Benchmark policy ranges – a trustee’s recipe for managing the manager

The legal framework in which superannuation fund trustees operate is about to undergo radical change with the application of the Superannuation Industry (Supervision) Act 1993 (SIS). One consequence of the SIS changes is that trustees will be required to effect an investment strategy that has regard to the circumstances of the fund, including the risk involved and the likely return from the fund’s investments. It is probable that the benchmark portfolio will assume even greater importance in the relationship between trustees and their appointed managers, and that it will be unwise for trustees to passively approach the benchmark specification problem.

The benchmark structure plays a pivotal role in the definition of fund objectives and in maximising the likelihood that fund objectives will be met. For a balanced fund, the benchmark structure is usually defined by a set of neutral asset holdings together with a set of minimum and maximum asset holdings — the policy ranges. These components of the benchmark structure fulfil different functions:

Neutral: a set of asset holdings that, if held passively, would have an acceptable probability of achieving the fund objectives outlined by the trustees on behalf of fund members.

Policy ranges: upper and lower limits on asset holdings within which a professional fund manager will actively manage the portfolio and attempt to outperform the benchmark neutral with acceptable risk.

The practicalities of designing an appropriate benchmark structure for a balanced superannuation fund dictate that a prudent trustee needs to address these questions:

1. How are benchmark policy ranges

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to be established?
- Will the policy ranges need to be "narrow" or "wide"?
- Will two assets with the same benchmark neutral weight necessarily have the same policy ranges?
- Are policy ranges always symmetrical around the benchmark neutral?

Benchmark policy ranges may be interpreted as a mechanism for managing the agency relationship between the trustee and the fund manager. Policy ranges effectively control the investment behaviour of the fund manager so that the performance of the managed fund will be consistent with the trustee's preferences. In other words, appropriate policy ranges will help minimise any potential agency loss that is inherent in the relationship between trustees and fund managers.

The concept of agency loss may be defined as the reduction in value added that the trustees and fund members will bear if:
- the manager exhibits relatively poor market-timing ability; or
- the manager exhibits a higher risk tolerance than the trustees and builds more risk into the active portfolio than the trustees would have, had they made the asset-allocation decision themselves.

Either or both of these components of agency loss may jeopardise the ability of the fund to achieve the objectives that the trustee has embodied in the benchmark neutral.

If trustees could convey to their managers the precise risk tolerance to be adopted when selecting the active portfolio, then the agency loss would arise simply from managers having less than perfect market-timing ability. Under this scenario, the trustees will always perceive different value added from their managers because they bear the full consequence of all random asset outcomes and not just the subset that the manager correctly predicted. This difference in perceived value added may be treated as an explicit level of risk tolerance.

When the risk tolerances of trustees and managers differ, then the agency loss may increase as the difference in perceived value added increases. In practical terms, this can be characterised by a situation in which trustees may be comfortable with an active risk level of 1.5 per cent per annum but a manager routinely manages the fund with a risk level of 2.5 per cent per annum.

It is in this situation that the policy ranges play their major role. This paper shows that the restriction that the policy ranges place on the investment behaviour of the fund manager is equivalent to an agreement between trustees and managers to manage the portfolio according to an explicit level of risk tolerance.

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If the policy ranges are central to the management of the agency relationship, then it follows that the design of policy ranges cannot rely on default settings. Nevertheless, in practice it is evident that many benchmark structures do not effectively manage this agency relationship and that inconsistencies between declared fund objectives and specification of the benchmark portfolio are a common and serious problem.

For example, many reports to members of the superannuation fund contain expressions of low risk tolerance implied by the desire to avoid negative returns, achieve target rates of return and incur limited risk. Yet these trustees also allow relatively wide policy ranges on many or all assets in the benchmark portfolio. It appears that the correspondence between policy ranges and the concept of trustee risk tolerance is not well understood.

This paper has three main objectives:
- to analyse the role played by benchmark policy ranges in the control of active risk and value added;
- to provide some insight into the probability sampling distributions of individual asset weights in active portfolios managed within a given benchmark structure; and
- to demonstrate that these sampling distributions can be used to define benchmark policy ranges that will limit the agency loss borne by the trustees.

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### Methodology

The research question that underlies the approach taken in the paper is:

- for a given set of assets and forecast risks and returns, what optimal unconstrained portfolio would a value-maximising fund manager select on behalf of a trustee with identical risk tolerance?

This question is answered using Monte Carlo simulation and quadratic optimisation techniques to generate optimal active portfolios under different assumptions about the risk tolerance of trustees and managers and the market-timing ability of the manager.

The benchmark structure of a balanced fund is modelled using expected returns, standard deviations and correlations for seven asset classes with the following neutral asset weights:

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>5</td>
</tr>
<tr>
<td>Australian index bonds</td>
<td>5</td>
</tr>
<tr>
<td>Australian bonds</td>
<td>15</td>
</tr>
<tr>
<td>Australian property</td>
<td>10</td>
</tr>
<tr>
<td>Australian equities</td>
<td>35</td>
</tr>
<tr>
<td>International bonds</td>
<td>5</td>
</tr>
<tr>
<td>International equities</td>
<td>25</td>
</tr>
</tbody>
</table>

The concept of value added is operationalised as:

Value added = market-timing outcome minus (risk tolerance multiplied by active risk).

The market-timing outcome is defined to be a return in excess of the benchmark neutral portfolio return, and is generated as a function of the manager's ability to accurately predict asset returns. The active risk (or tracking error) is generated by the manager's optimal asset allocation.
away from the benchmark neutral holdings.

By construction, both of these elements are determined in the simulation by the actions of a value-maximising manager who builds an optimal unconstrained portfolio on behalf of the trustee. The simulation models an "ideal" world in which managers make optimal asset-allocation decisions on behalf of trustees, and the asset outcomes that are not successfully predicted are not necessarily incorrectly predicted.

It is important to note that the simulation does not impose benchmark policy-range constraints on the manager. Instead, self-imposed constraints evolve due to the level of risk tolerance and market-timing ability. It is these self-imposed constraints that provide the insight into the nature of value-maximising policy ranges. In other words, the simulation results permit a characterisation of the sampling probability distribution of asset-allocation weights under conditions that maximise value added on behalf of the trustee. The practical implication is that by designing constraints based on these sampling distributions, it may be possible to select policy ranges that will:

1. Minimally restrict a manager's ability to maximise value added from the trustees' perspective; and thereby
2. Limit the agency loss between trustees and managers.

If so, then these should be closer to the policy ranges that prudent trustees ought to select rather than some arbitrary conventional setting.

In this paper, the importance of the policy ranges is assessed from three perspectives. First, indirectly through the sampling probability distribution of portfolio tracking errors for different levels of risk tolerance. Second, from an examination of value added across different levels of market-timing ability and risk tolerance. Finally, directly through the sampling probability distributions for individual asset weights within the benchmark structure.

It is also shown that the agency loss arising from a mismatch of risk tolerance between the trustee and the manager can be significantly limited by establishing the policy ranges from the percentiles of these distributions. This is tantamount to explicitly equalising the risk tolerance of both parties.

Results

As the manager maximises perceived value added, the optimal portfolio will deviate systematically from the benchmark neutral and thereby lead to increased active risk or tracking error. In general, a higher tracking error implies more extreme deviations from benchmark on some or all assets, whereas a lower tracking error implies that the active portfolio has not deviated far from the benchmark neutral.

The observed tracking errors from the simulation imply the extent of the self-selected policy ranges that would apply if the manager maximises value added. Using these simulated tracking errors it is possible to characterise the sampling probability distributions under different experimental conditions. The probability density functions presented in Figure 1 are such that the area under the curve equals 1.0. That is, the sum of the probabilities of all possible tracking errors is accounted for by these distributions. These functions are presented for three levels of risk tolerance when the manager's market-timing ability is assumed to be 50 per cent.5

Probability density functions, such as those in Figure 1, indicate the relevant range of tracking errors within which most probabilities lie. For example, there is a higher probability that tracking errors for a low risk tolerance trustee lie in the range 0.17 per cent to 1 per cent per annum than elsewhere. Similarly, for a high risk tolerance trustee the mass of probability lies in the relevant range 0.50 per cent to 2.5 per cent per annum.

Because of the direct association of asset allocation weights with port-
folio tracking error, the results in Figure 1 suggest that self-selected policy ranges are wider when the trustee or manager has higher risk tolerance. This follows because the risk-tolerant value-maximising manager tends to adopt more extreme asset-allocation positions which result in higher tracking errors as well as higher market-timing outcomes.

From these distributions, it may also be inferred that a tracking error statistic per se, is not sufficient to convey a trustee's risk tolerance because tracking error values are shared across different degrees of risk tolerance — they simply have different probabilities of being achieved.

The distributions in Figure 1 imply that there may be adverse implications for trustees when a mismatch between trustee and manager risk tolerances occurs because there is a higher probability of more extreme active risk being taken by the manager than the trustee is comfortable with. This will translate into significant agency loss, ie, variation from optimal value added from the low-risk trustee's perspective.

How can this be avoided? The results in Figure 1 imply that there are at least three mechanisms by which a low risk tolerance trustee can restrict a fund manager with higher risk tolerance to limit the agency loss:

1. by explicit agreement on the level of risk tolerance to be used in framing the managed portfolio;
2. by appropriate design of the policy ranges — narrower rather than wider; and
3. by specifying an absolute maximum level of tracking error for the active portfolio. Alternatively, some combination of all three benchmark controls may be applied.

Active risk is an important part of the value-added function but it does not represent the total impact of manager action on trustees' welfare. Figure 2 contains two important results on the level of value added, from the different perspectives of the manager and the trustee.

First, it shows that under all assumptions concerning risk tolerance, trustees perceive increasing value added as the manager's market-timing ability improves. Even for the trustee with low risk tolerance and limited tracking errors characterised in Figure 1, there is a small increase in value added in Figure 2 that is associated with the manager's improving market-timing ability.

Second, Figure 2 shows that even when trustee and manager risk tolerances are assumed to be perfectly aligned, the manager perceives higher value added than the trustee across different levels of market-timing ability. The reason for this is that although the manager can correctly predict 30 per cent of random asset outcomes, the trustee still has to bear the wealth consequences of the other 70 per cent of random outcomes. Hence, as market timing ability approaches perfection, there are fewer "surprises" for the trustees relative to the manager and perceived value.
added for both parties converges. Of

course, with zero market-timing abili-

ity, perceived value added also con-

verges because the value-maximising

manager will hold the benchmark

neutral portfolio.

In Figure 2, the difference be-

between value-added functions for a

shared risk tolerance is a measure of

the agency loss that arises from the

manager's imperfect market timing.

Conversely, for a given level of mar-

ket-timing ability, the difference in

value-added functions is a measure of

the agency loss associated with dif-

ferences in risk tolerance. Clearly, the

latter component of the agency loss

is of a higher magnitude and worthy

of closer scrutiny.

Under less "ideal" conditions (per-

haps more realistic) in which manag-

ers have different risk tolerance, can

invest sub-optimally, and make sys-

tematically unsuccessful predictions,

then the agency loss is likely to be

much more extreme.

The results in Figures 1 and 2 il-

lustrate the effects of deviations from

benchmark neutral across a total bal-

anced fund. Consistent with these re-

sults, there are also insights to be

gained into the sampling distributions

of individual asset weights and, by

implication, the policy bounds for

those assets. Figures 3, 4 and 5 illus-

trate the sampling probability distri-

butions for the seven asset classes un-
nder low, medium and high risk toler-
 ance respectively, together with the

assumption that the manager has a 50

per cent market-timing ability.

Some striking results are evident.

A comparison of Figure 3 with Fig-

ures 4 and 5 indicates that value-max-

imising managers acting on behalf of

trustees with low risk tolerance uti-

lise more assets, but confine their po-

sitions to narrower policy ranges. On

the other hand, managers with me-

dium and high risk tolerance require

wider policy ranges on fewer assets.

For example, Figures 4 and 5 indi-

cate that a combination of two Risky

assets (AUSEQY and INTEQY) and a

less risky asset (ANY OTHER AS-

SET) provides adequate scope for

maximising value added for a medium

to high risk tolerance scenario. It ap-

pears that the level of risk tolerance

contains major implications for the

complete benchmark structure in

terms of both assets held and their

policy ranges.

The results in Figures 3 to 5 also

indicate that asymmetry is a common

feature of all individual asset weight
distributions. Hence, the convention

that policy ranges are symmetric
around a benchmark neutral may be

inappropriate under some operational

conditions affecting trustees and their

appointed managers.

As an aside, it is also interesting

to note the high similarity of the sam-

pling probability distributions for

AUSIXB and INTBND which may

suggest that they are effectively sub-

stitutes in an optimal portfolio. If so,

then conventional arguments sup-

porting a separate asset class for in-
dexed bonds in a balanced fund which

will also include international bonds

may require closer examination.6

It was mentioned that probabil-

ity sampling distributions such as

those in Figures 3 to 5 provide the

mechanism for the design of appro-

priate policy ranges that will limit

agency loss. It is of particular in-
terest to consider the worst-case

scenario in which there is a mis-
match between a trustee with low

risk tolerance and a fund manager

with high risk tolerance.7 Again,

for the purpose of the exercise, the

manager's market-timing ability is

assumed to be 50 per cent.

The issue here is the extent to

which a high-risk manager can be

"brought into line" by a low-risk trus-

tee simply by designing appropriate

policy ranges for the benchmark por-
tfolio. The results in Table 1 assess the

impact of using the 25th and 75th per-

centiles of the sampling probabil-

ity distributions in Figure 3 to select

the policy ranges for a low risk toler-

ance trustee who then delegates the

benchmark structure to a high risk

tolerance manager.

The results in panel A of the table

are the numerical values that echo the

graphical presentations in Figures 1

and 2. From the perspective of a low

risk tolerance trustee, an identical risk

tolerant manager with 50 per cent

market-timing ability and no restric-
tions on asset holdings would gener-

ate an index of expected value added

equal to 5.28. Since an unconstrained

high risk manager would generate

value added of 28.72, the expected

agency loss attributable to differences

in risk tolerance is 23.44 when asset

weights are unconstrained and there

is a mismatch between trustee and

manager risk tolerances. Also, the

high-risk manager can generate a

maximum tracking error of 7.52 per

cent per annum compared with the

1.38 per cent maximum that a low-

risk manager would generate.

The results in panel B of Table 1

present the active risk and value added

that a high risk tolerant manager

would generate when selecting opti-

mal portfolios with constrained asset

weights. These constraints have been

set at the 25th and 75th percentile
cutoff points in the sampling probabili-

ty distributions in Figure 3. Now the

expected value added for the trustee

is 7.98, which is 2.7 greater than the

| TABLE 1: The Impact of Alternative Policy Range Constraints on Tracking Error, Value Added and Agency Loss |

<table>
<thead>
<tr>
<th>Lower and Upper Policy Ranges for All Assets, Constrained to Probability Intervals</th>
<th>Maximum Tracking Error (% per annum)</th>
<th>Perceived Value Added and Agency Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Manager</td>
</tr>
<tr>
<td>PANEL A: Trustee/Manager Risk Tolerance Identical; Policy Ranges Unconstrained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unconstrained Low Risk</td>
<td>1.38</td>
<td>12.89</td>
</tr>
<tr>
<td>Unconstrained High Risk</td>
<td>7.52</td>
<td>41.80</td>
</tr>
<tr>
<td>PANEL B: Trustee Risk Tolerance is Low; Manager Risk Tolerance is High; Policy Ranges Constrained</td>
<td>25% to 75%</td>
<td>1.48</td>
</tr>
</tbody>
</table>
expected value added that the low risk trustee would have generated in an unconstrained benchmark structure. In other words, the benchmark policy ranges have forced the high risk tolerance manager to identify maximum value added portfolios that are more consistent with the low risk tolerance trustee. In addition, the maximum tracking error that the high risk manager can generate has fallen to 1.48 per cent per annum.

The impact of the benchmark policy range constraints can also be assessed from the complete sampling probability distributions for tracking error presented in Figure 6. There, it can be seen that the tracking error distribution for a constrained high-risk manager can be forced towards the distribution for an unconstrained low-risk trustee by the appropriate design of the policy ranges.

A major implication of the results in Table 1 and Figure 6 is that when the benchmark structure is carefully engineered in accordance with trustee/member risk tolerance, the need to identify the manager’s risk tolerance diminishes in importance. High-risk managers can be safely appointed by low-risk trustees — once the appropriate controls are embedded in the policy ranges of the benchmark structure.

Conclusions

To ensure passing the “prudent man” test, the results in this paper suggest that the necessary sequence of trustee actions may be summarised as:

1 The trustee should obtain an unambiguous statement of all long-range forecasts of returns and risks for all asset classes that are to be used for benchmark design.

2 The trustee should provide a clear statement of trustee/member risk tolerance — low, medium or high. This may be quantified if necessary.

3 The trustee should obtain a clear statement of the fund manager’s risk tolerance. This could be ascertained from the distribution of active risk that the manager routinely holds for other clients of similar predilection. Preferably, this should equate with point 2.

4 The trustee should take reasonable steps to establish the market-timing ability of the selected manager. At present, this cannot be gauged accurately from most published fund surveys and there may need to be a supplementary disclosure from the fund manager in question.

5 The policy ranges should then be tailored around the benchmark neutral on the basis of 2, 3 and 4. These need not be symmetrical nor in some cases need the benchmark contain all assets. Just because they are on the menu, they do not have to be eaten!

6 The trustee may want to set an explicit tracking error constraint based upon the upper percentiles of tracking errors generated within the policy ranges in 5.

7 Finally, the trustee should demonstrate that conditions 5 and 6 of the benchmark structure will allow the detailed objectives of the fund to be achieved within reasonable probability limits.

NOTES

1 This paper considers a balanced fund, but identical issues need to be addressed for sector benchmarks such as Australian equities or international equities under the control of sector-specialist fund managers.

2 The theory of agency relationships also features the design of effective monitoring mechanisms and usually settling up procedures. In the present context, it would seem likely that fund performance surveys and the advice of asset consultants feature predominantly in both of these activities. However, some doubt exists as to whether the fund performance surveys identify the relevant components of value added that are defined in this paper.

3 In this paper, the use of the term sampling probability distribution means that a sample of data has been fitted to a well-known theoretical probability distribution. The parameters that maximise the “fit” then represent the distribution and provide a mechanism for making probability statements such as the probability of achieving a tracking error higher than x% is z. In this paper, these distributions are presented as probability density functions such that the area (sum of the probabilities) under the curve equals 1.0.

4 The issue of market-timing ability is an important one to both trustees and fund managers. For a discussion of the literature and some Australian empirical evidence, see Sinclair, N.A., 1990, “Market Timing Ability of Pooled Superannuation Funds: January 1981 to December 1987,” Accounting and Finance, May, 30, 1, and references therein. Overall, this evidence is not flattering to professional fund managers in their capacity as “market-timers”.

5 The choice of 50 per cent market-timing ability is arbitrary and is equivalent to a “coin toss”. The empirical evidence on market-timing ability suggests that this choice may overstate the market timing ability of many professional fund managers. However, the sampling probability distributions for tracking error appear to be relatively insensitive to different levels of market timing ability and, in general, the simulation results showed much less sensitivity to differences in market timing ability than to differences in risk tolerance. Hence, inferences based upon an assumption of a 50 per cent level of market timing ability may be generalised to other levels without significant misrepresentation.

6 An interesting line of inquiry into the implications of the equivalence of these assets, observed in this simulation, may be to examine analytically the pricing of AUSXDB and INTBND in the context of the international purchasing power parity theorem.

7 The implications of the counter-example of a high-risk trustee and low-risk manager are probably not as serious since excessive conservatism has seldom been the grounds for legal action.