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Superannuation: Switching and Roulette Wheels

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Abstract:

The introduction of choice has resulted in Australia's superannuation system providing unprecedented flexibility (through increased investment options and the timing choices) for members to optimise their expected benefits. This paper examines the impact of switching between investment options using a normalised ranked return or "roulette wheel" approach developed by Bauer and Dahlquist (2001) for the Australian setting. The paper tests various switching strategies for both single-sector and blended options, for the period 1985–2005, finding that members require forecast accuracy of around 70% to be successful at market timing. Finally, the paper considers the impact of switching strategies on accumulated balances.

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On switching (or market timing): *"I don't know anyone who's ever got it right. In fact, I don't know anyone who knows anyone who's ever got it right."* — Jack Bogle, Founder, The Vanguard Group Inc.

Superannuation choice has undoubtedly resulted in heightened competition between superannuation fund providers, with more than five million employees in Australia's workforce now able to participate actively in decisions about the management of their retirement savings.[1] Competition has brought changes in many areas of the industry, from reductions in management expense ratios and administrative charges, to greater services for members and increased product features. Turning specifically to the focus of investigation in this study — product features — two of the interesting developments in the recent past have seen superannuation funds provide a greater number of investment options for members in concert with greater flexibility to "switch" between these options.

Many superannuation funds allow members to select from a range of "single-sector" options (Australian shares, international shares, property, Australian bonds, international bonds and cash) and "blended" options (capital stable, conservative balanced, balanced, growth and high growth). This enables members to tailor their investment decisions on the basis of their preferences toward risk and reward. Moreover, superannuation fund providers are serving an important facilitation role, allowing members to engage in dynamic strategies through switching arrangements. A small number of funds will allow members to switch between options on a daily basis; however, most providers will, on a member's instruction, facilitate monthly switching (typically, the first switch in a 12-month period is free, with subsequent switches each charged an administration fee of around $20–$30).[2] As a result, the superannuation system now provides unprecedented flexibility (through increased investment choice and the timing choices) for members to optimise their expected final-time utility of wealth.[3]

This motivates the research question considered in this paper: What are the impacts (if any) of members utilising these product features? More specifically, what are the impacts of switching between various investment options? In the finance literature, notions of "switching" are considered attempts by members to engage in "market timing" and "investment options" linked to the issue of portfolio selection or asset allocation. In fact, standard finance theory places asset allocation at the heart of the investment management process (Markowitz 1952, Tobin 1958), with empirical studies suggesting that asset allocation may explain, on average, around 90% of the variation in total plan return (Brinson *et al* 1986).

This study follows the analysis of Bauer and Dahlquist (2001) in considering switching as attempts made to maximise returns by making decisions about whether to be "in" or "out" of particular investment options. For instance, members who switch may make monthly, quarterly or annual decisions about whether to be in single-sector options (such as Australian shares or property) or various blended options (such as capital-stable or high-growth), or seek the safe harbour of investing in cash. While a number of other studies (including Drew and Stanford 2003, Faff *et al* 2005, Frino *et al* 2005) specifically consider the impact of fund performance in the Australian superannuation industry, this study considers the issue of investment choice from the member perspective.

The allure of increasing portfolio returns through switching has attracted some of the leading researchers in the field to consider the problem. From the Nobel laureate William F. Sharpe's (1975) recommendation that investors "should probably avoid attempts to time the market altogether" (p. 67), to Jeffrey's (1984) paper entitled "The Folly of Stock Market Timing" and the recent conclusion of Bauer and Dahlquist (2001) that "market timing is a tough game" (p. 37), the received position suggests that market timing is at best difficult, and at worst a "wealth hazard" for fund members.[4] This study considers issues of switching from the perspective of a superannuation member by evaluating the merits of various switching strategies versus a more passive buy-and-hold strategy. The work of Bauer and Dahlquist (2001) commonly termed the "roulette wheel" (RW) or "normalised ranked return" approach provides the basis for the analysis undertaken. This approach provides members with some positive insights into how even relatively infrequent decisions to switch between investment options can have substantial impacts on portfolio returns. The roulette wheel analogy is apt, given that we will explore the impacts of switching using many spins of a "fair" roulette wheel. This allows a determination to be made of all possible market timing decisions over various time horizons.

METHODOLOGY

This discussion begins with a summary of Bauer and Dahlquist's (2001) RW approach, examining switching decisions across two investment options (stocks and bonds) over three periods. We assume that 100% is invested by the member in either of the options and, for simplicity; the issue of compounding has been ignored. Assume that the returns by period were: 1 (stocks = 5.0%, bonds = 0.6%); 2 (stocks = -3.0%, bonds = 0.8%); and, 3 (stocks = 7.0%, bonds = 0.7%). With two investment options from which to select (denoted by "s") over three periods (denoted by "n"), the total number of return paths is given by s^n , in this case, 2^3 = 8 return paths.

Table 1: Illustrative Return Paths

Path	Period 1 Asset held	Return (%)	Period 2 Asset held	Return (%)	Period 3 Asset held	Return (%)	Total return
1	Stocks	5.0	Stocks	-3.0	Stocks	7.0	9.0
2	Stocks	5.0	Stocks	-3.0	Bonds	0.7	2.7
3	**Stocks**	**5.0**	**Bonds**	**0.8**	**Stocks**	**7.0**	**12.8**
4	Stocks	5.0	Bonds	0.8	Bonds	0.7	6.5
5	Bonds	0.6	Stocks	-3.0	Stocks	7.0	4.6
6	**Bonds**	**0.6**	**Stocks**	**-3.0**	**Bonds**	**0.7**	**-1.7**
7	Bonds	0.6	Bonds	0.8	Stocks	7.0	8.4
8	Bonds	0.6	Bonds	0.8	Bonds	0.7	2.1

TABLE 2: ILLUSTRATIVE RW CALCULATIONS

Path	Period 1 Asset held	Period 2 Asset held	Period 3 Asset held	Total return	Rank	RW measure
6	**Bonds**	**Stocks**	**Bonds**	**-1.7**	**1**	**0.000**
8	Bonds	Bonds	Bonds	2.1	2	0.143
2	Stocks	Stocks	Bonds	2.7	3	0.286
5	Bonds	Stocks	Stocks	4.6	4	0.429
4	Stocks	Bonds	Bonds	6.5	5	0.571
7	Bonds	Bonds	Stocks	8.4	6	0.714
1	Stocks	Stocks	Stocks	9.0	7	0.857
3	**Stocks**	**Bonds**	**Stocks**	**12.8**	**8**	**1.000**
					Average	*0.500*

In this example, the optimal path (path 3) resulted in a return of 12.8%, with the worst strategy, path (path 6), earning -1.7%. Following Bauer and Dahlquist (2001), the possible returns paths are then ranked in ascending order and a normalised measure based on the ranks is computed.[5] The formula for the normalised rank (or RW measure) is:

If Rank = number of possible paths, then, RW = 1.000.
If Rank = 1, then RW = 0.000.
Otherwise, RW = (Rank - 1)/ (Number of Possible Paths - 1).

The calculations in Table 2 illustrate Bauer and Dahlquist's (2001) roulette wheel approach. The wheel is arranged to have only two possible outcomes with equal probability, one or zero, where the expected value of the game (or comparison across investment combinations) is 0.500. In this game of chance, the wheel decides whether to switch "in" or "out" of stocks, which determines the total return (in this example, over three periods). The key to the RW measure is the expected value of 0.500 over a large number of trials, as this is the value the member would expect over a large number of randomly chosen switches or investment paths (Bauer and Dahlquist 2001). From this foundation, we can extend the model to consider more real-world applications in the context of the increasing amount and complexity of choice offered to Australian retirement savers.

In this study, we examine monthly switching strategies across various investment pairing options versus a buy-and-hold or passive approach. We can think of the buy-and-hold strategy as the "measured asset" competing against various "switching asset combinations" and undertake comparative analysis on this basis.[6] In our stylised example, we could think of path 1 (stocks, stocks, stocks) and path 8 (bonds, bonds, bonds) in Tables 1 and 2 as measured assets or a buy-and-hold strategy.

As with previous studies (Sharpe 1974, Jeffrey 1984, Droms 1989, Krester 1990, Bauer and Dahlquist 2001), we commence our analysis across single-sector options faced by members against a cash option using Australian T-bills as a proxy. To extend the boundaries of previous investigation, we also consider switching against blended or multi-sector options, again against a cash option. Finally, we explore a common strategy used by members and professional fund managers alike, switching between Australian equities and Australian T-bills, to quantify the impact of switching on future accumulated balances for the period 1985– 2005.

DATA

We use monthly returns from January 1985 to December 2005 (a total of 252 monthly observations) for domestic (Australian T-bills, bonds, property, and equities) and global (international bonds and equities) investment opportunities.[7] The summary statistics for each of these six single-sector investment options are provided in Table 3. Unlike previous work in this field, we include the property asset class in the analysis; previous studies have typically focused on just stocks and bonds. In addition to these single options, a return series of popular blended options (on the basis of growth/income mix) was also generated for the purposes of analysis (again, previous work has largely considered switching between single-sector options). These descriptive statistics are also reported in Table 3.[8] All statistics are expressed in months (unless otherwise specified), are expressed in Australian dollar terms and invoke the assumption of perfect capital markets (in particular, no transactions costs).[9]

Table 3: Descriptive Statistics

Investment options	**Mean (%)**	**Median (%)**	**Standard deviation (%)**	**MAX (%)**	**MIN (%)**	**Annual mean (%)**
A: Single-sector options						
AUST. T-BILL	0.6866	0.4893	0.3548	1.6038	0.3477	8.2389
AUST. BONDS	0.8574	0.9237	1.6956	7.3583	-5.5286	10.2886
AUST. PROP	0.7439	0.5799	1.0923	4.5151	-5.5143	8.9272
AUST EQUITIES	1.0772	1.4778	5.2561	14.2212	-54.7030	12.9259
INTL BONDS	0.8353	0.9510	2.7289	10.1802	-9.9808	10.0231
INTL. EQUITIES	0.8972	1.4690	4.2917	11.2340	-19.5883	10.7665
B: Blended options						
CAP. STABLE	0.7847	0.8097	1.7570	5.9863	-7.3822	9.4164
CONS. BAL.	0.8348	0.9297	2.2226	7.4763	-12.1159	10.0177
BALANCED	0.8626	0.9876	2.4499	8.3388	-14.3895	10.3511
GROWTH	0.8847	1.0283	2.6470	9.0592	-16.6624	10.6163
HIGH GROWTH	0.8485	0.9346	2.1089	8.4871	-7.3095	10.1824

TABLE 4: AVERAGE ANNUAL RWs USING MONTHLY TIMING FOR NON-OVERLAPPING PERIODS, 1985–2005

Measured asset	**Switching asset 1**	**Switching asset 2**	**Average RW**
A: Single-sector options			
AUST. BONDS	AUST. BONDS	AUST. T-BILL	0.6388
AUST. PROPERTY	AUST. PROPERTY	AUST. T-BILL	0.6609
AUS. EQUITIES	**AUS. EQUITIES**	**AUST. T-BILL**	**0.6344**
INTL. BONDS	INTL. BONDS	AUST. T-BILL	0.5695
INTL. EQUITIES	INTL. EQUITIES	AUST. T-BILL	0.6109
B: Blended options			
CAPITAL STABLE	CAPITAL STABLE	AUST. T-BILL	0.6395
CON. BALANCED	CON. BALANCED	AUST. T-BILL	0.6486
BALANCED	BALANCED	AUST. T-BILL	0.6447
GROWTH	GROWTH	AUST. T-BILL	0.6396
HIGH GROWTH	HIGH GROWTH	AUST. T-BILL	0.6284

Table 5: Average Annual RWS using Monthly Timing for Overlapping periods, 1985–2005

Measured asset	Switching asset 1	Switching asset 2	Average RW
A: Single-sector options			
AUST. BONDS	AUST. BONDS	AUST. T-BILL	0.6411
AUST. PROPERTY	AUST. PROPERTY	AUST. T-BILL	0.6614
AUST. EQUITIES	**AUST. EQUITIES**	**AUST. T-BILL**	**0.6177**
INTL. BONDS	INTL. BONDS	AUST. T-BILL	0.5711
INTL. EQUITIES	INTL. EQUITIES	AUST. T-BILL	0.5933
B: Blended options			
CAPITAL STABLE	CAPITAL STABLE	AUST. T-BILL	0.6404
CON. BALANCED	CON. BALANCED	AUST. T-BILL	0.6325
BALANCED	BALANCED	AUST. T-BILL	0.6228
GROWTH	GROWTH	AUST. T-BILL	0.6153
HIGH GROWTH	HIGH GROWTH	AUST. T-BILL	0.6099

ANALYSIS

We discuss RW measures for monthly switching between two assets (versus the "measured" or buy-and-hold investment option) over a one-year period, from 1985 to 2005. The cost of estimating the normalised rank return is a computational expense due the exponential nature of the problem. For each one-year period, there are a total 2^{12} or 4,096 investment options between, say, Australian bonds and Australian T-bills. This is then calculated across rolling yearly windows commencing at January 1985 to December 1985, February 1985 to January 1986, continuing to December 2005 (a total of 241 rolling windows). The procedure is then repeated ten times (five single-sector and five blended options), resulting in just under ten million (9,871,360) RW measures being computed. The average annual results from strategies involving switching between the ten investment options and Australian T-bills (always set as the second switching asset) are presented in Tables 4 and 5.

These results provide preliminary insights into the challenge faced by members (or fund managers) attempting to optimise portfolio returns through switching between investment options. By way of illustration, it would be ideal to move into the relative safe harbour of Australian T-bills during periods when the Australian stock market is in negative territory (the third pairing in Tables 3 and 4). Over the period considered in this study (January 1985 to December 2005), the Australian equities investment option recorded negative returns in 89 of 252 months (around 35%). In Table 4 we computed the normalised rank return, or RW measure, for all possible monthly switches between Australian equities and Australian T-bills for each of the 21 years between 1985 and December 2005. An average for all 21 years is provided in the final column of Table 4. The results suggest that a buy-and-hold strategy of allocating all funds to the Australian equities option achieved a better return than 63% of all possible paths achievable through switching. These results corroborate the findings of previous studies, such as Bauer and Dahlquist (2001), suggesting that simply holding a diversified portfolio of US equities beats two-thirds of any monthly timing strategies involving US equities and US T-bills. Panel B in Tables 4 and 5 provides results of switching between blended options and cash. These results corroborate the findings from this and previous studies that have only considered single-sector options, reporting a range of 0.6099–0.6486. Using the "fair-coin" analogy, the ten buy-and-hold strategies for the period 1985 to 2005 were found to be superior, with results ranging from 0.5695–0.6614.

One of the interesting findings that Bauer and Dahlquist (2001) report is that, for single-sector options, "the annual variability of the RW measure is striking" (p. 38). To further the discussion, we consider the results for single-sector options (Table 6), and then turn to blended options (Table 7).

TABLE 7: AVERAGE ANNUAL RWs FOR FIVE BLENDED INVESTMENT OPTIONS: MONTHLY TIMING, 1985–2005

Year	CAPITAL STABLE	CON. BALANCED	BALANCED	GROWTH	HIGH GROWTH
1985	0.7133	0.9350	0.9707	0.9761	0.9885
1986	0.8261	0.9201	0.9504	0.9612	0.9712
1987	0.4850	0.4989	0.4989	0.4987	0.4969
1988	0.5248	0.6830	0.7087	0.7346	0.6860
1989	0.3783	0.4361	0.4601	0.4698	0.4725
1990	**0.1087**	**0.0298**	**0.0210**	**0.0181**	**0.0283**
1991	0.9810	0.9043	0.8396	0.7819	0.8786
1992	0.4940	0.2242	0.1463	0.1082	0.1592
1993	0.9873	0.9795	0.9702	0.9631	0.9690
1994	0.0823	0.1521	0.2059	0.2501	0.2562
1995	0.9875	0.9712	0.9346	0.9006	0.8694
1996	0.6466	0.7145	0.7724	0.7910	0.8017
1997	0.8576	0.7661	0.7155	0.7018	0.6835
1998	0.8830	0.8354	0.7880	0.7609	0.7165
1999	0.2291	0.6420	0.7839	0.8447	0.8703
2000	0.8535	0.5553	0.3988	0.3101	0.1641
2001	0.4571	0.4618	0.4430	0.4232	0.3287
2002	0.5792	0.1382	0.1057	0.1009	0.0842
2003	0.6440	0.8908	0.9287	0.9404	0.9336
2004	**0.9101**	**0.9802**	**0.9890**	**0.9905**	**0.9834**
2005	0.8020	0.9021	0.9077	0.9067	0.8552
Average	*0.6395*	*0.6486*	*0.6447*	*0.6396*	*0.6284*

NB: With Aust. T-bills as the second switching asset.

One of the striking outcomes for the Australian setting is the results for the Australian property and Australian T-bill pair. For instance, in 1986 and 1989, around half of all market timing strategies worked. However, during the property market crash of the early 1990s (1991 and 1992), the optimal strategy was to have a zero weighting to property, and in the four years from 2001, the optimal strategy was 100% weighting to property. Yet, even with these widely fluctuating fortunes through time, a simple buy-and-hold strategy of Australian property performed better than 63% of all possible active switching strategies.

Turning to the respective buy-and-hold blended options, even with their vast array of asset composition (ranging from capital stable with 20:80 growth/income mix, to high growth holding 100% equities), we find years where the challenge of switching ranges from simple (in 1990, around 98% of all market timing strategies worked), to the near impossible (in 2004, less than 9% of all active switching strategies were successful across the five single-sector investment options, with less than 1% against the growth strategy). Sharpe's (1975) analysis suggests that the investor would require around 70–

80% forecast accuracy for switching to work, with the results of this study corroborating this view for both the single-sector and blended options against cash.

IT'S TIME IN, NOT TIMING, THE MARKET THAT COUNTS

These findings raise a number of issues for further analysis. For instance, the timing of switches could be moved at a different frequency, or the measured asset could be changed. These issues have been examined by Bauer and Dahlquist (2001) at a single-sector level for the US. They found that, regardless of permutation, the buy-and-hold strategy consistently outperformed around two-thirds of any possible switching strategy.

While the difficulty of beating a buy-and-hold strategy through switching is well known, it is argued that further consideration in quantifying the impacts from a risk/reward perspective is warranted. In short, we conclude with a test of the widely held belief that "it's time in, not timing, the market that counts". We present RW measures for monthly market timing between Australian equities and Australian T-bills.

Figure 1: RW Measures for Buy-and-Hold Australian Equities Strategy versus Australian Equities and Australian t-bills Switching, 1985–2005

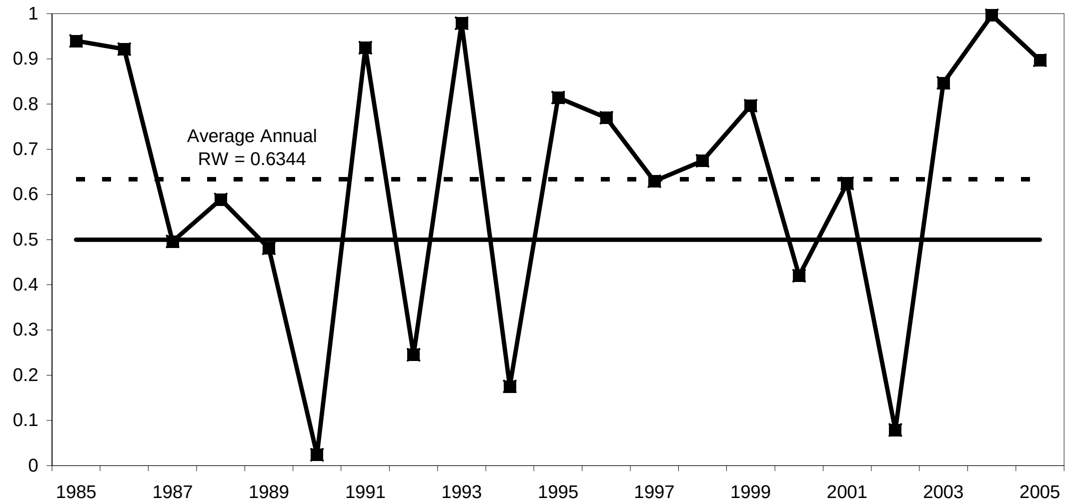
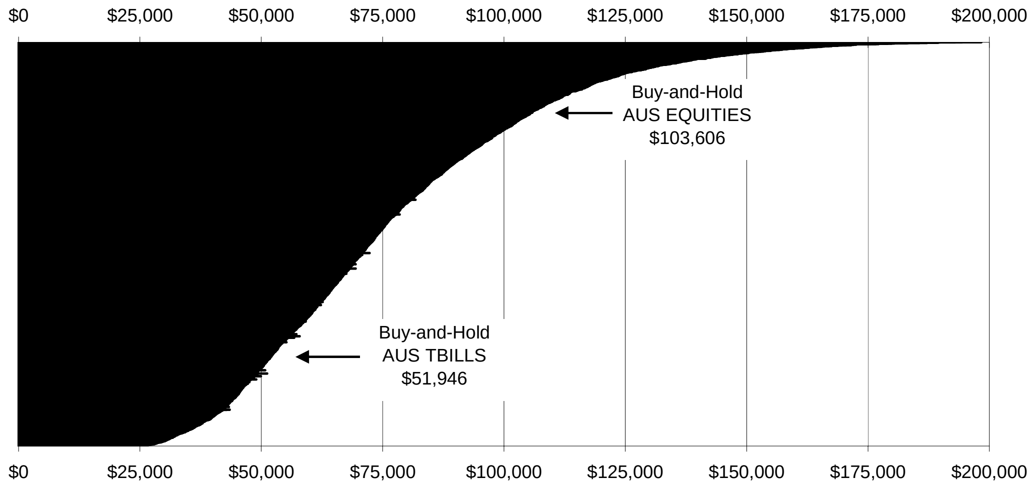


FIGURE 2: ACCUMULATED VALUE OF $10,000 FROM BUY-AND-HOLD AUSTRALIAN EQUITIES STRATEGY VERSUS AUSTRALIAN EQUITIES AND AUSTRALIAN T-BILLS SWITCHING, 1985–2005



The normalised ranked return measures plotted in Figure 1 fails to present a clear trend, with the RW measure oscillating between a maximum value of 0.9966 (2004) and a minimum value of 0.0239 (1990). As reported earlier, the buy-and-hold strategy again has a substantial advantage over all possible switching strategies (0.6344). To provide some context to the estimated RW measures, we revisit all possible switching strategies over this period (that is, 4,096 per annum, over 21 non-overlapping periods), repeating these investment paths annually through time. Using annualised data for the period between 1985 and 2005, the Australian equities investment option recorded a return of 12.93% pa (std dev. 16.26%), with Australian T-bills returning 8.24% pa (std dev. 4.23%). In previous research, the impacts of compounding have been ignored. Here, a compounding approach is used. We assume $10,000 is invested at January 1985 and compounded annually for 21 years. The crediting rate is calculated based on each of the 4,096 possible investment combinations repeated annually between Australian equities and Australian T-bills. To estimate a future accumulated value, these returns are then credited at the end of December each year until the end of 2005. No additional contributions are assumed to be made over the period and switching costs are assumed to be nil.

The impact of switching in Figure 2 is considered from an accumulated balance perspective. The range of accumulated values is from $24,765 for the worst possible combination of monthly switching, to $198,353 for those skilled (or lucky) enough to select the optimal combination. The buy-and-hold strategy of Australian equities is a top-quintile performer, resulting in a final balance of $103,606. Interestingly, just holding Australian T-bills (an investment option returning little more than 8% per annum over the observation period) was superior to more than 20% of all possible switching options! The impact of switching resulted in average returns in the range 5.29%–15.88% pa and standard deviations fluctuating from 4.08% to 18.39%. The results presented in Figure 2 suggest that even occasional attempts to switch in and out of the Australian equities market (without forecast accuracy of around 70%) may result in substantial downward revisions of estimated future accumulated balances of retirement savings. In short, the empirical findings of this study corroborate the statement “it’s time in, not timing, the market that counts”. In fact, the advantage accruing to those investors with “time” seems almost insurmountable.

CONCLUSION

From a superannuation fund member perspective, the move by fund providers to offer greater product features allows members to tailor portfolios that reflect their individual risk/reward preferences and investment horizon. These research findings have implications for current superannuation issues, such as the default investment option (with the question not necessarily being "what is the default option" but, alternatively, "what is the consistency of the default option through time") and lifecycle investing. The results may also provide opportunities for superannuation funds to be managed more efficiently: if members are switching regularly, this affects fund flows and may result in the fund holding sub-optimal levels in cash to cover any liquidity issues arising from switching. Finally, there is the need for research of this nature to move away from an "all or none" approach (that is, all in or all out of a particular investment option) and investigate switching at the margin. An immediate question that requires consideration is the use of the RW measure to model the impact of short-term tactical asset allocation decisions against benchmark portfolio weights.

NOTES

1 Mercer Human Resource Consulting Pty Ltd estimates that, from July 2005, about 5.2 million employees in Australia have the opportunity to switch their superannuation fund provider as a result of changes in the legislation (http://www.mercerwealthsolutions.com.au/news/subject/58/1112/).

2 In addition, depending on the type of product, the member may also incur a buy-sell spread when switching between investment options.

3 For instance, SunSuper provides five investment types ranging from "Conservative" to "Aggressive"; UniSuper offers seven types; and QSuper offers four "Ready Made Options" and four "Your Choice" options.

4 Other influential studies in this debate were contributed by Droms (1989), Krester (1990), Beebower and Varikooty (1991), and Becker *et al* (1999).

5 An important note in the specification of the RW measure is provided by Bauer and Dahlquist (2001), who provide a competing definition of RW of the form $\frac{k}{n}$, where k is the rank and n is the number of paths. Using this alternative definition, the RW values range from $\frac{1}{k}$ to 1, not 0 to 1. Bauer and Dahlquist (2001) provide a balanced discussion critiquing the relative merits of both approaches, arguing that the original definition of RW (in the manuscript) has "an advantage because it gives a consistent value of comparison even when the number of time periods is small" (p. 38).

6 Following Bauer and Dahlquist (2001), the measured asset may be "stocks" and the switching assets may be "stocks" and "bonds". The returns from "stocks" as the

measured asset are measured against the set of all possible returns based on the two switching assets. The normalised rank return for the measured asset is the RW measure for that particular measured asset/switching asset combination. Consider the extreme example of monthly switching choices between two assets — there are 2^{12}, or 4,096, possible investment paths. The optimal path has a RW rank of 1, the worst performing path ranking 0, and the third strategy of buy-and-hold, assuming that this option is neither the best or worst path, will be one of the remaining 4,094 paths. This rationale is used to consider the merits (or otherwise) of members switching across various investment options versus a more passive buy-and-hold approach.

7 Turning specifically to each of the return series, we used: **Australian T-bill Rate** (3-month T-bill rate from 1973 to November 1991, then 1-month T-bill from November 1991 to December 2005; **Australian Equities** (from 31 December 1949 to 31 December 1973 we used the Global Financial Data Australian Total Return Index based on historical ASX index data, from 31 December 1973 to 31 December 1979 we used the Corrected Statex Actuaries Accumulation Index and from 31 December 1979 to 31 December 2005 we used the ASX/S&P All-Ordinaries Accumulation Index); **Australian Bonds** (Andex Bond Accumulation Index from 31 December 1949 to 31 December 1976, CBA Bond Accumulation Index from 31 December 1976 to 30 September 1989, UBS All Composite Bond Accumulation Index from 30 September 1989 to 31 December 2005); **Australian Property** (Mercer Unlisted Property Fund Index is employed from 1973 to 2005 — n.b., this index is dominated by commercial and retail property); **World Equities** (we used the MSCI All Country World Equities Index); and **World Bonds** (from 31 December 1972 to 31 December 2005 we used the Lehman Brothers US Government Long Term Bond Index).

8 Growth/Income asset mix (%): **Capital Stable** (achieve returns at least 2.0% p.a. more than CPI, 20/80); **Conservative Balanced** (achieve returns at least 2.5% p.a. more than CPI, 50/50); **Balanced** (achieve returns at least 3.0% p.a. more than CPI, 70/30); **Growth** (achieve returns at least 4.0% p.a. more than CPI, 85/15); and **High Growth** (achieve returns at least 4.5% p.a. more than inflation, assuming shares only, 100/0).

9 Note 5 provides a description of the time series returns from the various indices used as a proxy for the investment options.

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