



Institute of Actuaries of Australia

Equity and Unitised Investment Products

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Presented to the Institute of Actuaries of Australia
Financial Services Forum
26-27 August 2004

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Equity and Unitised Investment Products

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August 2004

IAAust Financial Services Forum

Abstract

There has recently been considerable media, industry and regulatory attention, both in Australia and overseas, on unit pricing errors. Some of the errors publicly reported have involved significant amounts of money being attributed to affected investors.

In a commercial world there are limited amounts of time, resources and finance available to be spent on the maintenance and potential correction of unit pricing in products. Unit pricing processes need to be equitable as well as efficient and reliable.

We take a step back from the immediate mechanics of the unit pricing process and identify several principles that can be used as guides in assessing the equity and materiality of unit pricing issues. We also provide some comments on the practical aspects of addressing unit pricing problems.

While the conceptual framework of unit pricing may be considered straightforward, the practical management of unit pricing and the resolution of unit pricing errors is not. Analysis of unit pricing issues requires careful application of a number of skills central to actuarial practice, including equity, materiality, pragmatic implementation of business solutions, and communication with affected stakeholders.

The issues of developing management confidence in all aspects of the unit pricing and application processes, as well as the safeguards in place to minimise the risks of unit pricing errors, are matters that should be of concern to all providers of unitised investment products.

1 Introduction

Major problems, costing tens of millions of dollars, relating to unit pricing errors continue to regularly occur in Australia. In other countries there have also been major issues with unitised investment products, most recently in the USA with 'late trading' and cumulative costs, including penalties, in the billions of dollars.

Unit pricing is conceptually straightforward but the reality of implementation involves significant operational risks. Short time frames, high volumes of data and the difficulty of error detection and remediation compound these risks.

The word 'equity' is commonly used in discussions of assessing and remediating errors with unitised products. Historically in the financial services, and in life insurance in particular, actuaries have played and sought to play a central role in the development of equitable outcomes.

In this paper:

- ▲ Some causes of unit pricing errors are noted
- ▲ Some underlying principles supporting the management of unitised products are identified
- ▲ The idea of equity and some of its consequences are discussed
- ▲ Approaches to error control are considered
- ▲ An approach to error remediation is provided

2 Context

In the wealth management industry the underlying objective of investors is to grow the value of their investments. Unitised investment products are common in the managed investments and superannuation contexts. They may be provided on an after-tax basis to investors, via life insurance statutory funds, or on a before-tax basis through unit trusts or mutual funds.

The recent passage of 'investment choice' legislation, in the Superannuation Legislation Amendment (Choice of Superannuation Funds) Bill 2003, is likely to increase the use of, development of, and conversion to, unitised investment products to facilitate movements of superannuation monies between funds and providers from 1 July 2005. Potential issues with unitised investment products can be expected to take on a higher profile as a consequence for all stakeholders, including investors, managers, trustees and regulators.

Unitisation is one method of attributing change and growth in investment value to investors. An alternative approach is via crediting rates. Unit prices are more tightly and explicitly tied to movements in underlying assets than crediting rates. Unitisation provides the impression of greater accuracy and transparency

Unitisation appears to be straightforward, consisting of a single division. Yet there are repeated instances of values attributed to investors in unitised products

being wrong. These errors arise within both the major and smaller institutions and involve significant sums of money to correct.

Unit pricing errors can occur in many ways, such as:

- ▲ Erroneous fees or spreads
- ▲ Incorrect tax allowances
- ▲ Inappropriate changes in spreads
- ▲ Differential treatments of investors
- ▲ Late trading
- ▲ Assets not included in fund assets
- ▲ Missed distributions
- ▲ Processing errors, and so on

Errors are detected in various ways, such as:

- ▲ Through performance analysis
- ▲ Some form of audit, compliance or review work
- ▲ An outworking of investor queries
- ▲ Migrations of legacy systems (perhaps as a consequence of mergers)
- ▲ Serendipity

It is a positive outcome that the Australian Securities & Investments Commission (ASIC) has recently reviewed certain investment practices in the Australian managed funds industry focussing on 'late trading' and 'market timing'. ASIC concluded (ASIC 2004) that

'... ASIC found no evidence of systemic or large-scale use of improper investment practices in the Australian managed funds industry. ...'

While this paper focuses on unitised investments, many of the issues are also relevant in the context of crediting rates.

3 Operational Risk

Unit pricing issues have recently received increased profile due to increased regulatory interest. Over the last few years APRA and ASIC have conducted a number of reviews of unit pricing policies and procedures in regulated institutions, with some conclusions recently reported by APRA (APRA 2003).

The current driver of the development of techniques for measuring and managing Operational Risk is the so-called Basel Accord (BIS 2004), and the upcoming need for banks to hold capital to explicitly support Operational Risks. The definition of Operational Risk provided (Section 644) used is as follows:

Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk.

This definition now appears to be commonly accepted and used. The concept of operational risk is spreading through the financial services and the management of operational risk is being actively promoted by APRA and other regulators around the world.

In the context of unit pricing, this is demonstrated by the following, taken from APRA's Insight (APRA 2003):

The management of unit pricing is a good indicator of the overall framework for operational risk management in an organisation. Institutions that experienced significant unit pricing errors on a number of occasions were assessed as giving a low priority to operational risk management and having a higher frequency of other operational risk issues. Inadequate segregation of duties and a lack of independent management or board oversight allowed errors to remain undetected.

In many cases, significant errors occurred as a result of a number of failures in systems and control processes. The incidence of errors is higher where there are several different products and/or systems in place. Unit pricing errors also occur as a result of mergers and acquisitions, reflecting inadequate procedures when integrating systems.

A key issue implicit in the above quote, but recently articulated explicitly by APRA in the overall context of the management of financial institutions, is the crucial importance of the culture of the organisation. It is the people who run the systems and use the process who are ultimately the key driver in the management of operational risk.

It is often the case that unit pricing processes are conducted in a silo environment and often in the backroom and may not have a high profile within an organisation. It is not uncommon to find strong dependencies on one or two key people for unit pricing. The silo mentality can also be aggravated by having different steps in the process being carried out by different organisations under some form of outsourcing arrangement.

4 What is the Problem?

An advantage of taking a unitised approach is having accurate values at regular intervals (in particular, at the end of each unit pricing period), but this comes at the cost of managing the resulting time and volume constraints.

In practice, the calculation of the unit price is the culmination of a longer process chain. A chain is only as strong as its weakest link, so the determination and application of a unit price is only as reliable as the weakest link in the process chain. The time constraints imposed by the unit pricing period (usually daily prices are required) can impose significant pressure on completing the full process chain. This can be compounded by the need to produce many, perhaps hundreds, of unit prices. For example, the question of how late investment valuation data is to be treated needs to be addressed. From a practical business perspective the unit pricing process is a treadmill, which is only stopped in exceptional circumstances. Often staff can be more concerned with 'fire-fighting'

the out-workings of issues than in resolving the underlying problems (addressing symptoms rather than diseases).

While the theory may appear simple, it drives the need for the careful management and governance of all the operational risks associated with people, processes and systems required to support high volume work being completed in short (often daily) time frames. These issues lie around implementation and control, not the theory of what is required.

The risks involved in the management of unit pricing activities leading up to the determination of the unit prices, and subsequently in the use of the unit prices, are operational risks. This paper does not consider any of the risks associated with the choice of investment or its performance.

The importance of the management of the operational risks involved in unit pricing activities has been recognised by APRA, who have indicated that the approach taken by institutions to the management of their unit pricing may be considered to be something of a lightning rod for the institutions' overall management of operational risk.

5 Underlying Principles

There are some underlying principles identified to support unit pricing calculations and considerations:

- ▲ *Value*: For investors, the key issue is the change in value of an investment measured by the comparison of dollars received versus dollars invested.

In particular in the context of unitised products,

$$\text{Value} = \text{Number of Units} * \text{Unit Price.}$$

This implies that correctness (or otherwise) of either the Number of Units or the Unit Prices alone cannot imply the correctness (or otherwise) of the value being assessed.

- ▲ *Membership of a Group*: Investors participating in a unitised product choose to become members of a group. Membership of groups is considered to be to the mutual advantage of members. However, being part of a group can require some concessions on the part of each individual for the good of the group.

The issue of equity between subgroups and members, both at a particular time and over time, is especially relevant.

- ▲ *Investor Independence*: The behaviour of individual investors is presumed independent of the behaviour of other investors. In particular, ongoing investors should not be adversely impacted by other entries or exits to the fund.
- ▲ *Best Estimate at the Time*: In practice, perfect information will not be available for computing unit prices in limited time frames, so there is 'noise' in the unit pricing systems and processing. Understanding and

managing acceptable levels of noise in the system is important. Materiality considerations are central to this process.

6 Equity

The concept of equity is implicitly viewed as something that we all know and understand. There is little doubt that an understanding of equity and its application is considered to be an important actuarial matter.

However a peek at a dictionary, in this case an edition of Webster's (1976), gives a variety of meanings to the word equity. It is potentially misleading or inappropriate to try to take common meanings for words and interpret them in specialised contexts. Despite this, it is useful to see both the diversity of the common meanings of equity and observe commonality amongst them:

- ▲ *Source:* The word is suggested to flow from the Latin *aequitas*, literally meaning equality,
- ▲ *Meaning – Standards:* ‘... free and reasonable conformance to accepted standards, of natural right, law, and justice without prejudice, favouritism, or fraud and without rigour entailing undue hardship ...’,
- ▲ *Meaning – Legal:* ‘... a system of law to supplement, aid, or override common and statute law and are designed to protect rights ...’,
- ▲ *Meaning – Rights:* ‘... a right, claim, or interest existing or valid ...’.

The financial considerations that actuaries tend to focus on in discussions of equity are not mentioned.

We leave aside the usage relating to equities as investment stocks or securities.

Somewhat surprisingly a review of the Australian actuarial literature seeking a discussion of equity turned up very few results since 1980. Tim Jenkins (Jenkins 1982) provides an insightful discussion of equity in the context of the life insurance liability estate. In the conclusion to this paper, we find the comment:

It [the paper] is ... probably one where the ideas are so simple that I do members an injustice to present these ideas as if they were anything other than commonplace. The subject however may well be one of the most important we as a profession ever tackle ...

While the primary subject of the paper was not equity in of itself, the discussion of equity is fundamental to the paper. In many actuarial references the word equity is used but is undefined, as if it is so simple and agreed that no more need be said. This may be so for many (so apologies to them for stating the obvious), but perhaps not for all (including this author).

The concept of equity is intuitively focussed on the idea of fairness and consistency in some sense. This extends to being both over time and over interested parties at a particular point in time – witness discussions of inter-generational equity.

It is interesting to consider some of the broader (than actuarial) usages of these ideas:

- ▲ *Entry or Exit*: Whether the debate takes place in term of opportunity (potential) or delivery (results). A key issue here is whose is the obligation to 'make it work'.
- ▲ *Social Equity*: A broader debate often focussed on outcomes rather than inputs.
- ▲ *Legal Equity*: There is a long established body of legal knowledge and practice centred on the concept of equity, originating in the Equity Courts in England from the fifteenth century onward. A key underlying precept of this legal body of knowledge is that of returning the victim to a position they would have enjoyed had the (adverse) event in question not occurred.
- ▲ *Group Equity*: In the context of national retirement income systems there is a concept of group equity. It is explained in Knox and Cornish (1999) as follows:

This principle requires that social insurance schemes should provide similar benefits to individuals in similar circumstances. As such it is very similar to the economic concept of horizontal equity

- ▲ *Actuarial Equity*: Actuarial discussion typically focuses around financial and numerical outcomes to measure or assess the 'equity' of outcomes. Generally the focus is on the individual benefits received being demonstrably consistent with the premiums or contributions made.

These usages are not all entirely consistent with each other, and different stakeholders may draw on an 'equity argument' to achieve different or even opposing ends. So, while an actuarial perspective may seem to provide a (relatively) focused view, there are other aspects of the debate that may open up and challenge the actuarial perspective.

Underlying the above are ideas of fairness and consistent treatment of members and groups of members in some way. However, there are differing views depending on perspective taken and issues addressed - such as whether participation in the system is voluntary or compulsory and whether an individual or group (opening up issues relating to redistribution).

The strength of serious debates about equity can be seen in current debates regarding unisex annuities, which are established in some parts of the world. No doubt this is a complex debate and it is not our purpose here to pursue it. It is raised to illustrate that there are differing and accepted views on what is considered equitable. Actuaries may argue that there is a conceptual distinction between equity and equality, and so to use these words in the same context is confusing. This is not a universal view. See, for example, McDonald (2003).

We now leave the philosophical issues and move on to implementation questions. Again the literature seems very sparse. The only Australian actuarial reference found more recent than 1980, is Ward (1987). This again is in the context of the management of a life office and a set of basic criteria for the management of equity in life insurance is given. Key conclusions of this paper include:

- ▲ *Solvency*: The primacy of maintaining solvency over equity. The rationale is clear – if the entity ceases to function then discussions of equity (amongst other things) may be irrelevant.
- ▲ *Stakeholders*: All stakeholder groups involved should be considered (i.e. both policyholders and shareholders as appropriate).
- ▲ *Precise Equity Does Not Exist*: Judgement is needed and the key is consistency within a broad framework, rather than a focus on specific detail.

The context of unitised investment products is perhaps simpler to work with as we do not have a sharing between shareholders and policyholders to consider, and so focus on issues from an investor perspective only. We suggest that an assessment of equity needs to reflect a number of things:

- ▲ *Fairness and Consistency*: The treatment or allocation of benefits needs to be fair and consistent between different groups of stakeholders, as well as fair and consistent when an allocation is made within a given group of stakeholders. The fairness and consistency should be both at a point in time and over time after due consideration is given to relevant external matters.
- ▲ *External constraints*: Specific rules, such as legislative and regulatory requirements, trust deeds or other governing documents, must be considered.
- ▲ *Practicality*: Decisions made must be practical and able to be effectively implemented, cost effective in the broader context, understandable and effectively communicated. This may include issues related to the availability of capital to support remediation if it becomes necessary.
- ▲ *Avoid Unintended Consequences*: The application of equity argument may require considerable knowledge and appreciation of possible consequences to ensure unintended consequences are minimised.
- ▲ *Materiality*: As the impact of an event lessens it may become appropriate to take a more pragmatic and flexible approach, and if an issue is deemed immaterial then no action may be appropriate.
- ▲ *Costs*: The benefits of changes should be expected to exceed the costs of implementation, especially when the fund bears costs.
- ▲ *Balance*: In some cases these constraints may not be entirely consistent, and so pragmatic and balanced compromises need to be made.

Applying equity arguments can require considerable judgment and varying opinions can be held, so it is not necessarily an easy or precise exercise.

7 Some Applications

7.1 Noise in the Process

There is generally noise in the unit pricing process. This can be seen from a number of perspectives, including:

- ▲ *Time Delays:* Approximate data may need to be used as input to the unit pricing process given the typically stringent time frames in which unit prices are computed under. These time constraints can be seen in discussions regarding soft and hard unit prices.
- ▲ *Accruals:* Accruals inherently include an element of approximation. The management of any mismatch between the accrual and the result accrued for may generate an element of approximation in the unit pricing process. An example is that of income tax accruals, where held. The time lag often involved in dealing with tax matters can also compound the issues involved.
- ▲ *Thinly Traded Assets:* Estimates of value may be intermittent and approximate in the absence of an active and liquid market.
- ▲ *Rounding of Unit Prices:* The common practice of rounding buy prices up and sell prices down in some way can also lead to noise in the process. It is common to have unit prices specified to a certain number of digits following a decimal point. The use of these rounded unit prices generates different results than would be the case had unrounded prices been used.

To highlight this issue, consider an example where the trust deed specifies that unit prices be rounded to the nearest cent (up for buy prices, and down for sell prices). An investor invests \$1,000,000. The exact buy price has been computed to slightly above 1.25, and so is rounded up to 1.26.

Applying a buy price of 1.26 implies the creation of approximately 793,651 units. Applying a buy price of 1.25 implies the creation of 800,000 units. There is an 80 basis point difference in the number of units created.

As an aside, this example also highlights the more general point that specifying the accuracy of unit prices (or units held for that matter) in terms of the number of digits required after a decimal point is fundamentally flawed.

The above should not be taken as suggesting that the concept or implementation of unit pricing is fundamentally flawed. It simply reflects the reality that the conceptual precision of a unitised approach may not be not fully realised in practice.

7.2 Buy / Sell Spreads

The justification of these spreads is that entering or exiting investors 'pay their own way' in terms of bearing the costs of investment or divestment. Note that this presumes independence of investors.

If no buy or sell spreads are taken, then early investors and late exits bear a higher proportion of entering and exiting costs than late entrants and early exits. In principle, this is inequitable.

Reduced spreads may be used when it is believed a fund is growing or contracting. Sometimes both buy and sell spreads are reduced, or one of the buy or sell spread may be set to zero. These approaches inherently assume knowledge of collective investor behaviour, violating the independence of investor assumption. They also assume average behaviour over a longer period can be applied at a micro level. In practice these assumptions may not be valid and so the conclusions made presuming them may not follow. In particular, zeroing either the buy or sell spread to cater for netting of deposits against redemptions, may provide unintended benefits for particular groups of investors on an intermittent basis.

Buy and sell spreads need be considered in the broader context of materiality. If the buy and sell spreads are very small, they may not be material in the context of other noise in the unit pricing process. In this case the practical argument of simplicity may justify the removal of both buy and sell spreads.

Several other points should be borne in mind with regard to a discussion of buy/sell spreads:

- ▲ *Time Frame:* It is generally accepted that the majority of investment gains comes from the asset selection and not from investment timing. The discussion of buy and sell spreads relates to asset timing, and so may not be of long term significance for long term investors.
- ▲ *Other Investment Transactions.* Many funds have significant annual turnover of the assets held, independent of investors entering or exiting. These costs are shared amongst the ongoing investors. Often cash flows are use to balance the portfolio. A discussion of costs of investments should recognise the overall picture and not focus on one (potentially less important in the longer run) aspect.
- ▲ *Benefit of Buy/Sell Spreads not 'Used':* Typically (but no necessarily), the buy and sell spreads that may not be directly used by the fund to support transactions remain in the fund and so are to the benefit of the ongoing investors.
- ▲ *Other Purposes:* At a higher level, there may also be merit in the argument that buy/sell spreads discourage 'churning' of investments, which may be in the longer-term interests of investors.

Several of the above points pick up on some of the underlying principles we have outlined earlier, and have a broader perspective than just the single immediate transaction under consideration.

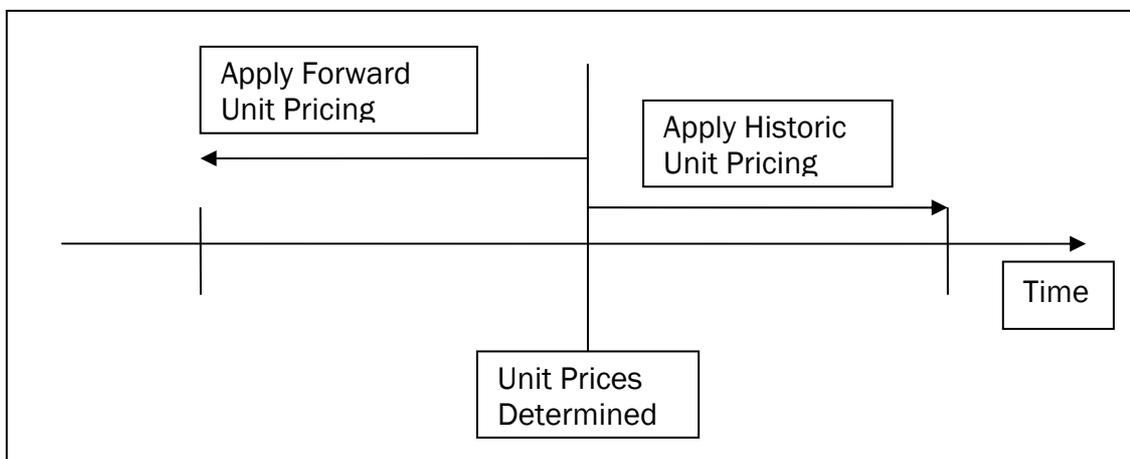
7.3 Forward and Historic Unit Prices

In the APRA working paper supporting the 2003 Insights article discussing unit pricing practices, the following definitions are provided:

- ▲ *Forward Unit Price:* Means that all unit acquisitions and redemptions that take place during the day will be processed at the end of the day price.

- ▲ **Historic (or Backward) Unit Price:** Means the same transactions (i.e. all unit acquisitions and redemptions that take place during the day) take place (i.e. will be processed) at the unit price calculated at the end of the previous day.

This can be summarised as follows:



Using Historic Unit pricing can be inequitable to the group of ongoing investors when the market value of the assets supporting the fund during the unit pricing period moves significantly. For example, if the value of these assets decreased, then exiting investors select against the fund (ongoing investors) on exit. Also, the potential for arbitrage can be a cause for concern.

8 Errors

From the perspective of an investor, an error in the unit pricing process occurs when the value of their investment does not change as it should. In principle this includes the impacts of backdating.

8.1 Importance of Materiality

Recognising that there is noise in the unit pricing process means an appropriate level of materiality needs to be applied when assessing whether an error is material. At the industry level such guidance is provided by the broadly accepted IFSA Guidelines – in particular, IFSA Guidance Note 4.0, IFSA 1999. In this context the primary criteria for assessing an error as material is that the error in the unit price is 30 or more basis points. This approach to materiality of errors focuses on the impact on individual investors, and it need to be recognised that this a different perspective to materiality considerations at the overall entity level.

It is also the case that errors, and so potential remediation approaches, may impact different groups of investors in different ways. These different groups of investors need to be identified.

8.2 Correction of Net Asset Values

In some cases errors are detected with regard to the assets. Care needs to be taken to ensure that a correction proposed at a high level, for example at the level of the fund, is equitable at lower levels, in particular at the level of the individual investors.

Assume some monies have been excluded from the Net Asset Value in determining the unit price; the error was an isolated instance and was some time in the past. The approach of now increasing the Net Asset Value of the fund to reflect the omitted monies (including lost investment income) may be superficially appealing.

However, while the correct Net Asset Value may then be obtained, the allocation of the additional monies between the various groups of investors is inequitable and so inappropriate. For example, exited investors may not receive any benefit while investors entering the fund after the error occurred receive a windfall benefit.

9 Error Control

There are several levels at which error control can be addressed.

In all cases there is a strong focus on the implementation issues involved. While a clear theoretical or philosophical basis is a necessary condition for resolving and mitigating issues, the sufficient condition for business success is not whether the actions required were identified, but whether they were executed (properly!). From an execution or implementation perspective, key tests of quality include:

- ▲ *Reproducibility of Results*: This drives the need for strong systems and controls.
- ▲ *Robust quantification of assessments*: This permits discussions to move on from how the result was obtained to the more important issue of the messages the results are sending.
- ▲ *Documentation*: This drives the need for clarity in and consistency of approach.

9.1 Error Prevention

This can be approached in a variety of ways. Having in place the appropriate policies and procedures, applied by well trained and competent personnel in a well controlled environment, from both the IT systems and overall perspectives, is the best approach.

Support by the relevant compliance and audit functions are important in this area. Further steps that can assist with error prevention include:

- ▲ *Appropriate System and Model Reviews*. This covers not only the process for determination of unit prices, but also their use and application in administration systems. A 'correct' unit price incorrectly applied will likely still produce an incorrect ultimate result.

- ▲ *Controls and Sign-offs*: Clear, documented and enforced controls, sign-offs and line authority, including change controls.
- ▲ *Independent Validation*: Of system functionality and its conformance to contractual obligations.

Preventative steps may be repeated on a regular basis to provide ongoing assurance. This suggests that consistency of approach and comparability of results over time is of value.

9.2 Error Detection

Errors will occur and new situations will arise, implying the need for pro-active error detection. A pro-active approach can be pursued by having checks and balances incorporated into regular processes, signoff and control procedures.

Further confirmation and confidence can be achieved by reviewing the final outputs of the unit pricing process – the individual investor transactions. The focus is on having consistency as well as correctness checks on all investor values. A clean bill of health from such a check can provide managers, trustees and regulators with improved confidence in the unit pricing processes and system. This differs from the more traditional audit style approach as it examines every transaction and its focus is not so much on process but on the outcomes of the process.

9.3 Error Cure

At some stage organisations are likely to detect material errors in their unit pricing process that adversely impact some or all investors and need correction, both in terms of remediation to adversely impacted investors and, potentially, in system or process reviews seeking to ensure that such events do not recur.

The basic criterion for remediating unit pricing errors is to ensure that no investor is materially disadvantaged. This is a one-sided test that does not automatically require investors who may have received a windfall benefit to surrender that benefit. Often the business case is that such ‘clawbacks’ are not made since the adverse publicity is not worth the gain. A ‘no clawback’ approach implies the costs of remediation for investors adversely impacted needs to be sourced from outside the fund.

The one-sided nature of error remediation is clearly seen in IFSA guidance, IFSA 1999, section 9.1:

The underlying principle is that if a pricing error occurs, the Scheme Operator should, having regard to the materiality of the error to each Investor's investment, return Investors to substantially the same financial position in which they would have been had the error not occurred.

10 An Approach To Remediation of Errors

An overall approach to the remediation of errors can follow a defined process:

- ▲ *Identify:* Error identification comes from a variety of sources. When investigating a problem it is important to have a full understanding of the underlying issues in contrast to reactively addressing only immediate symptoms.
- ▲ *Cap:* When an error is identified the key issue is to quantify it in terms of which investors are impacted and to ensure this group does not grow.
- ▲ *Quarantine:* It is important to understand the extent to which a fund can continue to operate, in particular to continue to accept investments.
- ▲ *Fix:* Once an error is quarantined, it can be fixed. The fix process need to be comprehensive, and generally requires assessment of a broad range of issues to ensure that the ultimate objective of apportioning monies to adversely affected investors is fully met. Issues to be considered include tax effects, investment performance reporting, investor communications (annual statements), and the practical mechanics of allocating remediation monies. A clear understanding of the equity issues involved, and their practical consequences, is crucial to developing robust resolutions.
- ▲ *Communicate:* It is crucial that communication issues surrounding the fix, both the investigative and remediation work and within and without the organisation, are appropriately communicated to stakeholders.

In terms of determining the remediation amounts the preferred approach is to do computations 'off-line'. That is, not to seek to directly 'unwind' all transactions in the administration system and then 'rewind' in an effort to replicate the correct sequence of events had the correct information been used. This is often impractical due to sheer volume of transactions. It also presumes perfect data (transaction data in particular), which is unlikely to be the reality. Nor does it address the issue of applying remediation to the 'production' system which may well have been continuing to run in the background.

A better approach is to determine corrected values for investors, assuming the effects of the error have been removed, in a separate environment. This value is then compared with the value originally determined. Where additional value is due to the investor this is identified separately for each investor, whether they remain with the fund or not. Allocation of remediation amounts to investors is handled for ongoing investors via the attribution of additional units, and for exited members via a cash payment in some form.

A number of specific assumptions are made to ensure that the remediation calculation process is focussed and delivers useful results.

In some cases the situation can be complicated by additional factors such as:

- ▲ *Distributions:* An error may, in theory, impact the computation of distribution amounts. Practical treatment of this issue depending on the circumstances of the distribution and the materiality of the impact of any change.
- ▲ *Nesting of Investment Options:* It is not uncommon for invested monies to go through intermediate investment funds, perhaps several times,

before arriving at the underlying market vehicle. Errors may occur at any point in the 'nested' structure, and the knock-on consequences of error (and its remediation), both up and down the investment process, need to be considered.

This approach requires and uses specialised software to determine remediation amounts and to ensure the necessary level of security to support the remediation process. In particular, it also provides an environment that permits calculations and results to be replicated and checked in detail. Strong levels of control and reproducibility of remediation are strongly recommended to provide comfort for the major stakeholders - investors, managers, trustees and regulators.

There are a number of practical matters that need to be managed and controlled as part of the overall remediation process in addition to the theoretical aspects of the remediation process, the determination of corrected unit prices and computation of remediation amounts. These include:

- ▲ *Data Integrity*: Reprocessing of transactions presumes the transactions and other required data is available, correct and complete. There can be a need for a review and cleansing of transaction data.
- ▲ *Attribution of Remediation*: The mechanics of actually getting remediation amounts to investors, current and exited, need to be considered and may be quite difficult
- ▲ *Knock-on Effects*: Consideration needs to be given to any knock-on effects for the business on completion of the remediation.

11 Limitation

This paper provides a general discussion and should not be interpreted as providing specific advice or recommendations for any particular issue or event that may arise in practice. Each issue or event arising in practice will have its own set of specific circumstances and business management issues to be addressed.

12 Conclusion

Unitised investment products are common and there is good reason to expect they will become more common. As with any process, there are risks involved with the provision of these products. While investment risks are generally passed through to the investor, there can be significant operational risks associated with the management of these products. Given the number of unit prices computed, the time constraints the computations are often made under, and the highly integrated processing required to administer unitised products, it is probably naive for providers to expect that unit pricing errors will not occur.

Prevention is always better than cure in the context of managing unitised investment products and this is supported by robust processes and systems effectively used by quality people. When an error is detected, an understanding of the equity considerations involved and their practical implications is key to the successful resolution of the errors. The management of unitised investment

products may be conceptually relatively straightforward but is often complex in its implementation, with error resolution being more involved.

The traditionally espoused actuarial skills of making informed and balanced judgements, assessing materiality, and implementing balanced and equitable resolutions should come to the fore in this environment.

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References

- ASIC, 2004, *ASIC Completes Review of Australian Managed Fund Practices: Late Trading and Market Timing*, ASIC Media and Information Release 04-251, 6 August 2004.
- APRA, 2003, *APRA Reviews Unit Pricing Practices*, APRA Insight, 2nd Quarter.
- BIS, 2004, *International Convergence of Capital Measurement and Capital Standards - A Revised Framework*, Bank for International Settlements, June 2004.
- IFSA, 1999, *Incorrect Pricing of Scheme Units – Correction and Compensation*, Guidance Note No 4.00.
- Jenkins T C, 1982, *Equity and the Liability Estate*, Transactions of the Institute of Actuaries of Australia.
- Knox D and Cornish R, 1999, *The Development of Some Characteristics for Equitable National Retirement Income Streams*, Centre for Actuarial Studies, University of Melbourne, Research Paper No 70.
- McDonald O, 2003, 'Sex Discrimination and Annuities', part of Public Hearings on Sex Discrimination Outside the Workplace, 10 Sept 2003, European parliament. See www.euoparl.eu.int/hearings/20030910/femm/mcdonald.pdf
- Ward G C, 1987, *Notes on Research for Equity in Life Insurance*, Transactions of the Institute of Actuaries of Australia.
- Webster's 1976, *Webster's Third New International Dictionary*, Encyclopaedia Britannica Inc.