assumptions about asset allocation (particularly, relative to other inputs such as indexes and fees).

Several caveats should be noted. These simulations were constructed on the basis of static asset allocations over the 12 years to 2016. It is possible that funds may achieve higher or lower returns than these simulations might suggest, by dynamically managing asset allocation with the aim of achieving better returns. Second, returns over longer periods will be different from those over a 12 year horizon, and so what may appear to be a poor asset choice over one period may not be so over a different one. Finally, the simulations are non-probabilistic in that they act as if any given allocation of assets is equally probable. Funds will generally be less likely to have asset weightings at the extremes shown in table 4.14.

System-level analysis

Analysis in chapter 2 showed that the superannuation system (both APRA-regulated funds and SMSFs) delivered returns above BP1 but less than that of BP2 over the long term (10 years). This result is robust to an 8 year time frame and a 5 per cent tax rate applied to the BP. APRA-regulated funds perform commensurate with BP1 but below BP2 when returns are measured net of investment fees, but gross of administration fees. Over a 5-year time frame the system falls below both BPs (table 4.15).

Table 4.15 **System-level analysis[a]**
Alternative approaches

Benchmark type	*BP1 (%)*	*BP2 (%)*	*Actual return (%)*	*Result*
APRA-regulated funds				
System-tailored (in chapter 2)	5.49	6.11	5.58	Performance above BP1 but not BP2
System-tailored, net investment returns[b]	6.16	6.78	6.16	Performance equal to BP1 but below BP2
System-tailored, 8 years, 2008-2016	3.11	3.88	3.54	Performance above BP1 but not BP2
System-tailored, 5 years, 2011-2016	8.95	9.09	8.32	Performance below both benchmarks
70/30 (growth/defensive)	5.62	6.07	5.58	Performance below both benchmarks
System-tailored, 5% tax rate	5.13	5.72	5.58	Performance above BP1 but not BP2
SMSFs				
System-tailored (in chapter 2)	5.49	6.11	5.59	Performance above BP1 but not BP2
System-tailored, 8 years, 2008–2016	3.11	3.88	3.44	Performance above BP1 but not BP2
System-tailored, 5 years, 2011–2016	8.95	9.09	6.76	Performance below both benchmarks
70/30 (growth/defensive)	5.62	6.07	5.59	Performance below both benchmarks
System-tailored, 5% tax rate	5.13	5.72	5.59	Performance above BP1 but not BP2

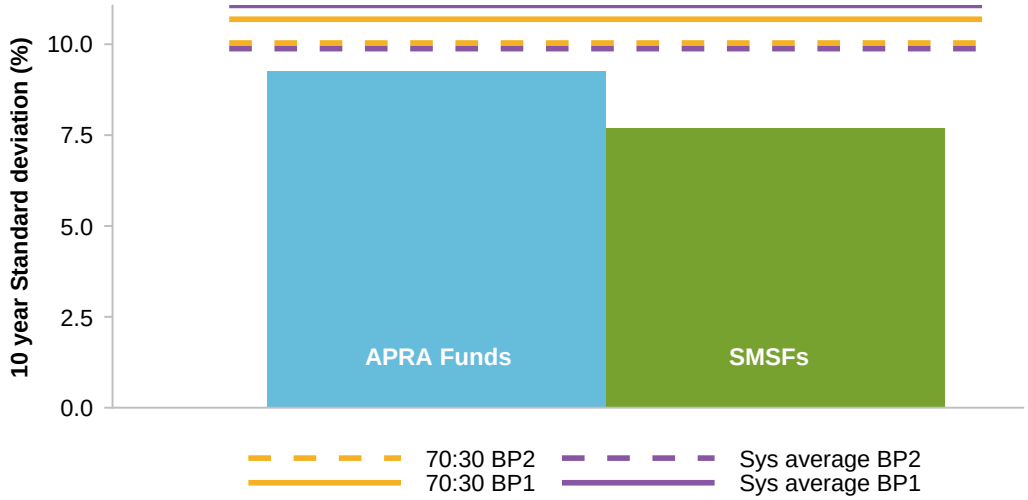
a APRA and ATO returns data are not directly comparable as they use different calculations and different data. ATO asset allocation data does not map to typically used asset classes, and thus does not allow the construction of a benchmark portfolio for the SMSF segment. The time period is 2006 to 2015 unless otherwise specified. **b** Net investment returns are returns measured net of investment fees but gross of administration fees.

Sources: PC analysis of APRA-confidential data, ATO confidential data and financial market index data (various providers).

APRA-regulated funds delivered lower long-term volatility than both BPs. SMSF returns were 'smoother' over the 10 years under analysis, having lower volatility than APRA-regulated funds and all BPs (figure 4.8). The higher volatility exhibited by the 70:30 benchmark suggests that the system has altered strategic asset allocation across time to 'smooth' out returns.

Figure 4.8 **System-level volatility**[a]

APRA regulated funds, SMSFs, and BPs (various); 2006–2015



Sources	PC analysis of APRA confidential data, ATO confidential data and financial market index data (various providers).		
Benchmark	70:30 BP1 and BP2, System average BP1 and BP2		
Coverage	All APRA-regulated funds and SMSFs. Excludes exempt public sector superannuation schemes, eligible rollover funds and insurance-only superannuation funds.		
Survivor Bias	No.	**Selection Bias**	No.

[a] APRA and ATO returns data are not directly comparable as they use different calculations and different data. ATO asset allocation data does not map to typically used asset classes, and thus does not allow the construction of a benchmark portfolio for the SMSF segment.

Asset-band analysis

In chapter 2, the Commission analysed the performance of 'asset-band' segments. That is, options are bundled together based on their percentage allocation to growth assets. Broadly, more aggressive options tended to perform better against their segment-tailored benchmarks compared to more conservative ones. However, this result is sensitive to the time period considered. Over a 5-year period, nearly all asset bands fall below their benchmarks (figure 4.9). The relationship between returns and the proportion of growth assets is also more noticeable over a 5-year period. This contrasts with the result in chapter 2, that balanced, growth and high growth options delivered similar returns, which might reflect the impact the GFC had on returns from growth assets in previous years.

It is worth noting that in some cases (including in the draft report) BP1 delivers returns greater than BP2. Most of these cases occur for conservatively oriented units. For example, this holds for secure, capital stable and conservative-balanced options, but not growth and

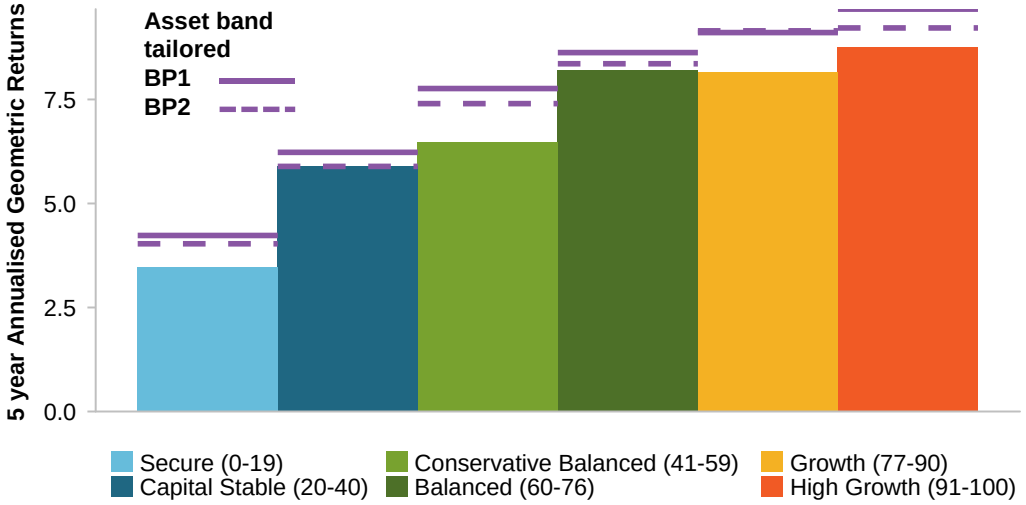
high-growth options (figure 4.9), and, as illustrated in figure 4.15, this also holds for the for-profit segment.

There is a twofold explanation for this. First, unlisted asset classes have lower allocations in more conservative portfolios (compared to more aggressive portfolios) and the for-profit segment (compared to the not-for-profit segment). And second, the Commission assumed that BP2 is subject to a 0.4 per cent indirect investment cost (compared to 0.15 per cent for BP1), regardless of the allocation to unlisted investments. Therefore, these BPs (conservative and for-profit) get little-to-no impact from higher returns in unlisted asset classes, but still incur the higher costs, thus 'dragging' BP2 below BP1.

This result represents a limitation of the assumptions used in the analysis. As with all BP inputs, the Commission is seeking feedback on refining indirect cost adjustments.

Figure 4.9 **Asset-band analysis[a,b]**

Benchmark adjusted for asset allocation, 2012–2016



Sources	PC analysis of APRA confidential data, financial market index data (various providers) and SuperRatings data.
Benchmark	Asset-band tailored BP1, BP2.
Coverage[c]	Accumulation options from APRA-regulated funds. In 2004-05, the figure represents up to 61% of total assets and 64% of member accounts of APRA-regulated funds. In 2015-16, the figure represents up to 91% of total assets and 92% of member accounts of APRA-regulated funds.
Survivor Bias	No. **Selection Bias** Yes.

[a] Net returns are estimated less investment fees, taxes and implicit asset based administration fees. This means that some options may be reported gross of asset based administration fees.. [b] The option type categories have been taken as given from SuperRatings data. [c] These coverage estimates are likely to be overestimates due to the estimation method (section 4.1).

A different tax rate assumption for the BPs (from system median to 5 per cent) leads to improvements in the relative performance of the more conservative options. With a 5 per cent tax rate applied to the BPs, the only asset-band option type falling below their BPs is 'conservative balanced (41-59)' (table 4.16). And as expected, there is a clear correlation between the percentage allocation to growth assets and the volatility of returns (figure 4.10).

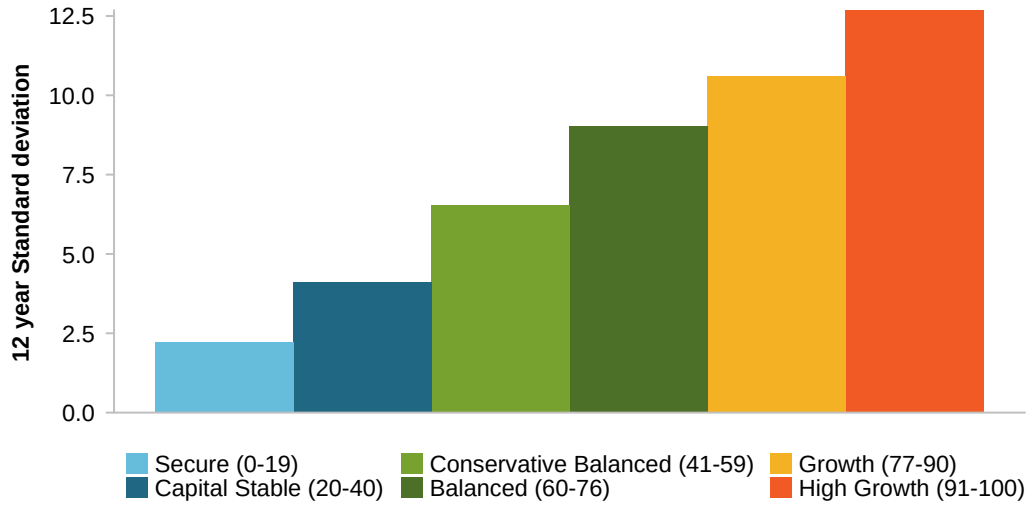
Table 4.16 **Asset-band analysis**

Alternative BP tax rates, 2005-2016

Benchmark type (% growth assets)	*BP1 (%)*	*BP2 (%)*	*Actual return (%)*	*Result*
Secure (0-19)				
Median tax (in chapter 2)	4.74	4.52	4.63	Performance above BP2 but not BP1
5% tax rate	4.29	4.07	4.63	Performance above both benchmarks
Capital stable (20-40)				
Median tax (in chapter 2)	5.57	5.45	5.29	Performance below both benchmarks
5% tax rate	5.21	5.10	5.29	Performance above both benchmarks
Conservative balanced (41-59)				
Median tax (in chapter 2)	6.33	6.21	5.67	Performance below both benchmarks
5% tax rate	5.92	5.81	5.67	Performance below both benchmarks
Balanced (60-76)				
Median tax (in chapter 2)	6.16	6.35	6.77	Performance above both benchmarks
5% tax rate	5.74	5.94	6.77	Performance above both benchmarks
Growth (77-90)				
Median tax (in chapter 2)	6.37	6.72	6.87	Performance above both benchmarks
5% tax rate	5.93	6.29	6.87	Performance above both benchmarks
High growth (91-100)				
Median tax (in chapter 2)	6.46	6.61	6.80	Performance above both benchmarks
5% tax rate	6.02	6.20	6.80	Performance above both benchmarks

Source: PC analysis of APRA-confidential data and financial market index data (various providers).

Figure 4.10 **Asset-band analysis[a,b]**
Volatility of returns, 2005-2016



Sources	PC analysis of APRA confidential data, financial market index data (various providers) and SuperRatings data.
Coverage[c]	Accumulation options from APRA-regulated funds. In 2004-05, the figure represents up to 61% of total assets and 64% of member accounts of APRA-regulated funds. In 2015-16, the figure represents up to 91% of total assets and 92% of member accounts of APRA-regulated funds.
Survivor Bias	No. **Selection Bias** Yes.

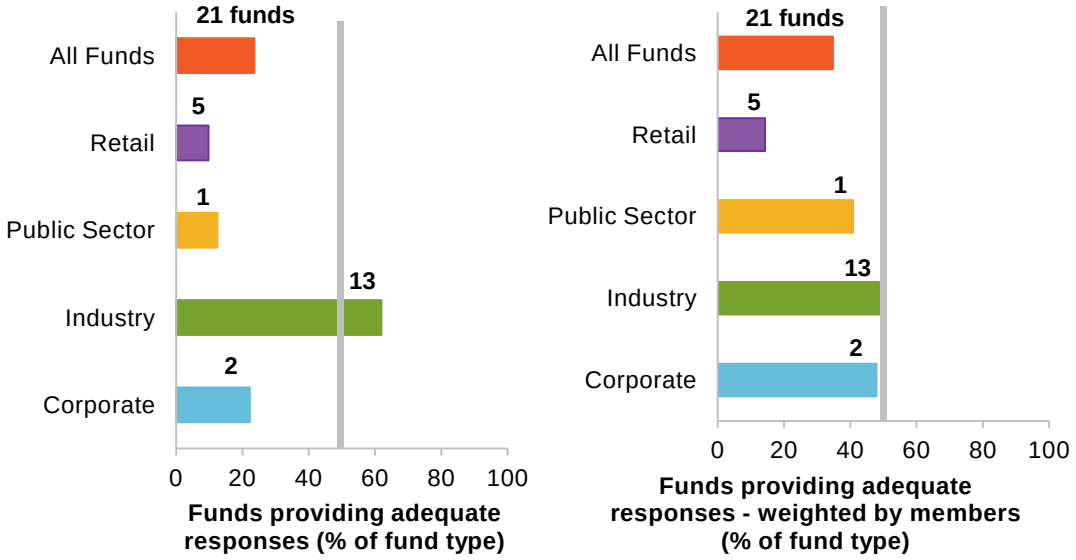
a Net returns are estimated less investment fees, taxes and implicit asset based administration fees. This means that some options may be reported gross of asset based administration fees. **b** The option type categories have been taken as given from SuperRatings data. **c** These coverage estimates are likely to be overestimates due to the estimation method (section 4.1).

Asset-class returns

The Commission sought to benchmark returns to individual asset classes using data from its funds survey. However, low response rates made this a difficult task. Just over 20 per cent of funds provided an 'adequate' response and only five funds a full response. Weighted by members, this number increases slightly (figure 4.11). Industry funds responded relatively well (13 funds), and retail funds relatively poorly (5 funds). Funds providing inadequate responses were typically smaller (both by assets and members) and produced lower returns in 2016 (table 4.17).

Figure 4.11 **Funds survey response rate adequacy[a]**

Per cent (and number) responding adequately for net returns by asset class



[a] Adequacy is defined as having provided returns for cash, equities (domestic and international), and fixed interest (domestic and international), for financial years 2011-12 through to 2015-16. Exceptions are allowed if the fund reported zero assets in these asset classes. This is different than the adequacy definition in chapter 2 which just takes into account a 'cell' (year, asset class pairs) completion rate. The measure here better reflects the 'usability' of the data.

Source: Funds survey.

Table 4.17 **Fund survey response rate adequacy[a]**

Adequate and inadequate responding funds characteristics, 2016

	Adequate (average)	*Inadequate (average)*
Size by assets ($b)	17.66	7.98
Size by members (m)	0.34	0.15
Net return (%)	3.43	2.35

[a] Adequacy is defined as having provided returns for cash, equities (domestic and international), and fixed interest (domestic and international), for financial years 2011-12 through to 2015-16. This is different than the adequacy definition in chapter 2 which just takes into account a 'cell' (year, asset class pairs) completion rate. The measure here better reflects the 'usability' of the data.

Sources: Funds survey and PC analysis of APRA confidential fund-level data.

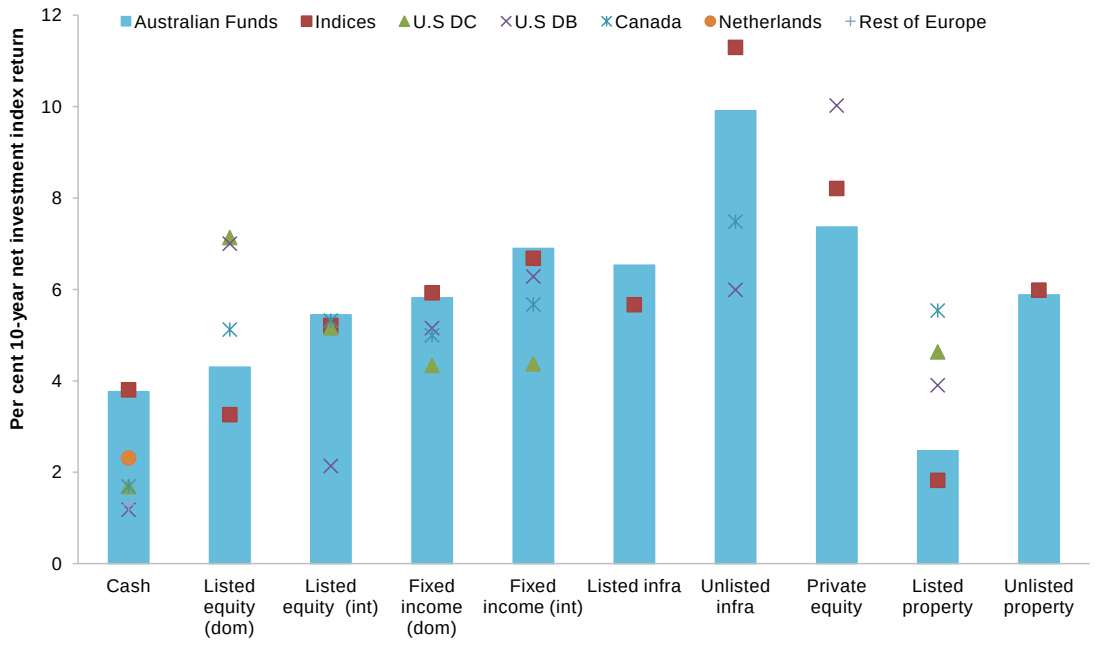
Nonetheless, the Commission has analysed these data. Results suggest that Australian funds that responded to this survey question had mixed performance relative to indexes at the asset-class level over the 10 years to 2017 (figure 4.12). A more comprehensive sample would have provided a more robust view of performance at the asset-class level.

Comparisons with pension funds in other countries offer slightly different insights, but overall suggest that Australian funds that responded to the Commission's funds survey are not systematically above or below their peers in other countries. These funds performed similarly or better in cash, listed equity (international), fixed income (both domestic and international) and unlisted infrastructure. However, they underperformed international peers in listed equity (domestic), private equity and listed property. A key caveat is that 'domestic' asset classes are clearly different as they relate to individual countries. For example, a Canadian fund's domestic equities portfolio is a different stock market than that for an Australian fund. This also explains why international benchmarks can be quite different to index benchmarks for domestic asset classes and less so for international asset classes.

The complete data on international performance purchase from CEM Benchmarking is provided below (table 4.18).

Figure 4.12 **Funds survey net returns by asset-class analysis[a,b,c,d]**

Asset class net investment returns relative to benchmarks, 2008-2017



a The returns in this chart are pre-tax returns less investment fees. **b** The CEM dataset provides returns to asset classes over the 10 year period to 2016. **c** Some benchmarks are not available for some asset classes. **d** Hedging ratios of indices for international asset classes correspond to those listed in table 4.3. The index benchmark for listed infrastructure is for international listed infrastructure, as consistent with the benchmark portfolios. Index benchmarks for unlisted infrastructure and unlisted property are domestic also consistent with the benchmark portfolios. The listed property index benchmark is a weighted combination of domestic and international listed property, with the weights being determined by the system allocation to domestic and international property using SuperRatings asset allocation data similar to the construction of benchmark portfolios as outlined in section 4.2.

Sources: Funds survey, PC analysis of CEM and financial market index data (various providers).

Table 4.18 **International comparison: investment returns**

Asset-weighted average returns by asset class, 2007–2016 (%)

Asset class	*US DC*	*US DB*	*Canada*	*Nether-lands*	*UK*	*Rest of Europe*	*Asia-Pacific*	*Total*
Domestic equities	7.1	7.0	5.1	na	na	na	na	na
International equities	5.2	2.1	5.3	na	na	na	na	na
Total equities	7.1	4.8	5.6	5.4	na	5.1	4.1	5.0
Domestic fixed interest	4.3	5.2	5.0	na	na	na	na	na
All other fixed interest	4.4	6.3	5.7	na	na	na	na	na
Total fixed interest	4.3	5.7	5.4	5.7	na	4.6	4.9	5.5
Cash	1.7	1.2	1.7	2.3	na	1.3	na	2.0
Balanced	4.9	na	na	na	na	na	na	na
Listed property	4.6	3.9	5.5	na	na	na	na	na
Unlisted property	5.0	0.6	0.3	na	na	na	na	na
Total property	4.8	1.1	0.3	4.8	na	0.5	na	1.5
Private equity	na	10.0	10.7	12.3	na	10.4	14.5	10.5
Unlisted infrastructure	na	6.0	7.5	6.4	na	5.9	5.8	7.7
Hedge funds	na	2.7	2.0	5.2	na	6.2	2.9	3.3
Natural resources	na	4.7	12.9	na	na	na	na	4.9
Global tactical asset allocation	na	4.9	7.3	1.0	na	na	na	5.5
Commodities	na	-5.5	-6.9	-5.3	na	na	na	-5.1

DC denotes defined contribution. DB denotes defined benefit. na denotes not available.

Source: CEM Benchmarking.

The default and choice segments

Analysis presented in chapter 2 showed that the default segment outperformed its respective BPs, while the choice segment fell below its BPs. However, this result is (marginally) sensitive to changes to the time period under analysis and the tax rate. Shortening the time frame to 2012 to 2016 sees both segments underperform, regardless of the tax rate applied to the BPs. Applying a 5 per cent tax rate (instead of the median) over 2005–2016 sees the choice segment perform above both BPs (table 4.19).

The default segment can be defined in multiple ways. The analysis in chapter 2 is based on current MySuper products and their predecessors. This is the Commission's preferred definition throughout the draft report as it best captures those disengaged individuals not making an active choice.[13] For the same reason, throughout this supplement unless otherwise stated, the default segment refers to current MySuper products and their predecessors. An alternative definition involves counting all default investment options. These are the investment options applied to new fund members, whether they join through an employer

[13] Although the definition is an imperfect measure of this — many MySuper members are likely to have actively selected that product.

default or voluntarily, and who do not actively choose their own investment option within the fund. Therefore, it captures those actively choosing a fund, but not a product. This was recommended by AIST (sub. 39, p. 29). On this definition, default investment options on average outperform BP1 but not BP2 (figure 4.13).

As noted in chapter 2, similar results to those reported in figure 2.6 are obtained when conducting this analysis using the Rainmaker dataset (rather than SuperRatings), although MySuper falls just under BP2.

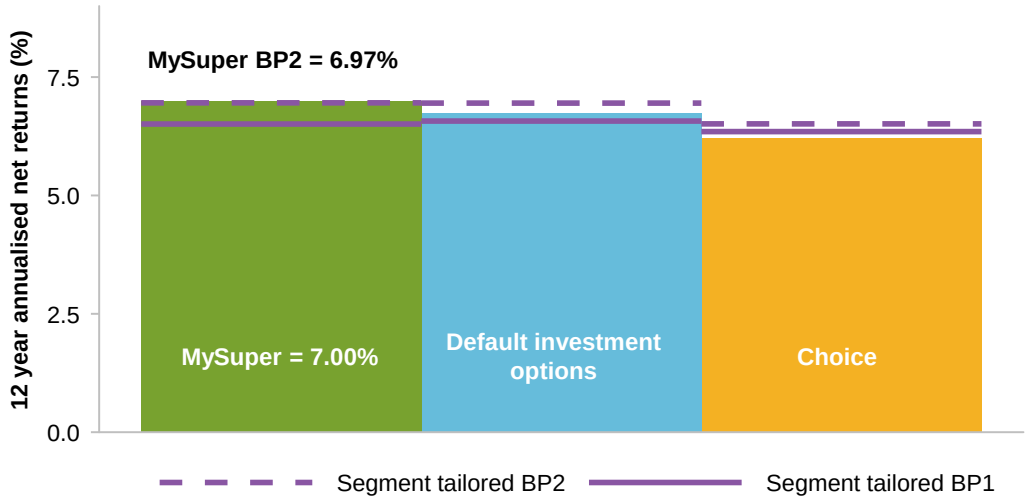
Table 4.19 **Choice and default (MySuper) segment**
Tax and time period sensitivity

Benchmark type	*BP1 (%)*	*BP2 (%)*	*Actual return (%)*	*Result*
Choice				
2005–2016 (in chapter 2)	6.35	6.51	6.22	Performance below both benchmarks
2005–2016, 5% tax rate	5.94	6.11	6.22	Performance above both benchmarks
2009–2016, median tax rate	5.55	5.45	4.99	Performance below both benchmarks
2009–2016, 5% tax rate	5.15	5.05	4.99	Performance below both benchmarks
2012–2016, median tax rate	8.99	8.81	7.15	Performance below both benchmarks
2012–2016, 5% tax rate	8.55	8.36	7.15	Performance below both benchmarks
Default (MySuper)				
2005–2016 (in chapter 2)	6.51	6.96	7.00	Performance above both benchmarks
2005–2016, 5% tax rate	6.08	6.56	7.00	Performance above both benchmarks
2009–2016, median tax rate	5.45	5.73	5.73	Performance above both benchmarks
2009–2016, 5% tax rate	5.03	5.33	5.73	Performance above both benchmarks
2012–2016, median tax rate	9.06	9.14	8.25	Performance below both benchmarks
2012–2016, 5% tax rate	8.59	8.69	8.25	Performance below both benchmarks

Sources: PC analysis of APRA confidential data, financial market index data (various providers) and SuperRatings data.

Figure 4.13 **A broader default definition[a,b]**

Returns compared to segment-tailored BPs, 2005-2016



Sources	PC analysis of ABS data (*Consumer Price Index, Australia, June 2017*, Cat. no. 6401.0), SuperRatings data and financial market index data (various providers).		
Benchmark	Segment tailored BP1, BP2 and CPI + 3.5		
Coverage[c]	Accumulation options from APRA-regulated funds: In 2004-05, the figure represents up to 61% of total assets and 64% of member accounts of APRA-regulated funds In 2015-16, the figure represents up to 91% of total assets and < 92% of member accounts of APRA-regulated funds.		
Survivor Bias	No.	**Selection Bias**	Yes.

a The MySuper segment includes options which could be linked to their MySuper successors. The 'default investment options' segment includes MySuper products and non-MySuper default products assigned to members who actively select a fund, but not an investment option. **b** Net returns are estimated less investment fees, taxes and implicit asset based administration fees. This means that some options may be reported gross of asset based administration fees. **c** These coverage estimates are likely to be overestimates due to the estimation method (section 4.1).

Not-for-profit and for-profit

Analysis in chapter 2 showed that not-for-profit funds beat their tailored BPs while for-profit funds fell short of theirs. This result is not sensitive to the tax rates used in the BPs, or whether the analysis is confined just to funds that are still in existence. It is marginally sensitive to altering the asset allocation assumption and weighted returns by members. It is most sensitive to the time period used (table 4.20).

Table 4.20 **For-profit and not-for-profit segments**

BP sensitivity tests, 2005–2016 unless stated otherwise

Benchmark type	*BP1 (%)*	*BP2 (%)*	*Actual return (%)*	*Result*
For profit				
Median tax (chapter 2)	5.87	5.82	4.91	Performance below both benchmarks
5% tax rate	5.45	5.40	4.91	Performance below both benchmarks
Static 2016 asset allocation	5.62	5.55	4.91	Performance below both benchmarks
Only current funds[a]	5.87	5.82	4.90	Performance below both benchmarks
Member-weighted returns[b]	5.87	5.82	5.70	Performance below both benchmarks
2009–2016	5.12	4.97	4.17	Performance below both benchmarks
2012–2016	7.79	7.68	6.42	Performance below both benchmarks
Not for profit				
Median tax (chapter 2)	6.45	6.60	6.84	Performance above both benchmarks
5% tax rate	6.02	6.19	6.84	Performance above both benchmarks
Static 2016 asset allocation	6.48	6.94	6.84	Performance above BP1 but not BP2
Only current funds[a]	6.45	6.60	6.88	Performance above both benchmarks
Member-weighted returns[b]	6.45	6.60	6.57	Performance above BP1 but not BP2
2009–2016	5.85	5.66	5.59	Performance below both benchmarks
2012–2016	8.93	8.62	8.16	Performance below both benchmarks
All APRA-regulated funds				
Median tax (chapter 2)	5.99	6.42	5.87	Performance below both benchmarks
5% tax rate	5.59	6.01	5.87	Performance above BP1 but not BP2
Static 2016 asset allocation	6.20	6.46	5.87	Performance below both benchmarks
Only current funds[a]	5.99	6.42	5.91	Performance below both benchmarks
Member-weighted returns[b]	5.99	6.42	5.79	Performance below both benchmarks
2009–2016	5.15	5.37	4.92	Performance below both benchmarks
2012–2016	8.56	8.89	7.35	Performance below both benchmarks

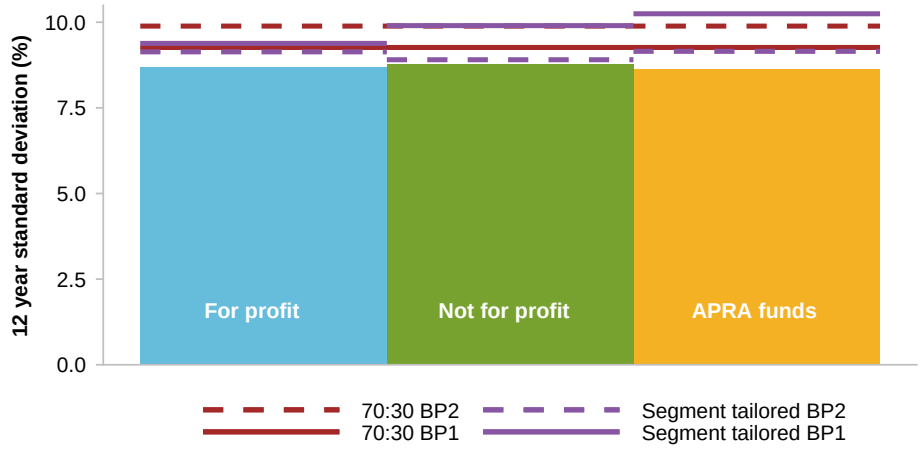
[a] Benchmarks are still based on all funds (meaning they are the same as in chapter 2). [b] Benchmarks are the same as in chapter 2, meaning they are not member-weighted.

Sources: PC analysis of APRA confidential data and financial market index data (various providers).

Realised volatility is similar across all segments, although for-profit funds have delivered 'smoother' returns relative to their tailored BPs (figure 4.14). As reported in chapter 2, analysing the segments net of investment fees and taxes (but gross of administration expenses) does not alter the result that not-for-profit funds outperform for-profit funds (figure 4.15).

Figure 4.14 For-profit and not-for-profit segments

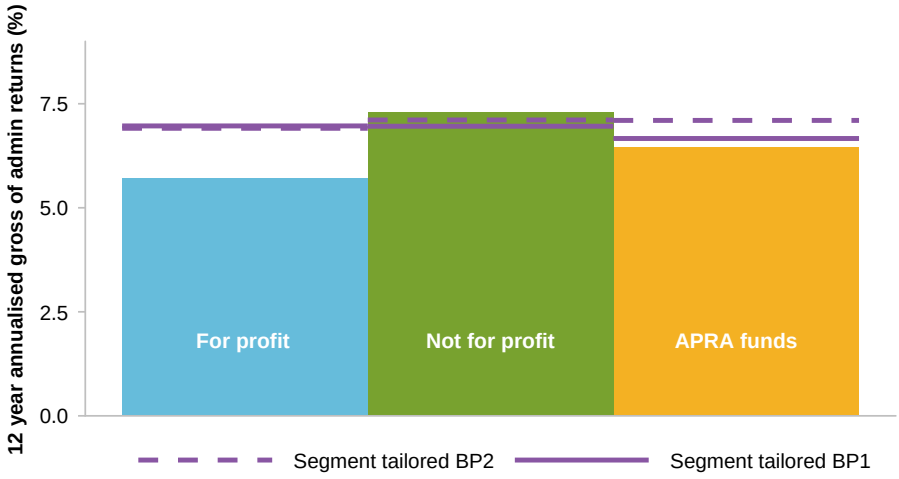
Standard deviation, 2005-2016



Sources	PC analysis of APRA confidential data and financial market index data (various providers).
Benchmark	70:30 BP1 and BP2, System average BP1 and BP2.
Coverage	All APRA-regulated funds. Excludes exempt public sector superannuation schemes, eligible rollover funds and insurance-only superannuation funds.
Survivor Bias	No. **Selection Bias** No.

Figure 4.15 For-profit and not-for-profit segments

Returns gross of administration expenses, 2005-2016



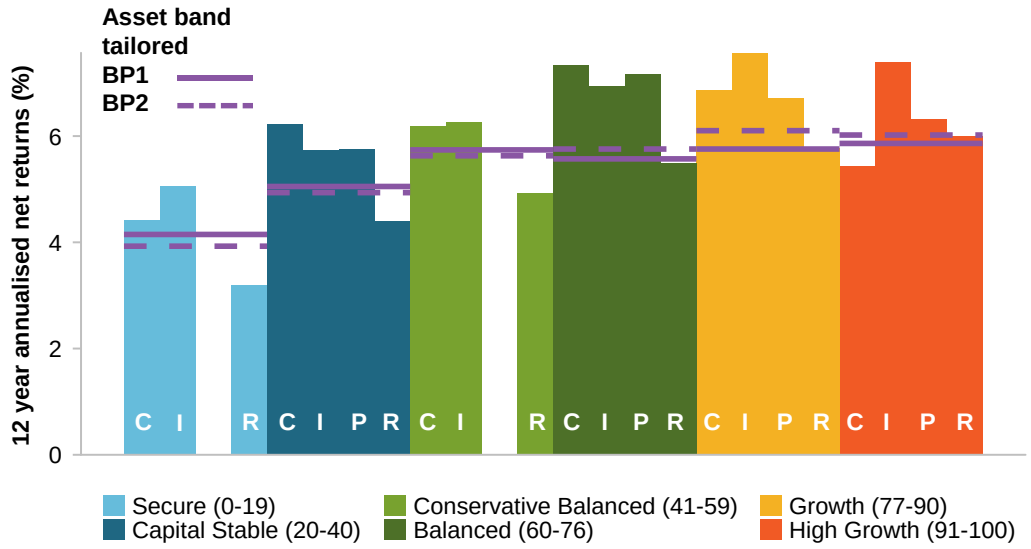
Sources	PC analysis of APRA confidential data and financial market index data (various providers).
Benchmark	Segment tailored (gross of administration expenses) BP1 and BP2.
Coverage	All APRA-regulated funds. Excludes exempt public sector superannuation schemes, eligible rollover funds and insurance-only superannuation funds.
Survivor Bias	No. **Selection Bias** No.

Fund-type and asset-band level

The performance divide between for-profit and not-for-profit funds is also evident when analysis is done at the fund-type and asset-band level. For most option types, not-for-profit products beat their asset-band tailored BPs, while retail (for-profit) products fall below all BPs in all asset-bands (figure 4.16). This result is relatively unaffected by alterations to the tax rate applied to the BPs (table 4.21).

Figure 4.16 **Asset band – fund type segments** [a,c]

Benchmark adjusted for asset allocation, 2005–2016



Sources	PC analysis of APRA confidential data, financial market index data (various providers) and SuperRatings data.
Benchmark	Asset-band tailored BP1, BP2.
Coverage[b]	Accumulation options from APRA-regulated funds. In 2004-05, the figure represents up to 61% of total assets and 64% of member accounts of APRA-regulated funds. In 2015-16, the figure represents up to 91% of total assets and 92% of member accounts of APRA-regulated funds.
Survivor Bias	No. **Selection Bias** Yes.

[a] 'C' stands for Corporate, 'I' stands for Industry, 'P' stands for Public Sector and 'R' stands for Retail. [b] These coverage estimates are likely to be overestimates due to the estimation method (section 4.1). [c] Net returns are estimated less investment fees, taxes and implicit asset based administration fees. This means that some options may be reported gross of asset based administration fees.

Table 4.21 **Asset-band – fund-type segments[a]**

Sensitivity tests, 2005-2016

BP type	*Fund type*	*Actual return (%)*	*BP1 (%)*	*BP2 (%)*	*Result*
Secure (0-19)					
Median tax	Corporate	4.41	4.74	4.52	Performance below both benchmarks
	Public sector	na			na
	Industry	5.05			Performance above both benchmarks
	Retail	3.19			Performance below both benchmarks
5% tax	Corporate	4.41	4.29	4.07	Performance above both benchmarks
	Public sector	na			na
	Industry	5.05			Performance above both benchmarks
	Retail	3.19			Performance below both benchmarks
Capital stable (20-40)					
Median tax	Corporate	6.22	5.57	5.45	Performance above both benchmarks
	Public sector	5.75			Performance above both benchmarks
	Industry	5.74			Performance above both benchmarks
	Retail	4.40			Performance below both benchmarks
5% tax	Corporate	6.22	5.21	5.10	Performance above both benchmarks
	Public sector	5.75			Performance above both benchmarks
	Industry	5.74			Performance above both benchmarks
	Retail	4.40			Performance below both benchmarks
Conservative balanced (41-59)					
Median tax	Corporate	6.19	6.33	6.21	Performance below both benchmarks
	Public sector	na			na
	Industry	6.26			Performance above BP2 but not BP1
	Retail	4.93			Performance below both benchmarks
5% tax	Corporate	6.19	5.92	5.81	Performance above both benchmarks
	Public sector	na			na
	Industry	6.26			Performance above both benchmarks
	Retail	4.93			Performance below both benchmarks

(continued next page)

Table 4.21 (continued)

BP type	*Fund type*	*Actual return (%)*	*BP1 (%)*	*BP2 (%)*	*Result*
Balanced (60-76)					
Median tax	Corporate	7.33	6.16	6.35	Performance above both benchmarks
	Public sector	7.16			Performance above both benchmarks
	Industry	6.93			Performance above both benchmarks
	Retail	5.49			Performance below both benchmarks
5% tax	Corporate	7.33	5.74	5.94	Performance above both benchmarks
	Public sector	7.16			Performance above both benchmarks
	Industry	6.93			Performance above both benchmarks
	Retail	5.49			Performance below both benchmarks
Growth (77-90)					
Median tax	Corporate	6.87	6.37	6.72	Performance above both benchmarks
	Public sector	6.71			Performance above BP1 but not BP2
	Industry	7.57			Performance above both benchmarks
	Retail	5.76			Performance below both benchmarks
5% tax	Corporate	6.87	5.93	6.29	Performance above both benchmarks
	Public sector	6.71			Performance above both benchmarks
	Industry	7.57			Performance above both benchmarks
	Retail	5.76			Performance below both benchmarks
High growth (91-100)					
Median tax	Corporate	5.43	6.46	6.61	Performance below both benchmarks
	Public sector	6.32			Performance below both benchmarks
	Industry	7.38			Performance above both benchmarks
	Retail	5.99			Performance below both benchmarks
5% tax	Corporate	5.43	6.02	6.20	Performance below both benchmarks
	Public sector	6.32			Performance above both benchmarks
	Industry	7.38			Performance above both benchmarks
	Retail	5.99			Performance below both benchmarks

a Benchmarks are option-type level, not option-type *and* fund-type level.

Sources: PC analysis of APRA confidential data, financial market index data (various providers), Rainmaker data and SuperRatings data. **na** Not available.

Retirement and accumulation

As noted in chapter 2, the accumulation segment beat BP1 but not BP2, while the retirement segment fell below both. A 5 per cent tax rate (only applicable to the accumulation stage) results in the accumulation stage beat both BPs. The results are also sensitive to the time period used (table 4.22).

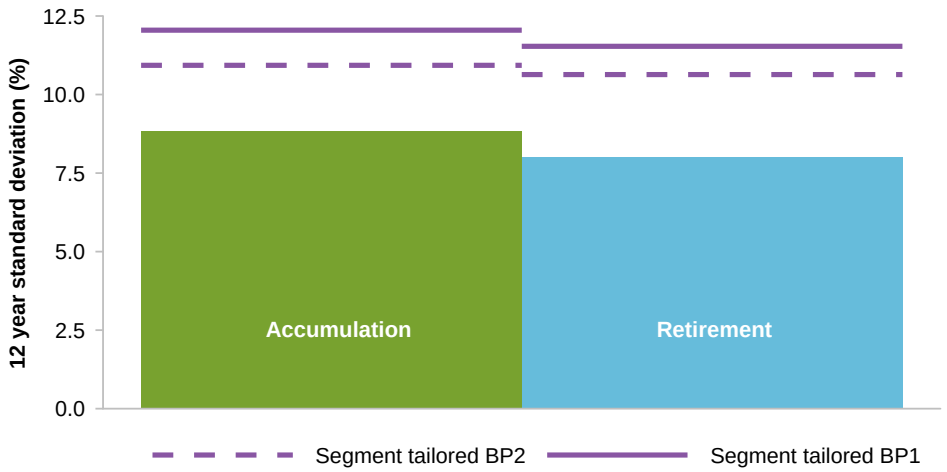
Both the retirement and accumulation segments handled volatility better than their BPs (figure 4.17). The results are different when analysing Rainmaker data (figure 4.18).

Table 4.22 **Retirement and accumulation segment**
Alternative approaches

Benchmark type	*BP1 (%)*	*BP2 (%)*	*Actual return (%)*	*Result*
Accumulation				
2005–2016 (in chapter 2)	6.31	6.60	6.56	Beats BP1, but not BP2
2005–2016, 5% tax rate	5.89	6.20	6.56	Beats both benchmarks
2009-2016	5.41	5.47	5.35	Falls below both benchmarks
2012-2016	8.94	8.88	7.69	Falls below both benchmarks
Retirement				
2005–2016 (in chapter 2)	6.37	6.73	5.87	Falls below both benchmarks
2009–2016	5.21	5.05	6.05	Beats both benchmarks
2012–2016	8.28	8.00	7.92	Falls below both benchmarks

Sources: PC analysis of APRA confidential data, financial market index data (various providers), Rainmaker data and SuperRatings data.

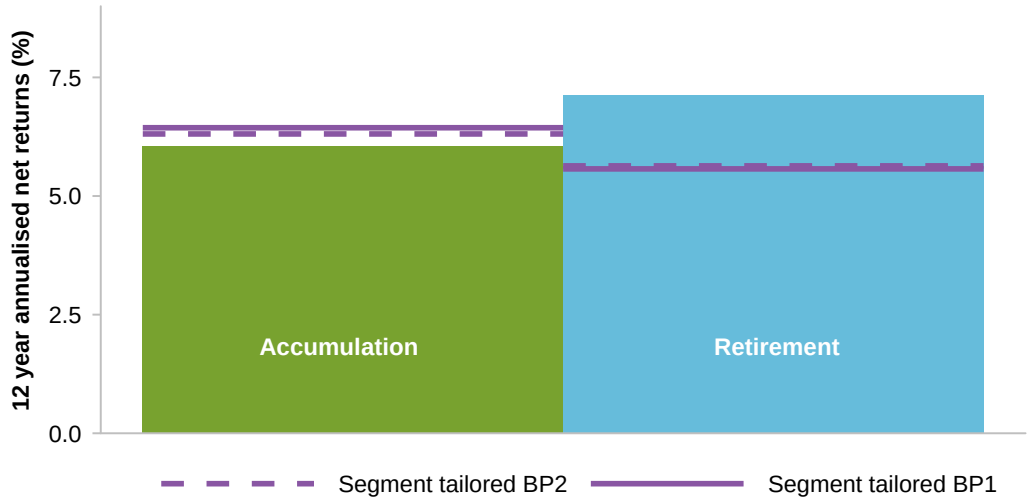
Figure 4.17 **Accumulation and retirement segments**[a,b]
Volatility, 2005-2016



Sources	PC analysis of SuperRatings data and financial market index data (various providers).
Benchmark	Segment tailored BP1, BP2.
Coverage[a]	Accumulation options from APRA-regulated funds. In 2004-05, the figure represents up to 61% of total assets and 64% of member accounts of APRA-regulated funds In 2015-16, the figure represents up to 91% of total assets and 92% of member accounts of APRA-regulated funds
Survivor Bias	No. **Selection Bias** Yes.

[a] These coverage estimates are likely to be overestimates due to the estimation method (section 4.1). [b] Net returns are estimated less investment fees, taxes and implicit asset based administration fees. This means that some options may be reported gross of asset based administration fees.

Figure 4.18 **Accumulation and retirement segments returns[a]**
Rainmaker data, 2005-2016



Sources	PC analysis of Rainmaker data and financial market index data (various providers).		
Benchmark	Segment tailored BP1, BP2.		
Coverage[a]	Accumulation options from APRA-regulated funds. In 2004-05, the figure represents up to 30% of total assets and 42% of member accounts of APRA-regulated funds In 2015-16, the figure represents up to 52% of total assets and 55% of member accounts of APRA-regulated funds		
Survivor Bias	No.	**Selection Bias**	Yes.

[a] These coverage estimates are likely to be overestimates due to the estimation method (section 4.1).

Fund-level analysis

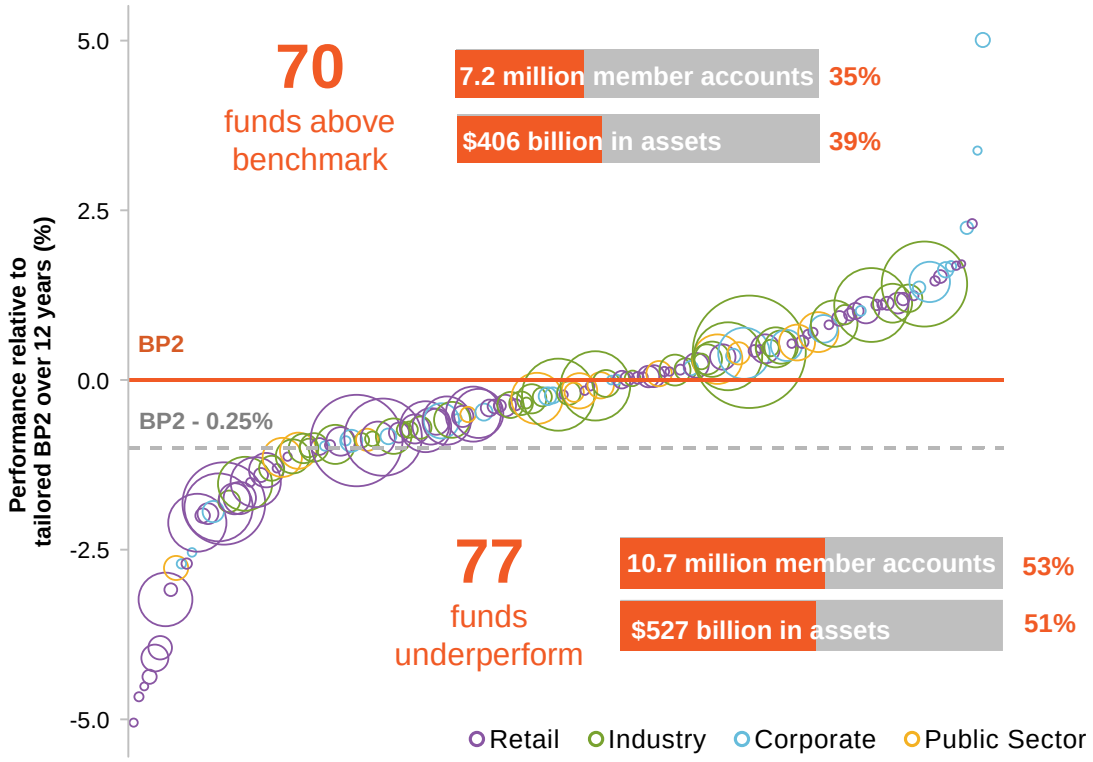
In chapter 2, the Commission presented analysis on the distribution of fund performance and found that about one in four funds in the sample considered underperformed a tailored BP2 by more than 0.25 percentage points. However, in this analysis the Commission only considered funds with a MySuper product, for the purposes of applying default asset allocation adjustments (section 4.2). The Commission has also conducted an analysis using the entire sample of funds available by fixing each fund's asset allocation over time to their 2016 asset allocation. While the Commission prefers applying the default asset allocation adjustment, this approach was undertaken to allow for an assessment of all funds in the system.

Subject to this assumption, the analysis shows that the extent of underperformance in the system is much larger than the Commission's analysis in chapter 2 would suggest, with over 50 per cent of assets and members in underperforming funds (figure 4.19). Nonetheless, the result that retail funds are overrepresented in the underperforming funds still holds (table 4.23).

Figure 4.19 **Distribution of fund performance under static asset allocations**

Compared to own asset allocation, 2005–2016

Size of circles indicates the size of each fund's assets under management



Sources	PC analysis of APRA confidential data and financial market index data (various providers).
Benchmark	Fund tailored BP2.
Coverage	All APRA-regulated funds which were still operating in 2016. Over the whole system, the figure represents 161 funds, 49% of assets and 70% of member accounts in 2016.
Survivor bias	Yes. **Selection bias** No.
Further results	14 funds performed less than 0.25 percentage points below BP2 (2.5 million member accounts and $96.3 billion in assets).

Of the 77 underperforming funds, 36 are funds which also have a MySuper product. In other words, over half (41) of the underperforming funds are funds without a MySuper product. This seems consistent with the finding that funds with a MySuper product are likely to perform better than those without.

However, some of the remaining funds (that do have a MySuper product) have lower performance in this analysis due to the use of the 2016 static asset allocation. Only one of the 20 underperforming funds in the chapter 2 analysis no longer underperform when this

alternative assumption is applied, suggesting that the 2016 static asset allocation imposes a higher benchmark for funds than when using default asset allocation adjustments.

Table 4.23 **Composition of underperforming funds**
2005–2016, with 2016 static asset allocation

Fund type	*Number of funds in population*[a]	*% of population in sample (number of funds)*	*Composition of under-performers (%)*	*% of funds (in each fund type) that are underperforming*	*% of assets (in each fund type) in underperforming funds*	*% of accounts (in each fund type) in underperforming funds*
Corporate	27	100 (27)	13	37	23	19
Industry	41	100 (41)	25	46	17	24
Public Sector	17	82 (14)	8	43	44	41
Retail	120	66 (79)	55	53	94	96

[a] The population of funds in this table includes all APRA-regulated funds which have provided annual returns for every year over the period 2005–2016, and which are not insurance only or eligible rollover funds.

Sources: PC analysis of APRA confidential data and financial market index data (various providers).

The Commission has also tested the sensitivity of the results to tax and administration fees by varying assumptions from the use of reported tax and reported administration expense ratios. In particular, by constructing fund tailored benchmarks using a 5 per cent tax rate, system median administration fees, and both a 5 per cent tax rate and system median administration fees, in place of the Commission's preferred assumptions (table 4.24).

Allowing for higher taxes and potentially higher administration fees reduces the magnitude of underperformance and increases the magnitude of performance above benchmarks, but under each set of assumptions, there remains a substantial tail of underperforming funds. In each case, retail funds are overrepresented amongst the underperforming funds.

Table 4.24 **Fund-level tailored benchmarking[a]**

Alternative approaches

		Own tax, own admin expense (Baseline)	*Own tax, system median admin expense*	*Flat 5% tax, own admin expense*	*Flat 5% tax, system median admin expense*
Funds performing above BP2	Number of funds	47	48	49	53
	Accounts (m)	9.8	8.9	10.5	11.0
	Assets ($b)	448	439	496	530
Funds less than 0.25% under BP2	Number of funds	7	7	9	5
	Accounts (m)	0.3	2.4	1.1	0.6
	Assets ($b)	19	106	48	33
Underperforming funds (under BP2 – 0.25%)	Number of funds	20	19	16	16
	Accounts (m)	4.6	3.3	3.0	3.0
	Assets ($b)	197	118	119	101
Composition of underperformers (%)	Corporate	15	11	13	13
	Industry	30	37	38	38
	Public Sector	10	5	6	6
	Retail	45	47	44	44
% of funds (in each fund type) that are underperforming	Corporate	21	14	14	14
	Industry	15	18	15	15
	Public Sector	40	20	20	20
	Retail	56	56	44	44

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Table 4.24 (continued)

			Own tax, own admin expense (Baseline)	*Own tax, system median admin expense*	*Flat 5% tax, own admin expense*	*Flat 5% tax, system median admin expense*
% of assets (in each fund type) that are in underperforming funds (%)	Corporate		6	–	9	6
	Industry		3	2	12	10
	Public Sector		32	8	32	8
	Retail		94	59	88	59
% of accounts (in each fund type) that are in underperforming funds (%)	Corporate		8	1	13	8
	Industry		5	5	13	13
	Public Sector		35	10	35	10
	Retail		96	68	95	68
Number of funds in sample	Corporate	14				
	Industry	39				
	Public Sector	5				
	Retail	16				
Number of funds in population[b]	Corporate	27				
	Industry	41				
	Public Sector	17				
	Retail	120				

a 'Own' in column headings refers to the individual fund's own actual tax rate paid or administration expense ratio. **–** Nil or rounded to zero. **b** The population of funds in this table includes all APRA-regulated funds which have provided annual returns for every year over the period 2005–2016, and which are not insurance only or eligible rollover funds.

Sources: PC analysis of APRA confidential data and financial market index data (various providers).

MySuper analysis

Chapter 2 presented the 3-year net returns for MySuper products. Conducting the analysis gross of administration fees does not materially alter the results. However, the results are quite sensitive to the tax rate applied to the BPs (table 4.25).

Table 4.25 **MySuper performance[a]**
Tax sensitivity, 2014–2017

	Median tax (chapter 2)	*Gross of admin fees*	*5% tax*
Products performing above BP2			
Number of products	12	16	31
Accounts (m)	4.6	4.7	7
Assets ($b)	192	200	300
Products under BP2 but not underperforming			
Number of products	3	1	8
Accounts (m)	0.25	np	0.8
Assets ($b)	6.8	np	28
Underperforming products			
Number of products	75	73	51
Accounts (m)	8.4	8.4	5.2
Assets ($b)	339	337	210
Composition of underperformers (%)			
Corporate	16	15	18
Industry	35	36	25
Public Sector	12	12	10
Retail	37	37	47
% of all MySuper products (in each fund type) that are underperforming			
Corporate	100	92	75
Industry	63	63	32
Public Sector	100	100	56
Retail	100	96	86

a Life-cycle product returns are derived from the weighted average returns to individual stages. **np** Not published.

Sources: PC analysis of ABS data (*Consumer Price Index, Australia, June 2017*, Cat. no. 6401.0), APRA MySuper data, and financial market index data (various providers).

The results from the 10-year analysis of MySuper products and connected pre-cursors are also sensitive to the tax rate applied to the BPs (table 4.26).

Table 4.26 **MySuper performance[a]**
Tax sensitivity, 2008-2017

	Median tax (chapter 2)	*5% tax*
Products in population by fund type		
Corporate	13	13
Industry	41	41
Public Sector	12	12
Retail	42	42
Products in sample by fund type		
Percentage of population (number of funds)		
Corporate	62 (8)	62 (8)
Industry	88 (36)	88 (36)
Public Sector	92 (11)	92 (11)
Retail	33 (14)	33 (14)
Products performing above BP2		
Number of products	32	48
Accounts (m)	9.2	9.8
Assets ($b)	375	412
Products under BP2 but not underperforming		
Number of products	10	2.5[b]
Accounts (m)	0.4	0.2
Assets ($b)	29	7.8
Underperforming products		
Number of products	26	15.5[b]
Accounts (m)	1.7	1.3
Assets ($b)	62	46
Composition of underperformers (%)		
Corporate	12	6
Industry	38	25
Public Sector	4	6
Retail	46	63

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Table 4.26 (continued)

	Median tax (chapter 2)	*5% tax*
% of all MySuper products (in each fund type) that are underperforming		
Corporate	38	13
Industry	28	11
Public Sector	9	9
Retail	86	71
% of all MySuper assets (in each fund type) that are in underperforming products		
Corporate	12	1
Industry	7	3
Public Sector	2	1
Retail	99.7	94
% of all MySuper accounts (in each fund type) that are in underperforming products		
Corporate	19	4
Industry	7	3
Public Sector	5	na
Retail	99.6	99

a Current MySuper products were connected with pre-cursors with the support of SuperRatings where requested. 15 life-cycle products are represented by their largest 'balanced' option (according to SuperRatings definitions, with three products having two representative options each, which is factored into product counts). **b** One life-cycle product has options in two performance categories, so half a product is allocated to each category. **na** Not available.

Source: PC analysis of ABS data (*Consumer Price Index, Australia, June 2017*, Cat. no. 6401.0), APRA (2017a, 2017c) data, financial market index data (various providers) and SuperRatings data.

Choice option-level analysis

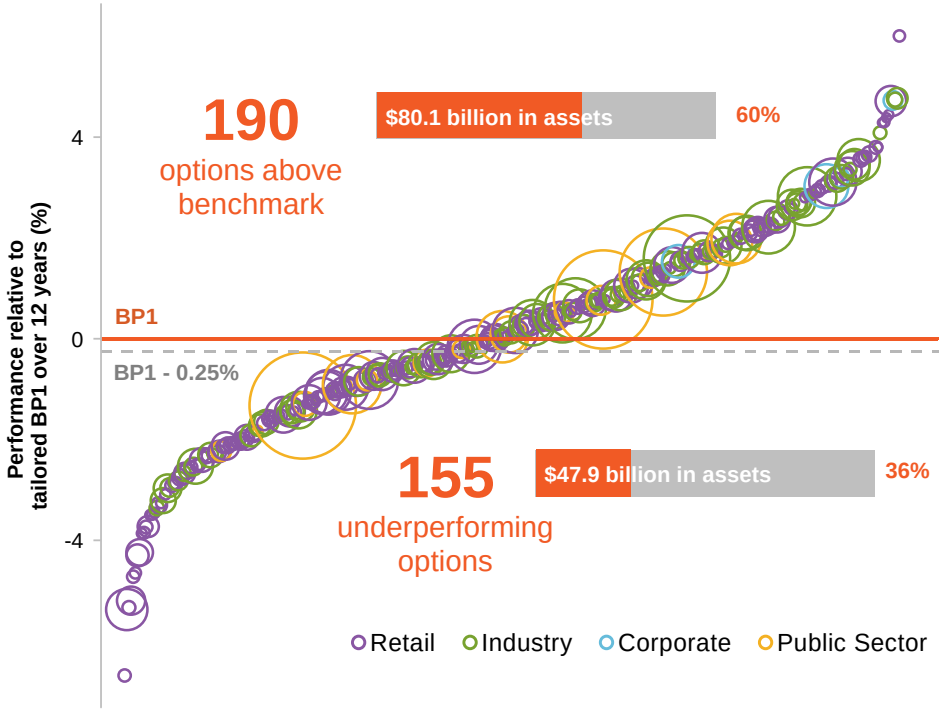
In chapter 2, the Commission considered the distribution of choice option performance and found that around 40 per cent of options in the sample were underperforming a listed benchmark (BP1) by more than 0.25 percentage points. This analysis, however, assumed an administration fee equal to the choice segment median administration fee (table 4.12) and a tax rate equal to the system median tax rate reported by funds in APRA data (figure 4.4). Some choice options may have substantially higher administration fees, and this tax assumption may not fully reflect the tax paid from these options.

Two sensitivity tests were conducted. First the Commission relaxed the administration fee assumption by allowing for administration fees to vary by the fund-type medians in the tailored benchmark portfolios. This means, for example, that the administration fees applied to retail options are substantially higher. Figure 4.20 presents this analysis and shows that under this alternative fee assumption there is a smaller tail of underperforming choice options and more options performing above their tailored benchmark. The composition of underperforming choice options changes slightly, but retail funds continue to be overrepresented (table 4.27).

Figure 4.20 **Distribution of choice options using fund-type administration fees[a]**

Compared to own asset allocation, 2005–2016

Size of circles indicates the size of each option's assets under management



Sources	PC analysis of APRA confidential data, financial market index data (various providers) and SuperRatings data.		
Benchmark	Option tailored BP1.		
Coverage	362 accumulation options from APRA-regulated funds with an estimated $133 billion in assets in the choice segment.		
Survivor Bias	Yes.	**Selection Bias**	Yes.

a Net returns are estimated less investment fees, taxes and implicit asset based administration fees. This means that some options may be reported gross of asset based administration fees.

Table 4.27 **Composition of underperforming choice options[a]**

2005–2016, with fund-type administration fees

Fund type	*Composition of underperformers (%)*	*Underperformers as a percentage of all in fund type (%)*
Corporate	0	0
Industry	23	33
Public Sector	5	35
Retail	72	49

a The percentage of choice option assets and accounts (in each fund type) that are underperforming has not been reported due to the small sample sizes.

Sources: PC analysis of APRA confidential data, financial market index data (various providers) and SuperRatings data.

The Commission has also considered testing the sensitivity of the analysis to the system median tax assumption by conducting the analysis using a 5 per cent tax rate assumption (table 4.28). The results of this analysis also point to less underperformance, with more options that performing above their tailored benchmarks. Retail options continue to be overrepresented in the tail of underperforming options under this assumption. It is also worth noting that most of the underperforming options under either of the tax assumptions are diversified options, as opposed to single-class options.

Table 4.28 **Distribution of choice options under different tax assumptions[a]**

2005–2016, with choice segment median administration fees

		System median tax (baseline)	*5% tax rate*
Options performing above the benchmark	Number of options	172	199
	% of assets in sample	57	63
	Assets ($b)	75.5	83.6
Options under benchmark, but not underperforming	Number of options	18	21
	% of assets in sample	3	7
	Assets ($b)	4.0	9.4
Underperforming options	Number of options	172	142
	% of assets in sample	40	30.0
	Assets ($b)	53.7	40.2
Composition of underperforming tail (%)	Corporate	0	0
	Industry	20	18
	Public Sector	3	3
	Retail	76	80
	Multi-sector (assets)	95	93
% of Choice options (in each fund type) that are underperforming	Corporate	0	0
	Industry	32	23
	Public Sector	30	20
	Retail	57	49

a The percentage of choice option assets and accounts (in each fund type) that are underperforming has not been reported due to the small sample sizes.

Sources: PC analysis of APRA confidential data, financial market index data (various providers) and SuperRatings data.

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