PLACING VALUE ON TAX LOSSES IN THE UNIT PRICING OF LIFE COMPANY INTERNAL FUNDS

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CONTENTS

Introduction

1.1. Introduction

The Paper deliberately uses the terminology "Placing Value on Tax Losses" rather than "Value of Tax Losses" to emphasise the difference between the concept of the value placed on tax losses in striking unit prices and the concept of the value of tax losses in other contexts.

A 2009 working party on unit pricing set up by the Life Committee of the Society of Actuaries in Ireland published a paper[i] in December 2009 on "Unit Pricing Practices".

That paper (see Appendix 1) identified that there was not a market consensus in Ireland on the appropriate approach to placing value on tax losses in the unit pricing of life company net internal funds with the objective of ensuring broad equity between different groups of policyholders. From a consumer perspective, it is unsatisfactory that there is no market, regulatory or professional consensus on the methodology for placing value on tax losses in unit pricing. The potential consequences of this lack of consensus, is that two companies with an otherwise identical internal unit-linked fund in an identical position regarding tax losses might quote unit prices (which should be equal) which are significantly different. The concern is not that Company A might adopt slightly different assumptions for the key economic parameters than Company B but rather that radically different approaches might give very different results for the same underlying assumptions.
That identified lack of consensus was the motivation for this paper with the objective of proposing a theoretically sound and practical approach to placing value on tax losses (a 'tax loss value algorithm') based on considering the merits of such an algorithm in the context of various possible scenarios.

The authors believe that some current approaches to placing value on tax losses are inappropriate with consequent implications for unit-linked policyholders. This might have resulted from asking the wrong question i.e. "What is the value to the fund of the tax losses?" whereas the correct question to ask should have been "What is the appropriate value to place on tax losses such that the tax loss transfer transactions between continuing unit-holders and exiting/incoming unit-holders are processed at unit prices that are fair to all the groups of unit-holders?".

The authors are not aware of any previously published material on the appropriate methodology for placing value on tax losses in unit pricing. This Paper proposes an explicit methodology that life companies should be capable of implementing in a practical manner in their unit pricing processes.

1.2. Glossary

ABI Guide: Association of British Insurers paper "A Guide of Good Practice for Unit Linked Funds -June 2006"

APRA Guide: The 2008 paper "*Unit pricing - guide to good practice* ('© Australian Prudential Regulation Authority and Australian Securities & Investments Commission. Reproduced with permission') for the life insurance, superannuation and funds management industries by the Australian Prudential Regulation Authority (APRA) and the Australian Securities and Investments Commission (ASIC).

Fund Value Method: This method (which is described in the Paper) derives the value placed on tax losses as an estimate (whether conservative or best estimate) of the value arising to the fund from the tax losses i.e. the difference between the present value of the fund tax charges without the tax losses and the fund tax charges with the tax losses.

NBB: New Basis Business which refers to life assurance non-pensions business written in Ireland on or after 1 January 2001 under a gross roll-up exit tax regime.

Net funds: Life assurance funds where tax is provided for on the income and gains of the fund before calculating the unit price.

OBB: Old Basis Business which refers to life assurance non-pensions business written in Ireland prior to 1 January 2001 on an I-E tax basis.

Tax Losses: Tax Losses are broadly speaking the amount of net realised losses on asset sales and net unrealised losses on assets held in the fund which have not been relieved against tax in calculating the tax accruals in the fund.

Transaction Value Method: This method (which is described in the Paper) for contracting funds derives the value placed on tax losses based on determining the value received by continuing unit-holders from the tax losses left behind by exiting unit-holders and dividing by the amount of tax losses left behind and then applying that ratio to the total tax losses.

2009 Unit Pricing Paper: The December 2009 paper "Unit Pricing Practices" by the 2009 Unit Pricing Working Party of the Society of Actuaries in Ireland

1.3. Market Background

The issue of the placing of value on tax losses in the unit pricing process arises in the context of TCF (treating customers fairly) and ensuring broad equity between generations of policyholders e.g. as set out for the UK in the ABI Guide's tax principles (see Section 2.4). If all policyholders enter a fund at the same time and all exit at another point in time the issue of equity between policyholders in the fund doesn't arise. However, if policyholders enter or exit the fund at different points in time, then as part of pricing the units for the purpose of the transactions a

value (which in some circumstances might be zero) should be placed on any tax losses and this value must be fair to entering, exiting and continuing policyholders.

In Ireland, new life assurance business written on or after 1 January 2001 is subject to a life company tax regime known as "New Basis Business" ("NBB") which is a 'gross roll-up with exit tax' regime. Life assurance business written before 1 January 2001 known as "Old Basis Business" ("OBB") is taxed under the I-E tax regime. Such net funds (existing pre 1 January 2001) are thus now referred to as "Old Basis Business" ("OBB") life funds. There is no new business (except top-ups and regular premiums) entering these life funds but there may be switches between OBB life funds. In general, individual Irish OBB life funds are in a contracting position as they are effectively in a run-off position. However there are still substantial life OBB portfolios being managed and so the issue of the valuation of tax losses therein is still of importance.

In the UK, the I-E tax regime continues in place. The valuation of tax losses for UK life companies remains an important issue in the context of TCF and maintaining equity between different groups of unit-holders.

1.4. Placing Value on Tax Losses in Unit-Linked Funds - Background

Tax losses arising from say a significant fall in the capital value of some of the assets of a unit-linked fund which is taxed on an 'I-E' basis can only (on a stand-alone fund basis) be tax relieved against future investment income or capital growth of the assets of the unit-linked fund. Thus tax losses are a 'contingent asset' in that the value of tax losses may only be realised if there is sufficient future investment income or capital gains in the unit-linked fund.

The word sufficient is important in the last sentence as if the future investment income or capital gains is not sufficient to relieve all the tax losses, then only part of the tax losses will have value for the unit-holders of the fund. A second necessary but not sufficient condition for the relief of the tax losses is that a sufficient number of unit-holders remain in the fund to generate the income and gains against which the losses may be offset according to the relevant tax rules.

In this Paper we set out a Transaction Value Method for placing value on tax losses in unit pricing which is based on the principle of striking fair transaction prices for the tax loss transfer transactions (for contracting funds) between exiting and continuing unit-holders having regard to the considerations set out in the remainder of this section.

The Extent to which Tax Losses May be Taken into Account in Establishing a Unit Price

(a) Transaction Value Method

Winding-Up Valuation
If an 'I-E' unit linked fund with tax losses were to be valued on any given day for the purpose of winding up the fund and repaying all the unit holders, then no value would be placed on the tax

losses as there would be no future investment income or gains and there would be no unit holders remaining in the fund the assets of whom might be capable of generating income or gains against which the losses might be offset. Tax losses have no value in such circumstances and no value ought to be placed on them in a winding-up valuation.

Valuation for the Purpose of a Partial Redemption – Case 1
Perfect foresight – investment income and gains will equal or exceed the amount of tax losses
Suppose that

- 20% of the unit holders wished to redeem their units in an 'I-E' unit-linked fund with tax losses which are equal in size to 40% of the value of the fund.
- We have perfect foresight as to the future investment returns of the unit-linked fund and that the remaining unit holders would earn a total return of 50% of the value of the unit fund (excluding any value placed on tax losses) over the remaining lifetime of the fund.

Prior to the exit of the 20% of unit holders, the fund had tax losses of 40% of the value of the fund and was expected to make 50% on the fund's assets over the remaining life of the fund. So the fund expected that the 50% return over its remaining lifetime would be split for tax purposes into: (i) the 40% that would be tax free because of the existing tax losses of 40% of the value of the fund; and (ii) 10% that would constitute taxable investment return.

The 80% of unit holders who are continuing will own all of the tax losses after the redeeming unit holders depart and the tax losses would then represent 50% (40%/(1-20%)) of the residual fund. This would allow the expected 50% return over the remaining lifetime of the fund to be earned completely tax free by the continuing unit holders.

Thus the exiting unit holders are passing on their share of the tax losses to the continuing unit holders and in the perfect foresight case ought to be rewarded for passing on their share of tax losses to the continuing unit holders. The exiting unit holders ought to receive consideration for the 10% (50% perfect foresight return *less* 40% tax fee return) component of the 50% expected return that the continuing unit holders will earn tax free.

In that case, the unit price might include an amount of the tax rate times 10% of the value of the fund (ignoring discounting for simplicity) in order to be fair to both the exiting unit holders and the continuing unit holders. If the tax rate is 20%, then the unit price should be the net asset value of the fund increased by 2% (20% of 10%) in order to treat exiting and continuing unit holders equally.

By way of contrast, if all of the unit-holders rather than 20% of the unit-holders were leaving the fund at a particular point in time, the unit price would not be increased by 2% because the tax losses would have no value as there would be no assets on which to generate return to claim the value of the tax losses attributable to the fund.

Valuation for the Purpose of a Partial Redemption – Case 2
Perfect foresight – investment income and gains will be less than the amount of tax losses
Suppose that

- 20% of the unit holders wished to redeem their units in an 'I-E' unit linked fund with tax losses which are equal in size to 40% of the value of the fund.
- We have perfect foresight as to the future investment returns of the unit-linked fund and that the remaining unit holders would earn a total return of 30% of the value of the assets in the fund (excluding any value placed on tax losses) over the remaining lifetime of the fund on the fund's assets.

Prior to the exit of the 20% of unit holders, the fund had tax losses of 40% of the value of the fund and expected to make 30% on the fund's assets over the remaining lifetime of the fund. So the fund expects that the 30% return over the remaining lifetime of the fund will be entirely tax free because the existing tax losses are 40% of the value of the fund whereas the return is only 30% of the value of the fund.

The 80% of unit holders who are continuing will own all of the tax losses in the fund after the 20% of unit-holders have departed and the tax losses will then represent 50% (40%/(1-20%)) of the value of the residual fund. The remaining unit holders will be able to earn the 30% return completely tax free but prior to the departure of the 20% of unit-holders, the remaining unit holders 40% tax loss position already ensured that all of the expected 30% return would be tax free.

Thus while the exiting unit holders are passing on their share of the tax losses to the continuing unit holders those additional tax losses generate no additional value for the continuing unit-holders. In such circumstances, the continuing unit-holders would not be prepared to pay the exiting unit-holders anything for the tax losses that the exiting unit-holders left behind.

Changing Circumstances over Time

Perfect foresight does not exist in practice. We can see from Case 1 and Case 2 above that if the circumstances of the fund changed whereby say there were to be a significantly lower investment return in the future, a practice of paying consideration to exiting unit-holders for tax losses (Case 1 above) would need to be reviewed especially if the expected future investment return was unlikely to absorb the fund's tax losses. In such circumstances, a unit-pricing basis akin to Case 2 above where no value is placed on tax losses might be the appropriate unit pricing basis.

(b) Fund Value Method

By way of contrast, for the Fund Value Method, the question that is asked is: "How much future investment can be earned tax free by the fund?" and at a high level the answer is the lesser of the tax losses (expressed as a percentage of the fund) and the future total investment return to the fund. Thus the size of the tax losses as a percentage of the fund value is relevant only in the context of setting a maximum limit on the percentage future investment return that can be received tax-free.

For the Fund Value Method, in case 1 the value of tax losses would be set based on 40% future tax-free investment return (because the 50% future investment return would be restricted to the maximum of the existing 40% tax losses).

For the Fund Value Method, in case 2 the value of tax losses would be set based on the 30% future investment return as the 40% tax loss cap would not impact. In case 2, it would not matter whether the existing tax losses were 40%, 50%, 100% or 200% as the value of tax losses would be set based on the 30% future investment return for all tax loss percentages greater than the 30% future investment return rate. The Transaction Value Method would give very different results for all those levels of existing tax losses percentages.

1.5. Executive Summary

To the knowledge of the authors, there is no explicit regulatory guidance in the UK, Ireland or Australia on the appropriate methodology for placing value on tax losses in unit pricing for life company internal funds which are subject to tax on the income and gains of the fund. Such regulatory guidance as exists describes the relevant issues with no specific guidance on how to derive appropriate values based on a prescribed methodology.
This is despite the significant effect that placing (or failing to place) a value on tax losses can have on unit prices and hence on policyholder benefits.

Whilst the Fund Value Method commonly used might seem plausible, the Paper's analysis demonstrates that the method gives results that are unfair as between continuing and exiting unit holders in many circumstances and results in excessive value being placed on tax losses for exits to the detriment of continuing unit-holders.
At another extreme, a company might adopt the "Zero Value Method" where no value is placed on tax losses in any circumstance. The Paper's analysis demonstrates that the method gives results that are inappropriate in some circumstances where it would be appropriate to places some value on tax losses for exits and that this method is to the detriment of exiting unit-holders.

The authors believe that such methods may lead to inequitable treatment of different groups of policyholders and that companies using those methods should review their approach in light of the results in this Paper.

This Paper sets out an explicit methodology ("Transaction Value Method") for placing value on tax losses in unit pricing for life company internal funds. The methodology for funds in contracting positions is based on an innovative approach that the authors have not seen described before. The methodology is based on the principle that the tax loss transfer transactions between continuing unit-holders and exiting/incoming unit-holders should be processed at unit prices that are fair to all the groups of unit-holders based on the benefits arising to the various groups of unit-holders from the tax loss transfer transactions. The Paper sets out separate methodologies for funds in expanding or contracting positions.

The authors believe that the proposed approach, the Transaction Value Method, provides a practical solution to the complex problem of valuing tax losses in unit pricing. The approach leads to the use of a straight-forward tax loss value formula of the form:

[Value Placed on Tax Losses] = [Tax Loss Value Proportion] *[Tax Rate] *[Tax Losses]

where

- [Tax Loss Value Proportion] is a non-linear function of [Tax Losses as a Percentage of Fund Value] where that latter item is the tax losses in the fund expressed as a percentage of the value of the assets in the fund (excluding any value placed on the tax losses) at the unit pricing date
- [Tax Losses] are broadly speaking the amount of net realised losses on asset sales and net unrealised losses on assets held in the fund on the unit pricing date which have not been relieved against tax in calculating the tax accruals in the fund
- [Tax Rate] is the rate on tax applicable to income and gains in the internal fund.

Life companies should be capable of giving effect to the Transaction Value Method in their unit pricing processes without undue difficulty.

The main advantages to all stakeholders in the unit pricing process of the proposed Transaction Value Method are:

- The methodology produces unit prices that are manifestly fair to all groups of unit-holders
- The methodology reduces discontinuities in unit prices as the value placed on tax losses automatically adjusts for changes in fund circumstances and avoids the situation where unit pricing discontinuities arise as a consequence of one-off company reviews
- It would standardise the approach across the industry and remove competitive distortions between life companies
- It would reduce the level of subjectivity in the tax loss valuation process

1.6. Composition of the Paper

This paper addresses two different tax regimes, viz (i) the legacy, Irish I-E system; and (ii) the UK I-E system. The differences (as set out in section 9) in the two tax regimes result in very different values being appropriate for the value to be placed on tax losses in unit pricing.

Sections 7 and 8 look specifically at the value to be placed on tax losses in unit pricing in the UK I-E system. Readers who are only interested in the Irish I-E system may skip sections 7, 8 & 9 of the paper. The UK reader may choose to skip sections 4, 5, 6 & 9.

This paper considers the issue of the valuation of tax losses solely in the context of a stand-alone fund i.e. it doesn't consider the issue of placing value on tax losses arising from transfer of tax losses for value to other funds or to the shareholder although the methodology outlined could be adapted to be used for these purposes also.

1.7. Summary Conclusions

The main conclusions are as follows:

Problems with Life Company Approaches

- An approach in common use ("Fund Value Method") gives results that are inappropriate in many circumstances and results in excessive value being placed on tax losses for exits to the detriment of continuing unit-holders. The Paper's analysis for ROI funds demonstrates that this method does not result in fair unit prices – see Section 4.4. The graphs numbered 4.4.2 and 4.4.4 illustrate this and show that this method is disadvantageous to continuing unit-holders in lower investment return rate scenarios. The value placed on tax losses by this method could be quite inappropriate as illustrated by graph 4.4.7 in certain circumstances e.g. where tax losses are high as a percentage of fund value.
- At another extreme, a company might adopt the approach that no value be placed on tax losses in any circumstance. The Paper's analysis demonstrates that the Zero Value Method gives results that are inappropriate in some circumstances where it would be appropriate to places some value on tax losses on exits and that this method is to the detriment of exiting unit-holders.
- It is understood that the norm in the UK is to place zero value on tax losses for funds in a contracting position. The analysis in the Paper supports the general validity of that approach in most circumstances but not in all circumstances as some value would generally be appropriate where the tax losses as a percentage of the fund value are low.
- The authors recommend that life companies should follow the Transaction Value Method set out in this Paper for placing value on tax losses in unit pricing.
- The Paper's analysis indicates that a theoretically sound and fair approach for contracting funds is to derive the [Tax Loss Value Proportions][1] using an investment return distribution in conjunction with the method described in section 4.7 for Republic of Ireland ("ROI") funds and section 7.4 for UK funds.
- The Paper's analysis indicates that a theoretically sound and fair approach for expanding funds is to derive the [Tax Loss Value Proportions] using an investment return distribution in conjunction with the method described in section 6.5 for ROI funds and section 8.5 for UK funds.

Proposed Unit Pricing Approach –Transaction Value Method

- The selection of a basis for placing value on tax losses in unit pricing should be based on the principle of striking a fair unit price for the transactions between continuing and incoming/exiting unit-holders – see Section 3.5. A suitable method (tax loss value algorithm) is required to determine a fair unit price.
- The essential difference in calculations between the Fund Value Method and the Transaction Value Method is set out in the table below.

Table
Comparison of the Projections used by Fund Value and Transaction Value Methods in Calculating or Placing Respectively a Value on Tax Losses

[1] The proportion of tax losses upon which full value is placed at the time of each unit transaction

	Fund Value Method	**Transaction Value Method**
Projection A (1)	Present value of fund tax charges allowing for WITHDRAWALS but *TAX LOSSES are ignored*	The present value of fund tax charges allowing for TAX LOSSES AND WITHDRAWALS but removing from the fund for each batch of exits the TAX LOSSES of exiting unit holders
Projection B (2) ***Same for both Methods***	Present value of fund tax charges allowing for TAX LOSSES and WITHDRAWALS	Present value of fund tax charges allowing for TAX LOSSES and WITHDRAWALS
Difference (1) – (2)	Value of TAX LOSSES to the fund	Value placed on TAX LOSSES for unit pricing purposes proportionate to difference
Points to note	Fails to apportion tax losses between 'stayers' and 'leavers'	The Difference, (1) – (2), is the present value of taxes not paid due to 'leavers' passing on their share of tax losses to 'stayers'[2]

- A practical daily unit pricing process requires a straight-forward tax loss value formula (for placing value on tax losses) to overcome the complexity of the tax loss value process. The complexity arises because the appropriate value to place on tax losses in a fund can vary over time from zero value to partial value to full value according to a fund's circumstances.
- An appropriate straight-forward tax loss value formula would be of the form outlined in the Executive Summary in section 1.5. In the case of contracting funds, the tax loss value formula would also include a [Residual Term Weighting Factor][3] if the [Tax Loss Value Proportion] figures were calculated on the basis of a fixed residual term.
- The [Tax Loss Value Proportion], as defined in section 1.5, is a function of:
    - The unit pricing basis (cancellation/intermediate/creation) for the fund
    - The [Tax Losses] expressed as a percentage of value of the assets of the fund(call this ratio [Tax Losses as a Percentage of Fund Value])
    - The withdrawal assumptions for the fund for contracting funds and new entrant assumptions for expanding funds and
    - The fund's investment return distribution

[2] The *value placed on tax losses* is calculated as the value received by continuing unit-holders from the tax losses left behind by exiting unit-holders and dividing by the amount of tax losses left behind and then applying that ratio to the total tax losses.

[3] The [Residual Term Weighting Factor] decreases linearly as the fixed residual term decreases

- For practical application in daily unit pricing, it is necessary to have prepared for each fund a schedule of values for the [Tax Loss Value Proportion]. Having generated such schedules on a one-off basis, thee schedules would be used in unit pricing subject to the appropriateness of the schedules being monitored frequently.
- The approach suggested in the paper is practical – see Section 10.8
- An appropriate tax loss value algorithm is required to determine the values of the [Tax Loss Value Proportion] figures - this algorithm is outlined in the paper.

UK & ROI Differences

- There are significant differences in results between ROI and UK funds – see Section 9.
- For an otherwise identical fund in a contracting position, the value placed on tax losses would be lower for a UK life fund than for a ROI life fund – see graph 9.4.1 in Section 9.4.
- For an otherwise identical fund in an expanding position, the value placed on tax losses would be lower for a UK life fund than for a ROI life fund – see graph 9.6.1 in Section 9.6.

General

- The proportion of tax losses on which full value would be placed in unit pricing reduces as the [Tax Losses as a Percentage of Fund Value] figure increases. This can be seen for contracting funds from graph 4.11.1 in Section 4.11 for ROI funds and from graph 7.7.1 in Section 7.7 for UK funds. This can be seen for expanding funds from graph 6.11.1 in Section 6.11 for ROI funds and from graph 8.11.1 in Section 8.11 for UK funds.
- Whilst the value placed on tax losses in a fund should be capped (as a percentage of the fund value) [4]for both contracting and expanding funds, placing a maximum value on tax losses is not a sufficient approach for contracting funds – see Section 10.7.
- The approaches in this paper can be extended to determine a method for placing value on tax losses for the purposes of fund mergers.
- The valuation of tax losses in unit pricing is a complex subject and requires assumptions for future lapse rates, investment returns etc. to be used. The best that life companies can hope for is that they have a method which is fair and reasonable to continuing, exiting and entering unit holders in most future investment return and lapse / new entrant scenarios and is based on a sound theoretical footing.
- It has to be accepted that a certain level of inequity between groups of unit-holders may arise from the placing on value on tax losses in unit pricing in some circumstances. However, provided that a life company has a well-documented and theoretically sound method which is regularly monitored, it is unlikely that any circumstances will arise where a need to change the tax basis for tax losses in unit pricing would trigger a doubt over

[4] For any given investment return distribution and remaining life of the fund, the probability of all the tax losses in a fund being relieved against tax diminishes with the size of tax losses as a percentage of the fund value.

whether or not a unit pricing error has existed for some time prior to the change of unit pricing basis.

1.8. Disclaimer

Any opinions expressed in this Paper are those of the authors and not of their employers.

1.9. Acknowledgements

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Market Background

2.1. 1993 Unit Pricing Working Party Paper of the SAI

The 1993 paper [ii] "Unit Pricing and Equity in the Management of Life Assurance Unit Funds" by a unit pricing working party of the Society of Actuaries in Ireland considered the issue of taxation in unit pricing.

As regards tax losses, the perspective in 1993 was as stated in the paper "*Sometimes a unit fund will have tax losses and the question of how to allow for these in unit prices will arise. If it is expected that relief on such losses will be obtained in the overall tax computation of the company, then it is appropriate to place a value on such tax losses. It may be that obtaining relief does not appear likely, and in this event a low value or a nil value might be put on the tax losses. In striking a balance between the interests of entering, exiting and continuing policyholders in this complex area, precedence should be given to the interests of the continuing policyholders*".

The most pertinent point is the recommendation that precedence should be given to the interests of the continuing policyholders. Looking back with the benefit of hindsight, this may seem rather biased towards continuing policyholders. However, as we shall see, where exiting policyholders are paid a certain amount for their share of tax losses, they receive benefit which is certain; by contrast, for continuing policyholders, the tax loss remains a contingent asset which may or may not crystallize depending on future investment returns and future lapses.

The other striking point is the conditionality on whether or not relief on such tax losses would be obtained in the overall tax computation of the company. In this paper that conditionality is not seen as important on the basis that what really matters is whether or not benefit accrues (or is likely to accrue) to one group of policyholders arising from a transfer of tax losses from another group of policyholders.

2.2. 2009 Unit Pricing Working Party Paper of the SAI

A 2009 working party on unit pricing set up by the Life Committee of the Society of Actuaries in Ireland published a paper in December 2009 entitled "*Unit Pricing Practices*". This included the results of a unit pricing survey for Irish life companies.

The relevant section of that paper is its section 3.7 which deals with the treatment of tax losses and an extract is shown in Appendix 1.

2.3. Other Tax Papers

A 1997 paper[iii] considered the issue of tax losses. That paper considered issues such as transfer of tax losses for value to other funds or to the shareholder.

2.4. ABI Guide

Section 3 of the ABI Guide addresses the use of discretion in managing a fund. The guide recommends that "*funds should be operated according to published criteria and standards. Specifically, the scope of the firm's discretion in managing the fund and the limits to that discretion should be documented and disclosed to policyholders and other relevant parties. This codification provides a clear point of reference against which to review any decisions taken, helping to provide clarity and certainty for all parties*".

There are a number of references to tax in the paper which are set out below but there are no specific references to the valuation of tax losses in unit pricing.

> *2.1.9 Whilst this Guide provides a high-level framework, the individual policy conditions should define in more detail the boundaries within which a company has agreed to operate its unit-linked funds. This should cover:*
> - *….*
> - *Deductions that can be made from the funds, including charges and allowance for taxes and how they are calculated.*

> *3.1.6 Subject to the terms of the original policy conditions, areas where discretion may be applied include:*
> - *….*
> - *Tax (e.g. how actual charges or credits for tax are calculated, when they are taken from fund or credited to fund, how deferred tax provisions are calculated)*

> *4.1.3 Expenses, income and taxation should be recognised appropriately in the price, being accrued in a timely and accurate fashion so that the unit price properly reflects the value of the underlying assets.*

> *4.3.16 Firms should ensure that the timing of cash transactions (e.g. applying management charges and tax payments) between the fund and the company do not give rise to an undue gearing effect on policyholder returns.*

> **Tax**
> *4.5.9 Where the fund is subject to tax the following principles should apply:*
> - *Policyholders should be treated fairly.*

- *The firm's approach to tax should, as far as possible, be consistent with any information or commitments given in marketing literature or policy documents.*
- *The basis of taxation chosen should aim to achieve broad equity between generations of policyholders and fairness between the company and the fund, supported by appropriate reconciliation to help ensure that a fair outcome has been achieved 39.*

4.5.10 The scope and nature of the taxation of unit linked life funds may be subject to change over time, but wherever possible announcements of future changes should be taken into account in any tax calculations.

[39] Without perfect foresight it will not be possible to achieve perfect equity, but the goal should be to balance the interests of different generations of policyholder and achieve a fair allocation of the burden of tax between the firm and the fund, recognising the tax relief which may be claimed on management expenses.

2.5. APRA Guide

The Australian Prudential Regulation Authority (APRA)[iv] is the prudential regulator of the financial services industry in Australia. An updated APRA Guide was released on 20 August 2008 by APRA and the Australian Securities and Investments Commission (ASIC).

The APRA Guide includes details of responses to an APRA unit pricing survey[v].

Responses to the APRA unit pricing survey indicated that risks arise from:

- ……..
- *Tax issues, including reconciliations of deferred and current tax, and determination of values for current tax, deferred tax liabilities, and deferred tax assets*

The APRA guide is helpful as it makes specific reference to the treatment of deferred tax assets.

"*Funds may have actual or net unrealised tax losses that can be carried forward as deferred tax assets or future income tax benefits (FITBs). These FITBs are available to offset future capital gains tax liabilities or future unrealised gains. FITBs may also be written off – for example, if market movements mean they are unlikely to be realised. Issues arise relating to the amount of FITBs that can be recognised, and the circumstances in which FITBs can be recognised. Our unit pricing survey showed a range of practice in recognising FITBs. Our review also found that where a view has been formed that the deferred tax benefits have been overstated, FITBs may not have been reduced to an appropriate level.*"

Guide to good practice in determining tax treatments

FITBs should be included in unit prices to the extent that they have value for present or future unit holders, taking into account the circumstances of the fund, the governing documentation, possible events, the likelihood and timing of those events, and your approach to discounting to allow for the time value of money. The value of FITBs included in unit prices should be

systematically reviewed to help achieve equity between investors and to minimise price discontinuities in unit prices.

We would not expect to see a tax policy that always, or never, recognises FITBs. It is reasonable to consider capping the amount of FITBs included in unit prices.

For these and other reasons, the amount of FITBs included in unit prices may not match the amount of FITBs reported in financial statements. Depending on the size or the reasons for the difference, differences may need to be explained in the financial statements.

When determining the amount of FITBs in unit prices and any cap on FITBs, factors you should consider may include, but are not limited to:

- *The level of unrealised gains/losses*
- *Expectations of market movements and their likely volatility*
- *The investment timeframe*
- *Likely investment inflows and outflows for the fund*
- *The extent to which FITBs in one pool can be applied against gains elsewhere in the same entity or consolidated entity*
- *The applicable tax rate*
- *Exposure of the fund to possible significant redemptions, and*
- *Marked change in the circumstances of your product.*

Valuation of Tax Losses

3.1. Tax Losses

Tax losses in a unit fund could consist of:
(i) Current year realized losses
(ii) Losses in a future chargeable year i.e. deemed disposal losses
(iii) Unrealized losses on assets not subject to deemed disposal rules

Similarly future investment return in a unit fund could consist of:
(i) Current year investment return (for a future year) to be taxed in the current tax year
(ii) Deemed disposal investment return (for a future year) to be taxed over a number of subsequent tax years
(iii) Unrealized investment return to be taxed when subsequently realized

For the same quantum of tax losses, the value placed on current year realized losses would be higher than for other tax losses. This is because, for the purposes of establishing tax provisions in unit pricing, current year realized losses would be capable of being offset against all three types of future investment return and are therefore more likely to be tax relieved in establishing the unit pricing provisions. In contrast, deemed disposal losses would only be capable of being offset against investment return falling to be taxed in a year greater than or equal to the tax charge year of the deemed disposal loss.

For simplicity, the calculations in the paper assume that all tax losses are realised losses and consequently are available for immediate relief (for the purposes of establishing tax provisions within the unit fund) against the fund's investment return.

In practice, some adjustment to the value placed on tax losses might need to be made for the actual composition (between the three categories i.e. (i), (ii) and (iii) above) of tax losses in a fund.

3.2. Reasons for Placing Value on Tax Losses

A fund's tax losses serve to reduce the tax charges that would otherwise arise in the fund on future taxable investment return.

Under the Irish I-E tax regime capital losses can be offset against both income and capital gains from all assets in the fund. Furthermore the absence of indexation relief in computing capital gains increases the size of taxable capital gains. Thus, there is a reasonable probability that a fund will have positive future taxable investment return. For the UK I-E tax regime, for the reasons given in Section 9.1, there is a lower probability that an otherwise identical fund will have positive future taxable investment return that the capital losses can be offset against.

It would be expected that all unit-holders in the fund have 'earned' a share of the tax losses either because they have experienced the tax losses or have paid an appropriate price on entry for a share of the tax losses. However, irrespective of what has happened in the past, all unit-holders at a point in time have a right to a proportionate share of the fund's assets including its tax losses.

If future tax charges are reduced (as a result of the existing tax losses) then that ought reasonably to be reflected in the fund unit price no later than the time these tax savings arise. Exiting unit-holders can only be allocated a benefit from the tax losses at time of exit if the then unit price includes some value placed on the tax losses. Continuing unit-holders might be largely indifferent to whether the tax relief comes through at the outset or when the tax savings arise provided that the unit prices for exits/new entrants are fair for the tax loss transfer transactions between them and the exiting/incoming unit-holders.

3.3. Placing Value on Tax Losses

Value might be placed on tax losses in a unit fund on the basis that:

- The tax losses can be relieved against taxable return within the unit fund itself; or
- The tax losses can be transferred to other internal unit funds for consideration; or
- The tax losses can be transferred to the company for consideration.

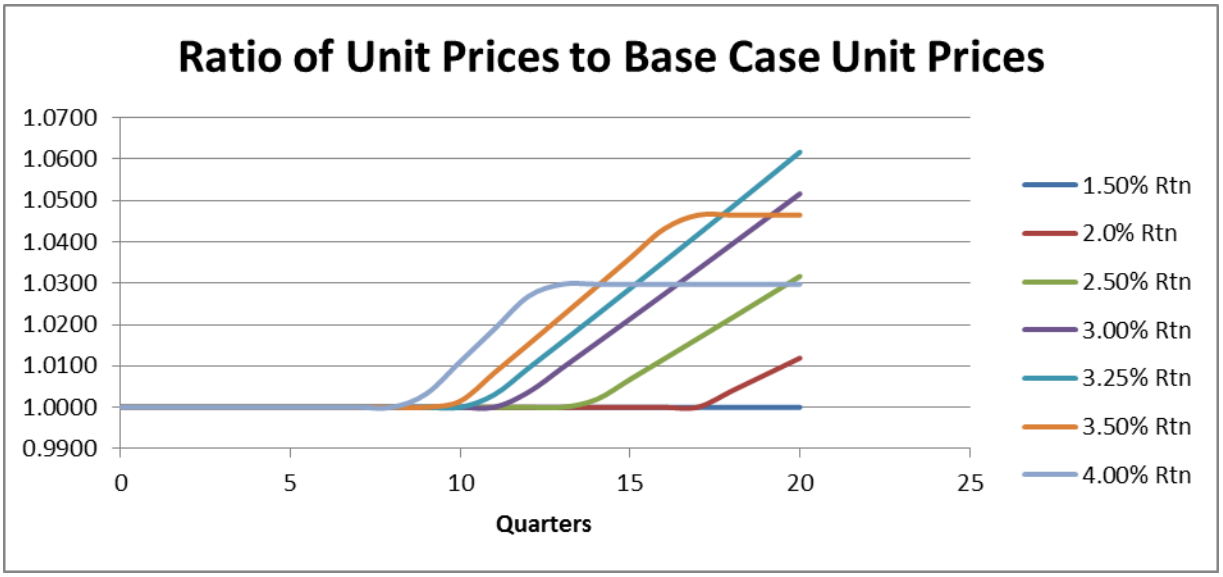
This paper's primary focus is on the valuation of tax losses in the scenario where value is placed on the tax losses only if they can be relieved against taxable return within the unit fund itself.

3.4. Consequences of Placing No Value on Tax Losses – Contracting Fund

Consider the example of a fund in a contracting position. Suppose no value was placed on tax losses and that the withdrawals experience was as set out below.

Tax Losses as % of Fund Assets					40%
Tax Rate					20%
Withdrawal Rates (per 1 in force at outset)	Year 1	Year 2	Year 3	Year 4	Year 5
	20%	20%	20%	20%	15%

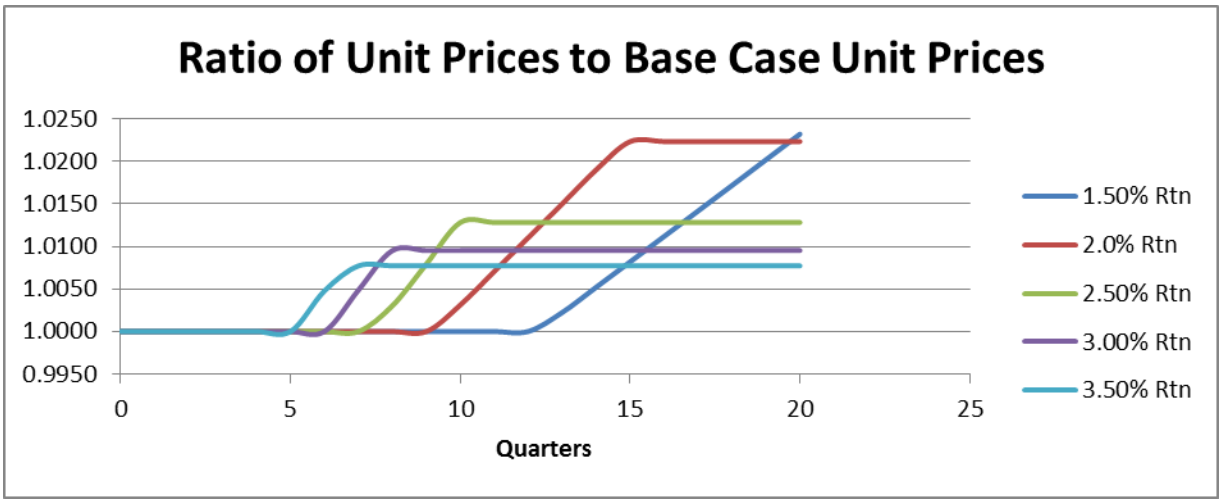
We can graph the ratio of the resultant unit prices to what the unit prices would be for the base case (where no exits take place and no value is placed on tax losses) for various quarterly investment return rates.



Graph 3.4.1: ROI, Contracting, 40% Tax Losses, No Value

The main features of graph 3.4.1 are:

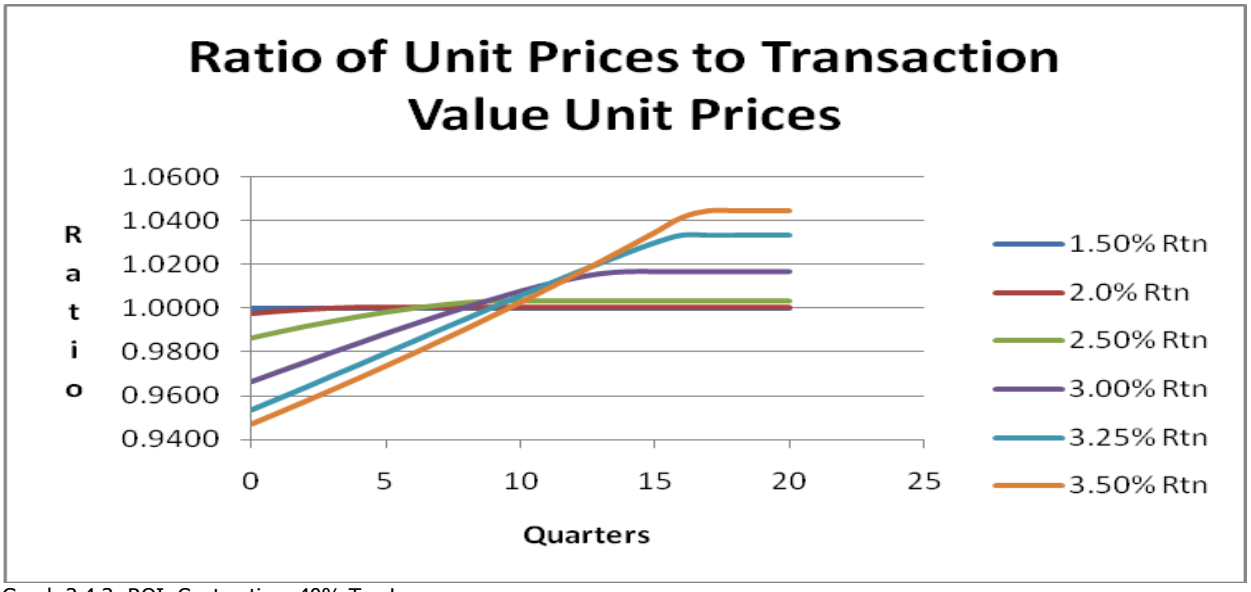
- The ratios will by definition be 1 at short durations for all investment return rates.
- For the later durations, the ratios spike above 1 and initially increasingly so for higher investment return rates.
- However for high investment return rates, the graphs level off and the higher the investment return rate, the earlier that this happens. This can be seen from the 3.5% and 4% investment return graphs. The reason for this is that the higher the investment return rate the earlier that unit-holders benefit from zero tax being charged due to the tax losses and the effect of withdrawals on later ratios is thus reduced. This feature is more evident is graph 3.4.2 (20% tax loss scenario).



Graph 3.4.2: ROI, Contracting, 20% Tax Losses, No Value

Whilst it is clear from graph 3.4.1 that placing no value on tax losses gives a clear benefit to (longer duration) continuing unit-holders, the consequences of this for earlier exits is unclear. In

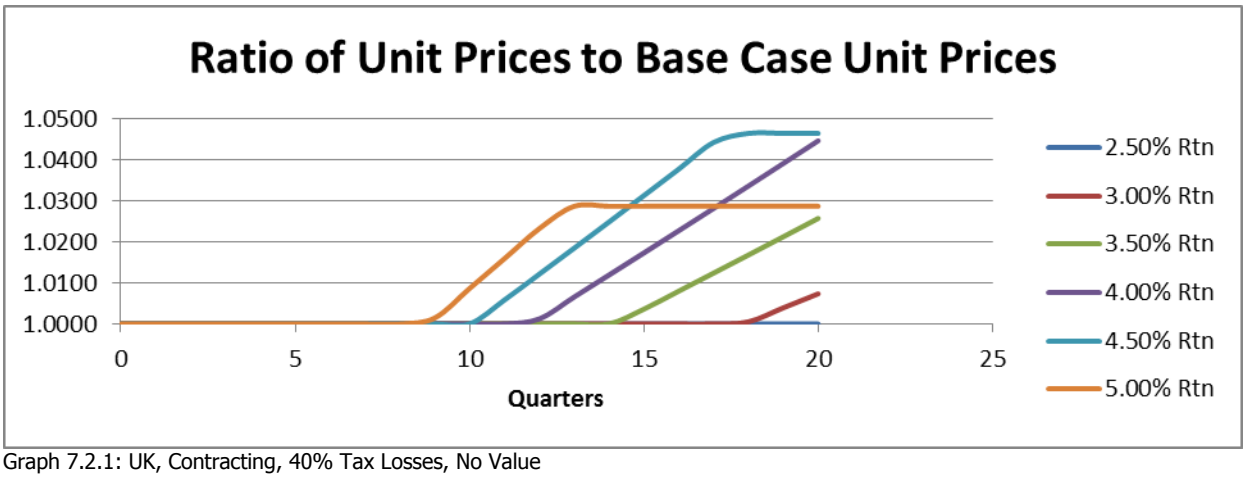
section 4.7, a methodology is set out to compute unit prices on a Transaction Value basis. The ratio of the unit prices (where no value is placed on tax losses) for the 40% tax loss case to the Transaction Value unit prices is shown below in graph 3.4.3.



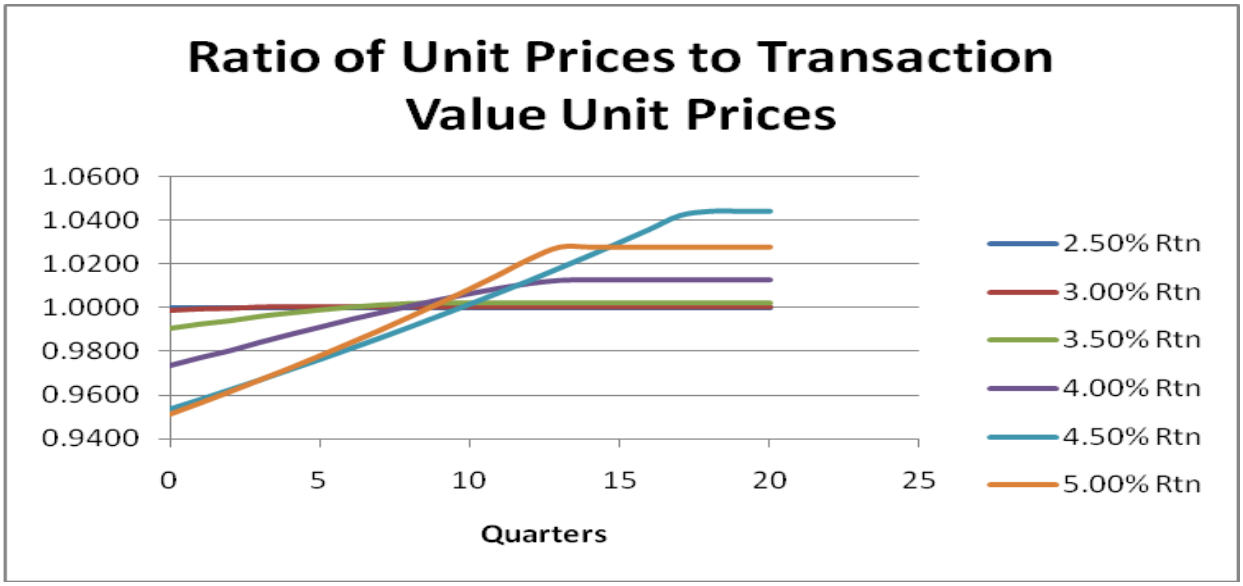
Graph 3.4.3: ROI, Contracting, 40% Tax Losses

The consequences for earlier exits of placing no value on tax losses is much clearer from graph 3.4.3. It can be seen that early exit unit-holders are disadvantaged if no value is placed on tax losses to the benefit of continuing unit-holders and that this is increasingly the case as the rate of investment return increases.

The consequences are somewhat less significant for UK funds as can be seen from graphs 7.2.1 & 7.2.3 (e.g. by comparing the 3.5% investment return graph against its ROI equivalent). This is because there is a lower probability when compared with an ROI 'I-E' fund that there will be positive future taxable investment return against which capital losses may be offset.



Graph 7.2.1: UK, Contracting, 40% Tax Losses, No Value



Graph 7.2.3: UK, Contracting, 40% Tax Losses, No Value

The conclusion is that the method of placing no value on tax losses in all circumstances is inappropriate. The challenge is, in the absence of perfect foresight, to find an algorithm to place value on tax losses such that the graph of unit prices to Transaction Value unit prices flattens.

3.5. Unit Pricing

The primary purpose of a set of unit prices is to determine the prices at which entering, exiting and continuing unit-holders exchange units for cash or vice versa with each other. It is important that purpose be borne in mind when considering the value to be placed on tax losses in unit pricing. Over or under valuation of tax losses in unit pricing would thus result in a transfer of assets from one group of unit-holders to another each time there is a transaction between unit-holders.

Unit prices have other purposes e.g. an indicative estimate of the on-going underlying value of the fund. There can be a conflict between these purposes. The classical example is where a fund is routinely in an expanding position but where for a particular unit pricing date there is a significant outflow. The unit fund might be priced for the particular unit pricing date on a cancellation basis. The cancellation unit price is the appropriate unit price for the transaction between unit-holders but is not the best estimate of the on-going (creation basis) unit price.

Thus the unit price should not be determined as the best estimate of the value of the fund at a point in time but rather the most appropriate price for unit transactions between entering, exiting and continuing unit-holders.

3.6. Objective

The objective is to derive an appropriate algorithm for placing value on tax losses in unit pricing.

In Section 2.5 of this paper, the relevant factors to consider as per the APRA guide are stated as follows: -

"*When determining the amount of FITBs in unit prices and any cap on FITBs, factors you should consider may include, but are not limited to:*

- *The level of unrealised gains/losses*
- *Expectations of market movements and their likely volatility*
- *The investment timeframe*
- *Likely investment inflows and outflows for the fund*
- *The extent to which FITBs in one pool can be applied against gains elsewhere in the same entity or consolidated entity*
- *The applicable tax rate*
- *Exposure of the fund to possible significant redemptions, and*
- *Marked change in the circumstances of your product*"

Whilst the APRA guide identifies the relevant factors, there is no indication as to how to apply those factors in determining an appropriate value. The challenge is to derive a tax loss value algorithm that has regard to those particular factors.

As a first step to deriving an algorithm, a number of scenarios are postulated and a number of possible unit pricing bases are considered in order to illustrate the practical difficulties that arise for various scenarios. This is considered in Sections 3.10 to 3.12.

3.7. Evaluating the Merits of Tax Loss Value Algorithms

Ideally, the merits of a possible tax loss value algorithm would be evaluated based on a comparison of its unit prices over time (under various scenarios) to the perfect foresight (of investment return and lapse rates) unit prices. However the derivation of perfect foresight unit prices requires the prior formulation of a tax loss value philosophy. Consequently the evaluation would be problematic if there is an absence of consensus on the tax loss value philosophy itself.

A more objective approach is required to prove the validity of a particular tax loss value philosophy. The Paper's approach is that the merits of a possible tax loss value algorithm should be evaluated based on a comparison of its unit prices over time (under various scenarios) compared to the unit prices of a base case. The base case proposed is where all policyholders are assumed to exit the fund at the same future point in time (i.e. a single tranche scenario) and no value is placed in the unit pricing on tax losses.

Note: To achieve the objective of equity in unit pricing for the base case, there is no necessity to anticipate in the unit pricing basis at a point in time any value arising from tax losses. Instead the unit pricing basis is that value arises from the tax losses to the extent that the policyholders receive a gross investment return until such stage as the tax losses are extinguished.

It is the comparison at later durations that is most important. This is because the base case unit prices at earlier durations will understate unit prices (compared to perfect foresight unit prices) because no value is anticipated on tax losses. The approach is objective as it is primarily based on determining whether or not the principle that unit movements should not affect subsequent unit prices is met.

This paper compares and contrasts the unit prices derived at various points in time on a number of possible tax loss value algorithms by expressing the unit prices as a percentage of the base case unit prices.

The illustrations show unit prices at quarterly intervals over a five-year time period.

This approach has a number of advantages:

- Firstly, the concept of equity in unit pricing includes the principle that exits from the fund should not affect the continuing policyholders. A good test of a tax loss value algorithm is that its unit prices should not be materially different from the unit prices of the base case (particularly at later durations). This is because (a) the unit prices of the base case are the unit prices in the scenario where there are no exits (and there is no anticipation of value from tax losses) and (b) materially different unit prices for a tax loss value algorithm would mean that exits from the fund materially affect the continuing policyholders.
- Secondly the extent of divergence of the unit price of a tax loss value algorithm from the base case unit price at any time quantifies the unit price discontinuity that would arise on a change in unit pricing basis (e.g. due to mass exits) at that time. This is because the unit price for any point in time for the base case represents the unit price that would apply if all policyholders exited at that time.

3.8. Required Features of Good Tax Loss Value Algorithms

The base case is not suggested as the optimal tax loss value algorithm. That is because the base case does not anticipate any value arising from tax losses as all policyholders exit together at a single point in time. There will be circumstances where it is appropriate to anticipate some value.

There are certain desirable features for a tax loss value algorithm:

- The unit prices of a tax loss value algorithm should converge over time towards the base case unit prices. That feature would confirm that the pricing basis in use was resulting in entries/exits from the fund not affecting the continuing policyholders.
- Subject to the above principle of convergence, it is desirable for higher rates of investment return that the unit prices of a tax loss value algorithm at later durations should be somewhat higher (rather than lower) than the base case unit prices. The rationale for this is that it is primarily the unit-holders who remain to later durations that

enable the contingent tax asset to crystallize (and value to be placed on tax losses at early durations to the benefit of early leavers) and so some benefit should accrue to the last exiting unit-holders.

- The unit price of a tax loss value algorithm for a contracting fund should not be materially different from the base case unit price at a point in time in order that a unit price discontinuity on change of basis (e.g. due to mass exits) is not large. In the case of expanding funds, it is acceptable for the unit price to differ materially from the base case unit price.
- The unit prices of a tax loss value algorithm should be similar to the perfect foresight unit prices and particularly so at later durations

Thus whilst a good tax loss value algorithm might have unit prices differing somewhat from the base case at the outset, they should converge over time to the base case.

3.9. Contracting Fund Scenario Assumptions

Tax Losses as % of Fund Assets					40%
Tax Rate					20%
Withdrawal Rates (per 1 in force at outset)	Year 1	Year 2	Year 3	Year 4	Year 5
	20%	20%	20%	20%	15%

Thus the in-force at start of each year (prior to year's exits) is 1.0, 0.8, 0.6, 0.4 and 0.2.

There are three scenarios considered viz Scenario 1 where no value will arise to remaining unit-holders from tax losses transferred to them, Scenario 2 where the tax losses in the fund will be fully relieved and Scenario 3 where the tax losses are not fully relieved but some value will arise to remaining unit-holders from tax losses transferred to them.

Scenario 1: *Investment Return <= Tax Losses as % of Fund Value*
This is where the percentage investment return (per individual policyholder) over the life-time of the fund will be less than the current tax losses as a percentage of the fund assets (excluding any value placed on tax losses).
Assume 1.5% growth rate every quarter.

Scenario 2: *Investment Return > Tax Losses as % of Fund Value and Tax Losses fully relieved*
This is where the percentage investment return (per individual policyholder) over the life-time of the fund will be greater than the current tax losses as a percentage of the fund assets (excluding any value placed on tax losses) and all the tax losses in the fund are relieved against tax.
Assume 3.5% growth rate every quarter.

Scenario 3: *Investment Return > Tax Losses as % of Fund Value and Tax Losses not fully relieved*
This is where the percentage investment return (per individual policyholder) over the life-time of the fund will be greater than the current tax losses as a percentage of the fund assets (excluding any value placed on tax losses) but because of withdrawals not all the tax losses in the fund are relieved against tax.
Assume 2.5% growth rate every quarter.

3.10. Scenario 1: Investment Return <= Tax Losses as Percentage of Fund Value

Suppose that the person setting the unit pricing basis had perfect foresight.

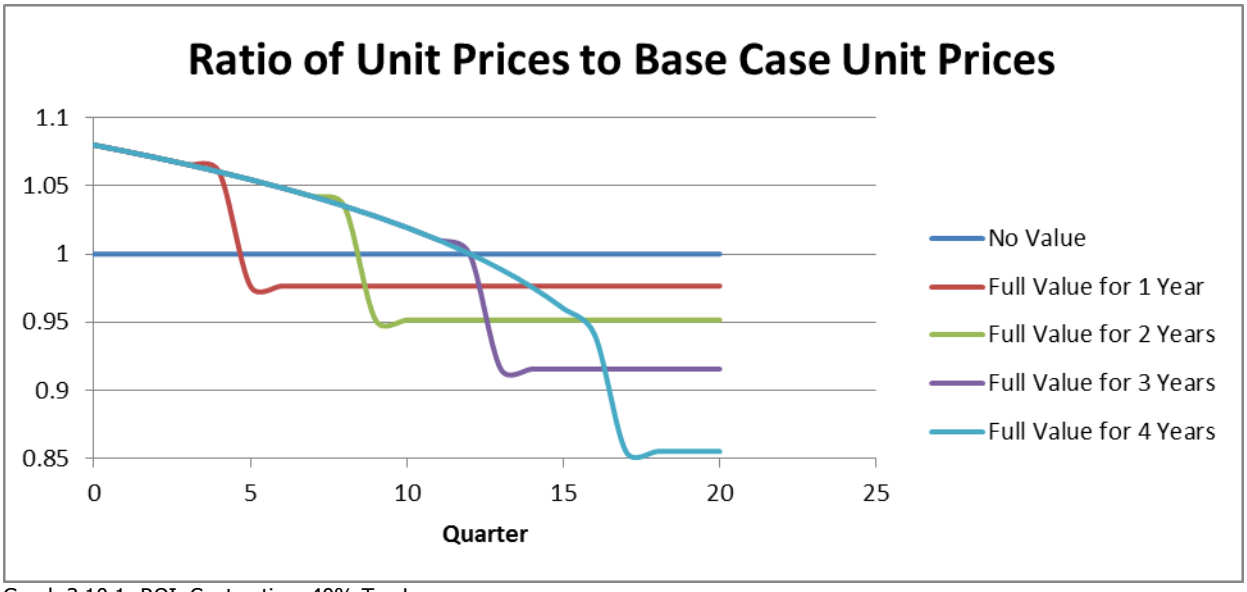
Scenario 1 is the case where the percentage investment return (per in-force policyholder) over the life-time of the fund will be less than the current tax losses as a percentage of the fund assets (excluding any value placed on tax losses).

Assuming a 1.5% growth rate every quarter, the tax losses as a percentage of fund value increase over time because the tax losses are reducing at a slower rate than the fund value is declining because of the assumed rate of withdrawals.

Suppose the unit pricing basis was to place full value on tax losses at all times (with the important restriction that for value purposes that tax losses in excess of 40% of fund value were ignored because otherwise the tax asset as a percentage fund value could become very large) e.g. at the outset the unit price was increased by 8% (20% of 40%).

Note: Discounting is ignored for simplicity. Whilst applying discounting would reduce the extent of the divergence of unit prices from the base case unit prices, the absence of discounting doesn't affect the main conclusions.

Graph 3.10.1 below shows the ratio of the resultant unit prices to the base case unit prices (where for example full value for one year means that full value is placed on tax losses for one year and then zero value is placed thereafter).



Graph 3.10.1: ROI, Contracting, 40% Tax Losses

For this Contracting Fund in Scenario 1, we would argue that the most appropriate unit pricing basis is to place no value on tax losses at any stage. That is the base case approach (where all exits take place at the same time and no anticipation of value from tax losses).

There is a clear rationale for this in that because the actual investment return is less than the tax losses, the policyholders pay no tax and receive a gross return and that more particularly the exit of some policyholders leaving behind their share of the tax losses doesn't result in any benefit for the continuing policyholders as they would pay no tax anyway with no exits.

In this particular scenario, the various approaches (other than the base case) do not meet the requirements of a good tax loss value algorithm which were set out in Section 3.8.

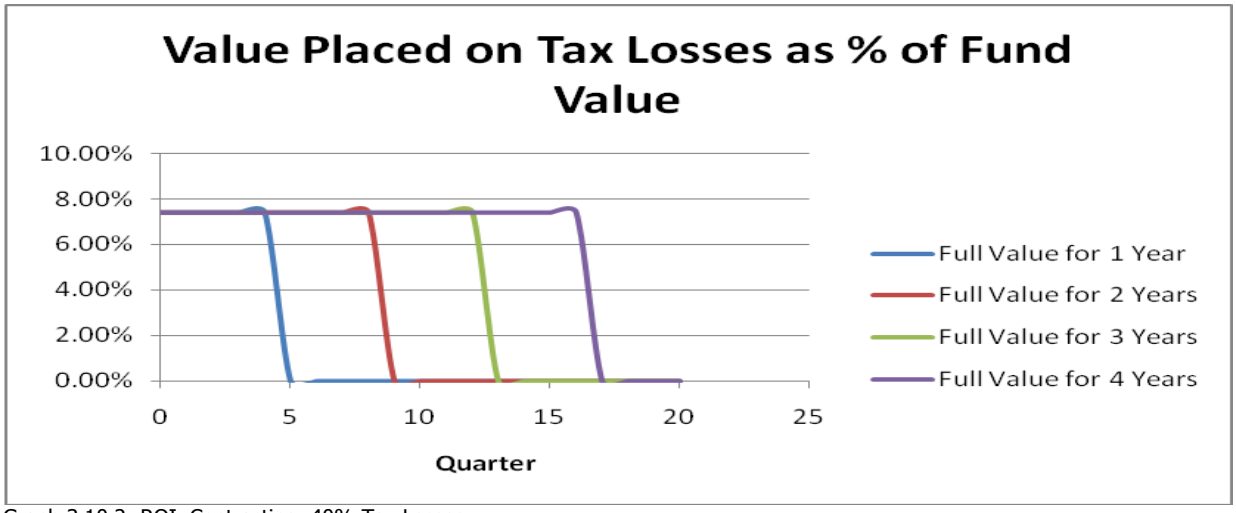
Indeed for this scenario, it is apparent from graph 3.10.1 that the longer the unit pricing basis of placing full value on the tax losses persists, the worse the outcome for the remaining continuing policyholders. In all cases, there is also a significant discrete fall in unit prices with the ratio remaining constant thereafter where the magnitude of the shortfall below 1 is larger for the longer lag periods in reverting to a zero-value basis.

The pattern is clear – there are higher ratios for the unit prices at the outset but this reduces over time as the effect of the overpayment for withdrawals starts to impact the unit prices. This is clearly inequitable.

In practice, the approach actually adopted might have been to only place partial value on the tax losses in the unit pricing. This would just mean that the fundamental inequity in the approach would still materialise but with a smaller magnitude.

We can also look at the value placed on tax losses as a percentage of fund value (inclusive of the value placed on tax losses). This quantifies the unit price discontinuity that would arise on a

change in unit pricing basis at particular times (e.g. due to mass exits). The graph 3.10.2 is shown below.



Graph 3.10.2: ROI, Contracting, 40% Tax Losses

Note: Whilst in this scenario tax losses as a percentage of fund value increase over time, the value placed on tax losses (whilst value is being placed) is constant at 7.4% because for value purposes tax losses in excess of 40% of fund value were ignored.

It is clear from graph 3.10.2 that there is a significant downwards unit price discontinuity in this scenario which would crystallise either on mass exits or on a belated recognition that the unit pricing basis was inappropriate.

This scenario establishes the principle that value should be placed on tax losses (for a contracting fund) only in the case where the envisaged percentage investment return (per individual unit-holder) over the life-time of the fund is greater than the current tax losses as a percentage of the fund assets (excluding any value placed on tax losses). How such value should be quantified requires further analysis as set out below.

3.11. Scenario 2: Tax Losses Fully Relieved

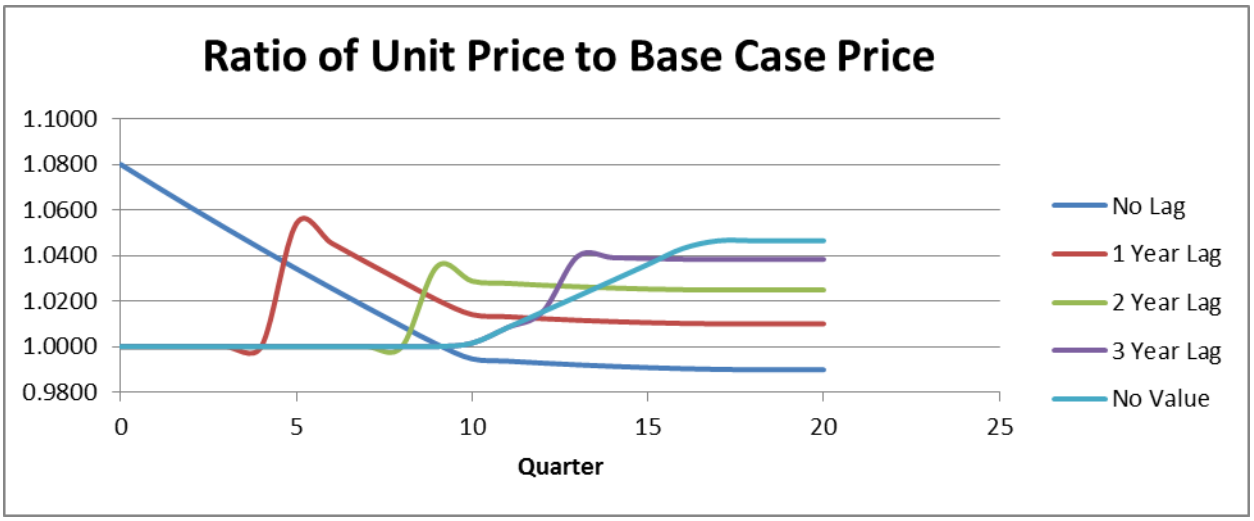
Scenario 2 is the case where the percentage investment return (per individual unit-holder) over the life-time of the fund will be greater than the current tax losses as a percentage of the fund assets (excluding any value placed on tax losses) and where the combination of the level of investment return and withdrawals results in the tax losses being fully relieved.

This is a scenario where the continuing unit-holders would benefit at the expense of exiting unit-holders if no value was placed on tax losses. This is because the exit of some unit-holders leaving behind their share of the tax losses would result in the continuing unit-holders being able to receive a higher rate of investment return tax-free compared to what would obtain with no exits.

Assuming a 3.5% growth rate every quarter, the tax losses as a percentage of fund value reduce over time because the tax losses are reducing at a faster rate than the fund value is declining because of the assumed rate of withdrawals. Furthermore the tax losses at the outset are fully relieved.

Graph 3.11.1 below shows the ratio of the resultant unit prices to the base case unit prices and where, for example, a one year time lag means that no value is placed on tax losses for one year and then full value is placed thereafter.

Note: Discounting is ignored for simplicity. Whilst applying discounting would reduce the extent of the divergence of unit prices from the base case unit prices, the absence of discounting doesn't affect the main conclusions.

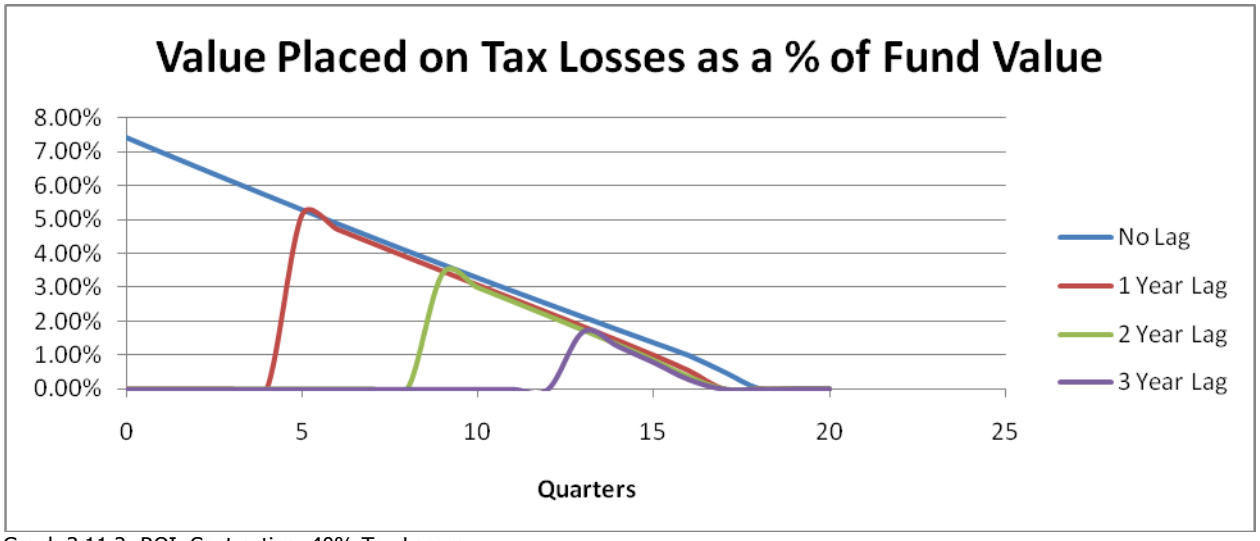


Graph 3.11.1: ROI, Contracting, 40% Tax Losses

In this case, it might appear that the no lag approach would be best. However we need to consider a further scenario before we can draw appropriate conclusions from the above.

Note: The no lag approach converges to a value below 1 because discounting was not applied.

We can also look at the value placed on tax losses as a percentage of fund value (inclusive of the value placed on tax losses). This quantifies the unit price discontinuity that would arise on a change in unit price basis at particular times. The graph is shown below.



Graph 3.11.2: ROI, Contracting, 40% Tax Losses

Note: In this scenario tax losses as a percentage of fund value reduce over time to zero.

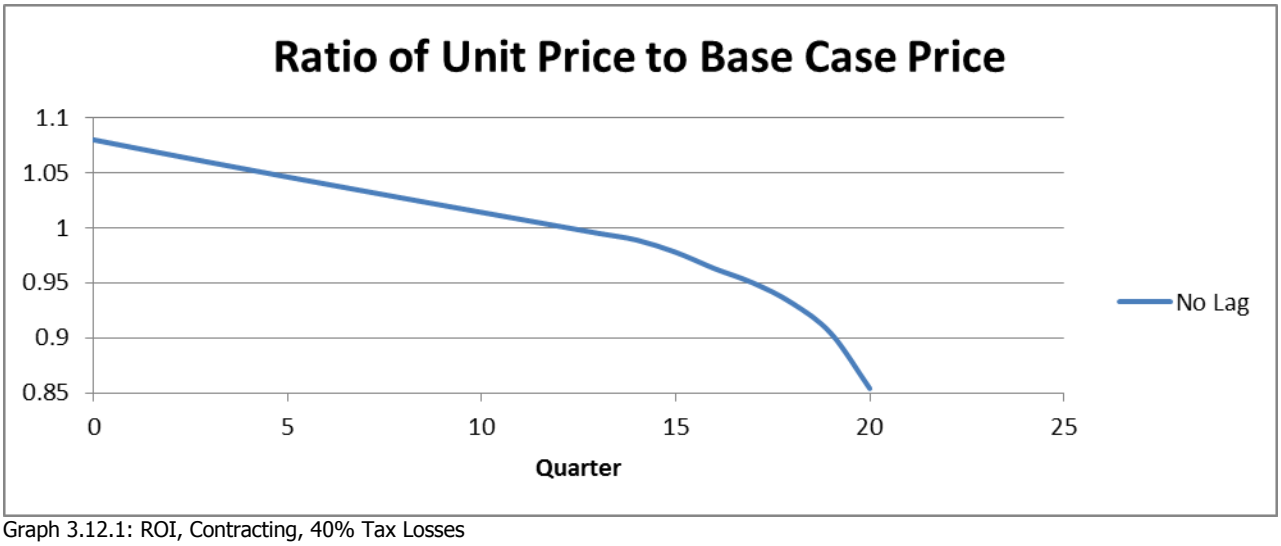
It is clear that there is a significant upwards unit price discontinuity in this scenario which would crystallise on recognition that the unit pricing basis was inappropriate (and should be placing full value on tax losses). The magnitude of the unit price discontinuity reduces over time because the amounts of the tax losses reduce over time.

3.12. Scenario 3: Tax Losses Not Fully Relieved

Scenario 3 is the case where the percentage investment return (per individual unit-holder) over the life-time of the fund will be greater than the current tax losses as a percentage of the fund assets (excluding any value placed on tax losses) but the combination of the level of investment return and withdrawals results in the tax losses not being fully relieved.

Assuming a 2.5% growth rate every quarter, the tax losses as a percentage of fund value initially reduce over time because the tax losses are reducing at a faster rate than the fund value is declining because of the assumed rate of withdrawals but later on increase over time. Furthermore the tax losses at the outset are not fully relieved.

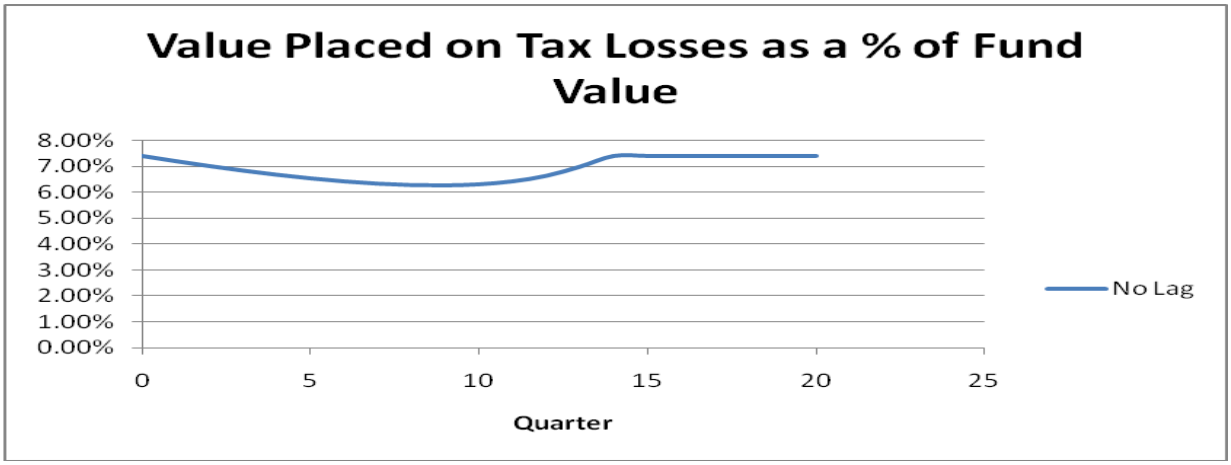
Note: Discounting is ignored for simplicity. Whilst applying discounting would reduce the extent of the divergence of unit prices from the base case unit prices, the absence of discounting doesn't affect the main conclusions.



Graph 3.12.1: ROI, Contracting, 40% Tax Losses

In this scenario the no lag (full value basis) is seen to be inappropriate. The problem is that as time passes it becomes more apparent that full tax relief will not arise and that therefore the full value basis is inappropriate. The general difficulty is thus that the full value basis would be appropriate in scenario 2 but not in scenario 3 but how do we determine at the outset whether we are in a scenario 2 or scenario 3 position?

We can also look at the value placed on tax losses as a percentage of fund value (inclusive of the value placed on tax losses). This quantifies the unit price discontinuity that would arise on a change in unit price basis at particular times. Graph 3.12.2 is shown below.



Graph 3.12.2: ROI, Contracting, 40% Tax Losses

It is clear that there is a significant downwards unit price discontinuity (>6%) in this scenario which would crystallise either on mass exits or on a belated recognition that the unit pricing basis was inappropriate as the value placed might then fall to zero.

ROI Funds – Contracting Tax Loss Value Algorithm

4.1. Placing Value on Tax Losses

The previous chapter demonstrated the difficulties that arise in determining an appropriate basis for placing value on tax losses.

For a given percentage of tax losses at a point in time for a fund, we don't know whether the eventual outcome for a fund is going to be a Scenario 1 outcome (where with perfect foresight effectively no value should be placed on tax losses) or a Scenario 2 outcome (where with perfect foresight effectively full value should be placed on tax losses) or a intermediate scenario like Scenario 3 where some partial value should be placed on tax losses.

4.2. Sharing the Contingent Value Arising From Tax Losses

Tax losses are a contingent asset of the fund in that future investment return could result in value accruing to the fund as a consequence of the tax losses. The issue is how should that contingent value be best shared between the exiting and continuing policyholders?

One could argue that both exiting and continuing unit-holders are making their own independent free-will decisions. The tax losses left behind by the exiting unit-holders are not being transferred to the company but rather to the continuing unit-holders. Some wind-fall benefit could arise from this. Should the continuing unit-holders pay the exiting unit-holders for the potential wind-fall benefit and, if so, on what basis should payment be determined? Payment of consideration would result in the exiting unit-holders receiving a cash benefit in respect of the contingent asset.

However, different views could be taken on the proportion of the contingent value that should be paid e.g. 0% for no payment for potential wind-fall benefit, 50% for equal sharing and 100% for full payment or some other intermediate basis.

Note: For the purposes of the illustrations, it is been assumed that the continuing unit-holders pay the exiting unit-holders based on a best estimate 100% value of the contingent value received.

4.3. Possible Philosophies for Placing Value on Tax Losses

It is necessary to formulate a philosophy for placing value on tax losses.

One possible philosophy (the "Fund Value Method") is to say that tax losses are a contingent asset of a fund generally (and hence of all its unit-holders). The argument is that for policyholder equity reasons all policyholders should share equally in any future benefits from these losses. Hence, a tax asset should be set up in the fund to reflect the value of the future reduced tax charges.

The best estimate value of the contingent asset (being the discounted value of the difference between the present value of the future tax charges with no tax losses and the present value of the future tax charges with the tax losses) would then be the value included in the fund valuation for unit pricing purposes. With this philosophy the fund is considered to be indivisible and the value of the contingent asset is shared equally between all unit-holders (i.e. between those exiting and those remaining) on the basis that all the unit-holders at a point in time were assumed to have contributed equally to the tax losses.

Consider this in the context of a simple example where the tax losses were 40% of the fund value, the future investment return to an individual unit-holder was 30% and future investment return was 20% of the fund value allowing for withdrawals. The amount of tax not paid (at 20% tax rate) in the fund is 4% of fund value because of the tax losses. It is correct to say that the ultimate value to the fund of the tax losses is 4% but that doesn't necessarily mean that the 4% value should be recognised immediately in the unit price. The "Fund Value Method" recognises the immediate 4% value (subject to discounting). The future investment return figure (30%) is not relevant to the "Fund Value Method" calculation but is quoted to illustrate that whether the figure was 30% or 50% (i.e. below or above 40%) ought to be relevant to an appropriate calculation of the value to be placed on the tax losses. It is the 20% figure (i.e. the combination of the 30% future investment return per individual unit-holder and the withdrawal rates) that is relevant to the "Fund Value Method" calculation.

A theoretical objection to this philosophy is that a fund can be considered to be divisible into groups of unit-holders at a point in time in setting the unit pricing basis e.g. for a contracting fund there are two groups viz exiting unit-holders and continuing unit-holders. Whilst both groups of unit-holders might have contributed equally to the tax losses, the generation of value from the tax losses is dependent on the actions of solely one group viz the continuing unit-holders. The question arises as to whether or not it is appropriate to share the contingent value arising from the actions (i.e. remaining in the fund) of one group of unit-holders (the continuing unit-holders) equally amongst all unit-holders. The contingent value for an individual unit-holder is the possibility to receive some future investment return tax-free but that contingent value is dependent on the individual unit-holder continuing for some period of time. The theoretical objection is thus is that if there is no benefit to the continuing unit-holders as a result of the withdrawals then no consideration should be paid by them to the exiting unit-holders.

The theoretical argument is that it would be inappropriate to share the contingent value arising from the actions of the continuing unit-holders equally amongst all unit-holders. Leaving aside for the moment the theoretical argument, the next section considers the practical results of the "Fund Value Method". Reading that section and then returning here, it is observed that the method does not work well in practice confirming the theoretical objection.

The fundamental problem with the "Fund Value Method" is that it is predicated on the principle that the present value of the expected benefit from investment return arising in the fund that is not taxed (due to the existence of tax losses) should be immediately recognised as a tax asset in unit pricing. It is the pace of recognition of the value of the contingent tax asset and hence the method of sharing the contingent value amongst different groups of unit-holders that is causing the problem evident in the results shown in Section 4.4.

In the context of the simple example, whilst the continuing unit-holders receive gross tax-free investment returns, that is not a consequence of the exit of some unit-holders as the continuing unit-holders would have received the same gross tax-free investment returns with no exits. If any non-zero value is placed on tax losses, the continuing unit-holders would receive a lower eventual benefit than they would have received if there were no exits. That would be because they would be paying consideration to the exiting unit-holders for tax losses notwithstanding that they receive no benefit from the tax losses left behind by the exiting policyholders.

If however the 30% and 20% figures were replaced by 45% and 35%, the continuing unit-holder would receive a 45% tax-free investment return with exits whereas he would have received 40% tax-free and 5% subject to tax with no exits. The continuing unit-holders would receive some benefit from the tax losses left behind by the exiting unit-holders and would therefore be prepared to pay something to the exiting unit-holders. This would require that some value be placed on tax losses in unit pricing.

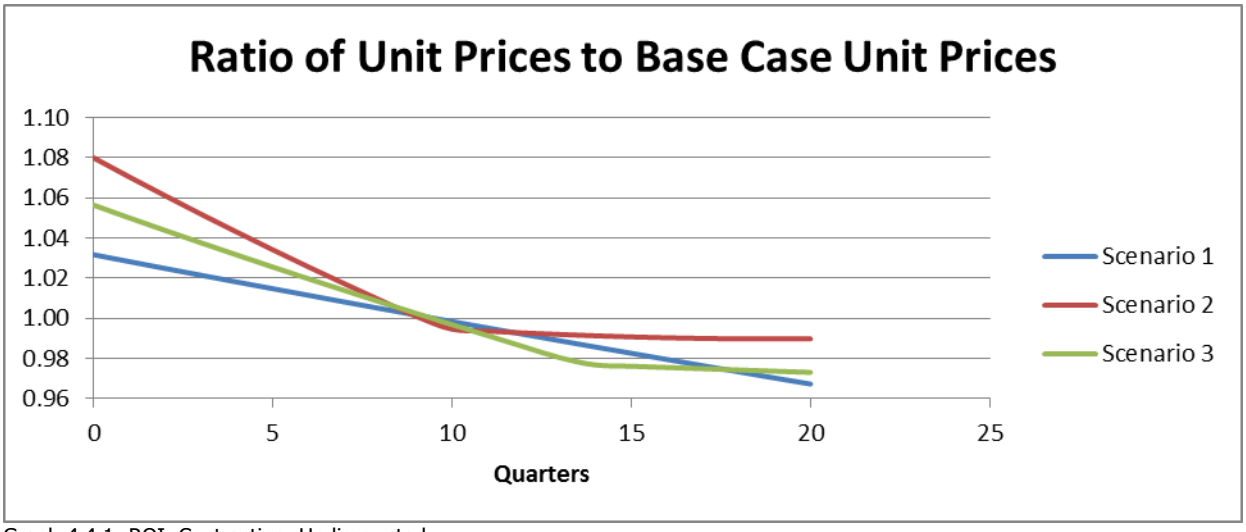
These examples lead to the alternative and much more compelling argument that, in a contracting fund scenario, the ruling principle is that the value placed on tax losses should be quantified in the context of the likely value that the continuing unit-holders would receive from the tax losses left behind by the exiting unit-holders.

The challenge is to determine a practical method to use in applying such a principle.

4.4. Results of Fund Value Method

The method is based on projecting future investment return and withdrawals and deriving the value placed on the tax losses as the difference between the present value of the future tax charges with no tax losses and the present value of the future tax charges with the tax losses. It is necessary also to adjust for the tax effect of the difference in investment return arising in the two calculations (because the fund values differ because of the differences in the tax charges). The assumptions are as per Section 3.9.

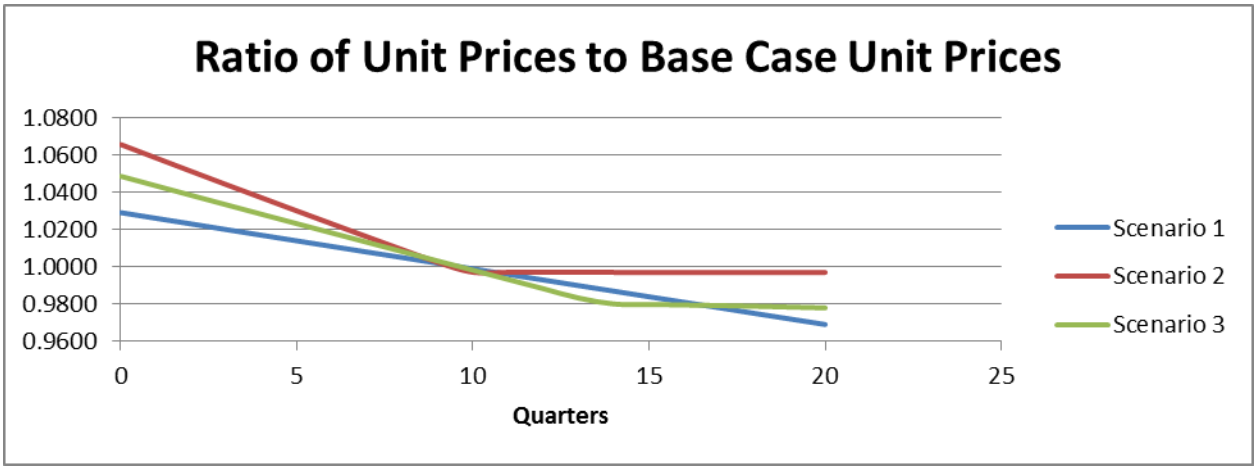
This section can be considered in the context that there are three separate funds each with a best estimate scenario corresponding to scenario 1, 2 and 3 respectively (because the graphs for a single fund with a single best estimate scenario would have to start at the same point).



Graph 4.4.1: ROI, Contracting, Undiscounted

Note: The reason that the scenario 2 graph (full tax relief) converges to below 1 is because discounting was not applied.

The results as presented above are on the basis of not applying discounting (to ensure consistency with previous results). However in practice discounting would be applied but applying discounting doesn't affect the basic shape of the graphs as shown below.



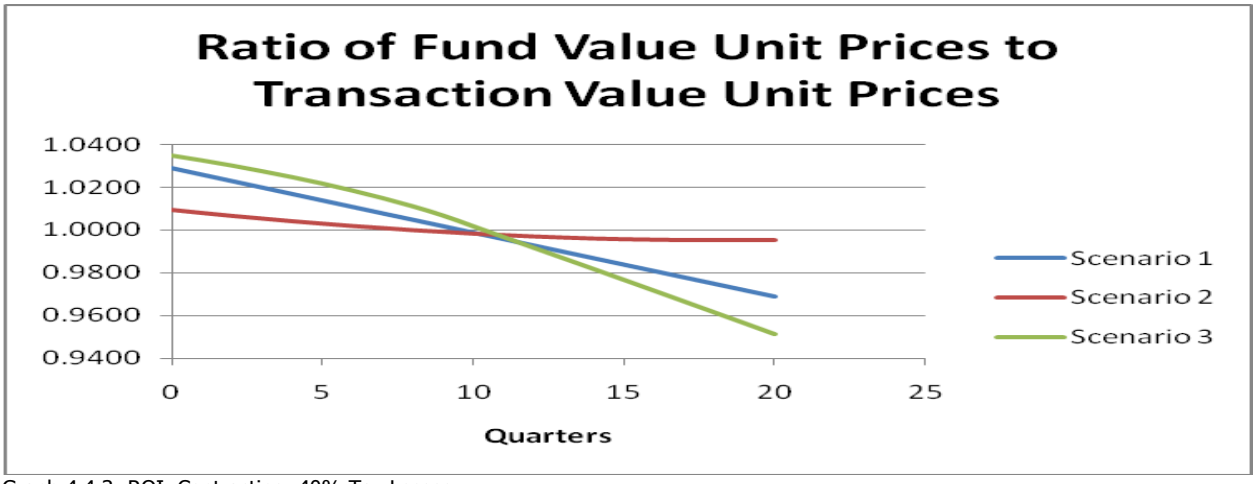
Graph 4.4.2: ROI, Contracting, Discounted

Notes: With discounting, the scenario 2 graph (full tax relief) can be seen to converge to 1.

The results show that the Fund Value Method works wells for scenario 2 (as would be expected because the method effectively places full value on tax losses in this scenario). It doesn't work well for scenarios 1 or 3 (because the ratios don't converge to 1 at later durations) and in particular for scenario 1. This is not unexpected as its inherent weakness is that it could be placing value on tax losses in circumstances where it is inappropriate to do so. In scenario 1, the remaining unit-holders receive a reduced benefit as a consequence of paying consideration

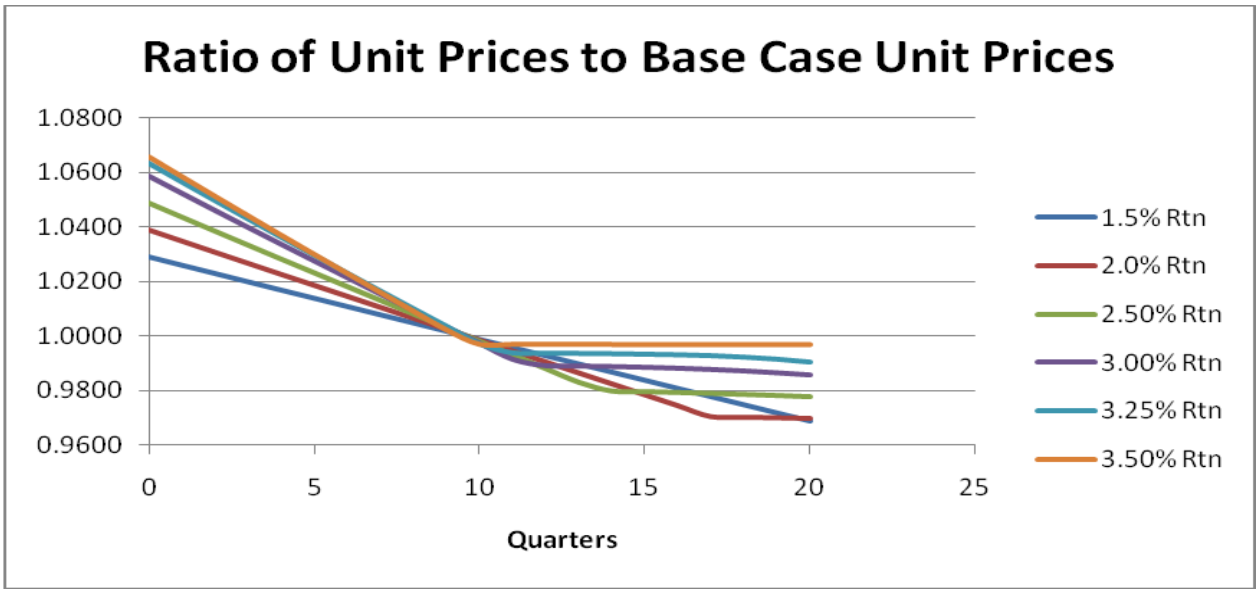
for tax losses when those tax losses were of no value to them. The latest remaining unit-holders are disadvantaged most.

In a later section, an approach to determine Transaction Value Method unit prices is set out. The comparison of the unit prices on the Fund Value Method to the Transaction Value Method unit prices is set out below.

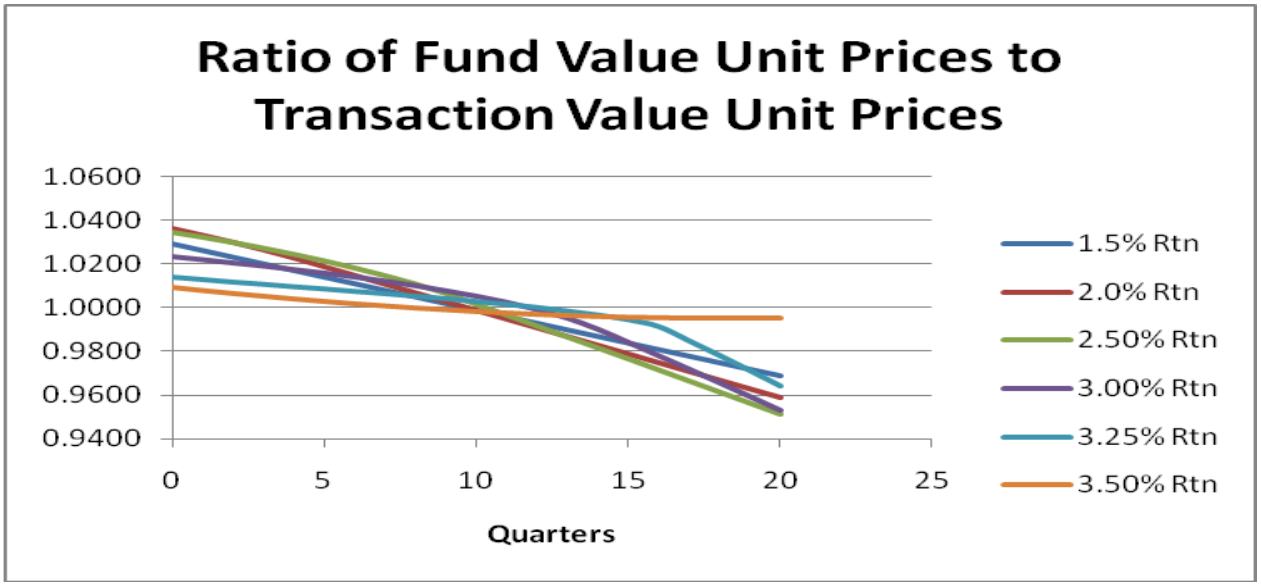


Graph 4.4.3: ROI, Contracting, 40% Tax Losses

An expanded set of results is shown below.



Graph 4.4.4: ROI, Contracting, 40% Tax Losses

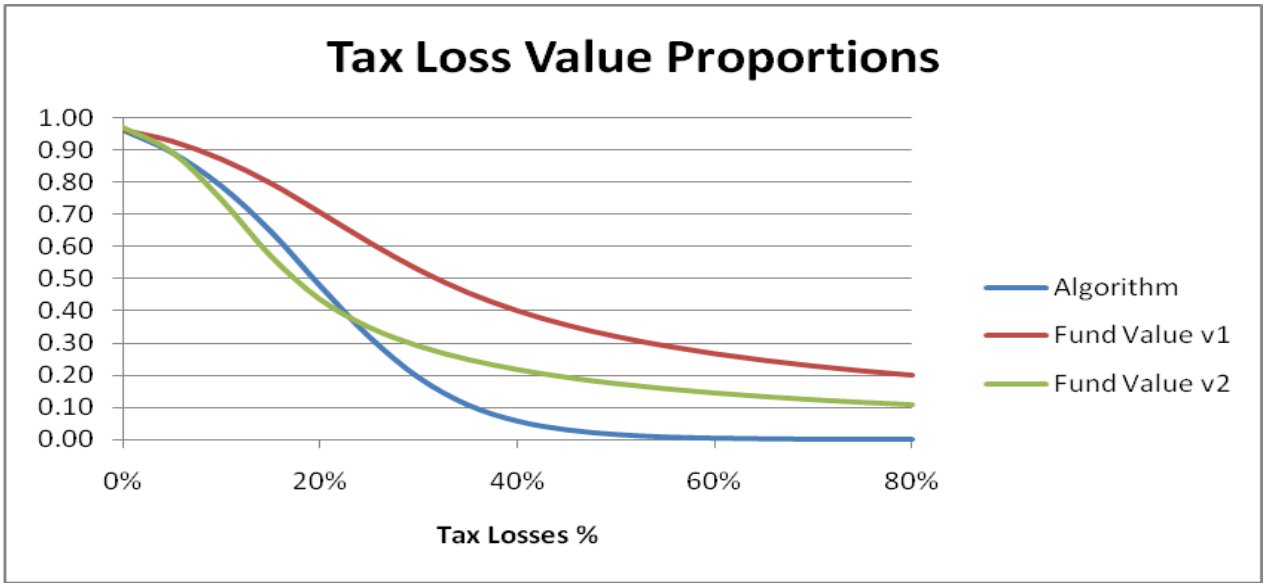


Graph 4.4.5: ROI, Contracting, 40% Tax Losses

The results are that for low investment return rates the method places too high a value in tax losses at early durations resulting in exits being overpaid at the expense of continuing unit-holders with the consequence that unit prices at later durations are too low.

The conclusion from the results is that the Fund Value Method doesn't generate fair unit prices and is thus inappropriate.

A tax loss value algorithm is derived in section 4.11.
It is instructive to compare the results of the Fund Value Method against that algorithm.



Graph 4.4.6: ROI, Contracting, 40% Tax Losses

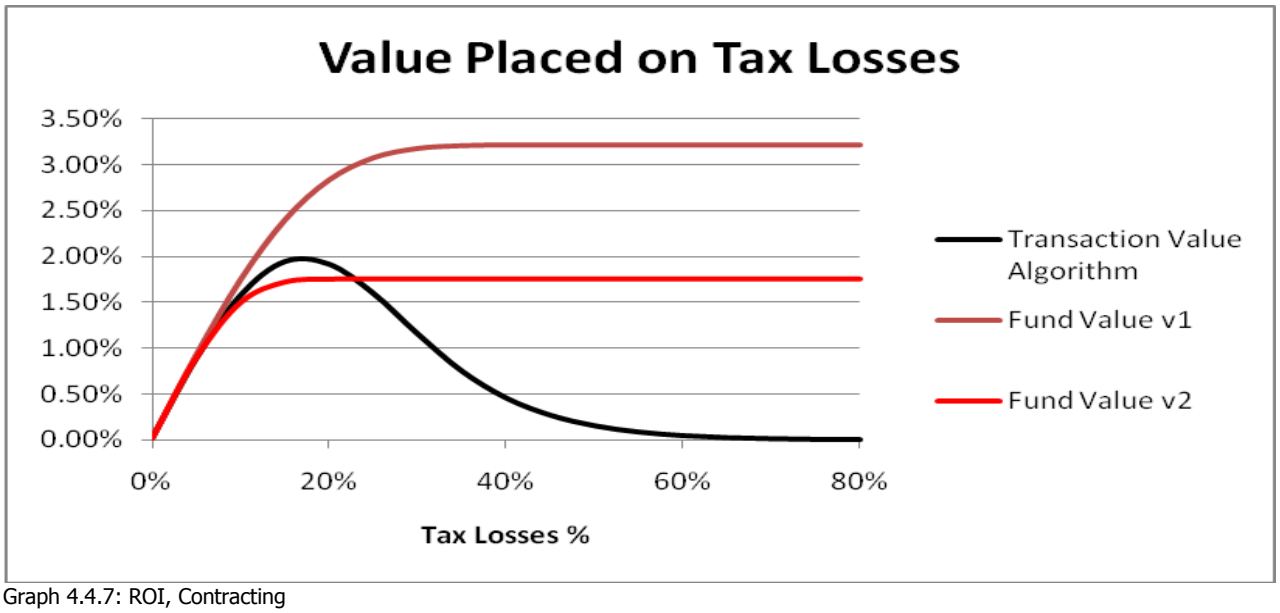
Graph 4.4.6 shows the values derived for the [Tax Loss Value Proportion] figures for various [Tax Loss %] figures using the various methods.

Notes

- The algorithm results and Fund Value v1 results are based on a normal distribution for the 5-year investment return (per in-force policy) with a 40% mean and 20% standard deviation (and assuming that investment return is uniform over the five year period).
- The Fund Value v2 results are based on a normal distribution for the 5-year investment return with a 20% mean and 10% standard deviation

It can be seen (from a comparison of the brown and black lines) that the Fund Value Method gives tax loss value proportion figures that are too high. This feature becomes more pronounced for higher tax loss percentages.

The use of a more conservative assumption for the Fund Value Method mitigates this (from a comparison of the red and black lines) to some extent but doesn't resolve the major problem that the Fund Value Method produces tax loss value proportion figures that are much too high for higher tax loss percentages.



Graph 4.4.7: ROI, Contracting

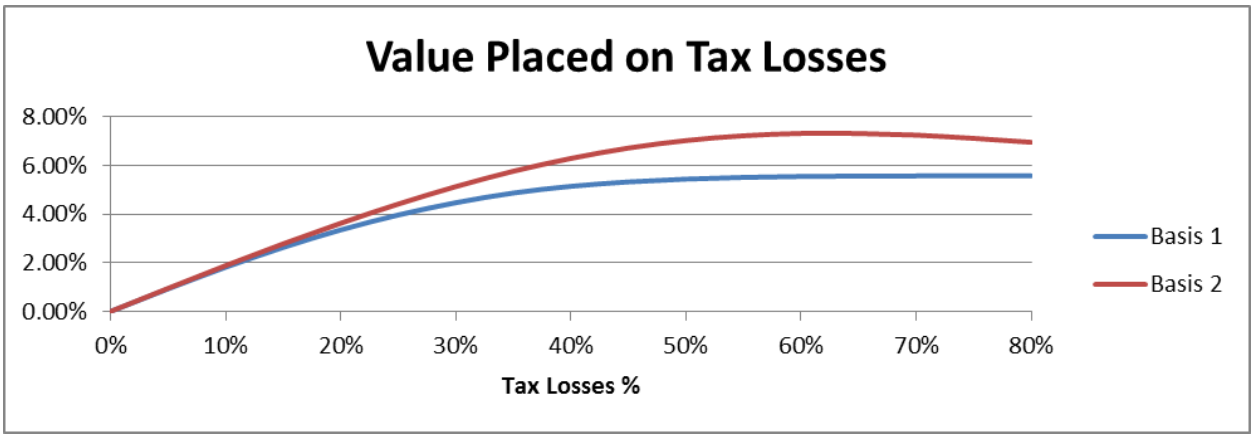
Graph 4.4.7 shows the values placed on tax losses for various [Tax Loss %] figures using the various methods.

It can be seen (from a comparison of the black and brown lines) that the Fund Value Method gives value placed on tax losses figures that are too high compared to the Transaction Value Method. This feature becomes more pronounced for higher tax loss percentages.

The use of a more conservative assumption for the Fund Value Method mitigates this (from a comparison of the black and red lines) to some extent but doesn't resolve the major problem

that the Fund Value Method produces values placed on tax losses that are much too high compared to the Transaction Value Method for higher tax loss percentages.

The shape of the tax loss value curve for the Fund Value Method is similar to the appropriate shape for expanding funds e.g. as per graph 6.10.1 below for



Graph 6.10.1: ROI, Expanding, 25% mean and 12.5% standard deviation

The problem with the Fund Value Method is that the value placed on tax losses for a contracting fund peaks and then plateaus rather than correctly falling towards zero as the tax loss percentage gets very large.

4.5. Developing a Tax Loss Value Algorithm

It is apparent from the considerations in the previous chapter that in a contracting fund scenario that the most equitable approach would be to derive the value placed on tax losses in unit pricing based on a quantification of the benefit received by continuing unit-holders from the tax losses left behind by the exiting unit-holders.

For practical reasons, we might want to ultimately value tax losses based on a formula such as [Tax Loss Value Proportion] * [Tax Rate] * [Tax Losses]. How might we quantify such [Tax Loss Value Proportion] figures?

A possible approach might be to proceed as follows:-

Suppose that there are withdrawals of w at a point in time. If the remaining unit-holders receive a benefit of X per unit-holder (arising from the tax losses left behind by the exiting unit-holders), then if the full benefit (1-w)*X was to be passed back to the exiting unit-holders the unit price should include an amount of (1-w)*X/w. Thus the value placed on tax losses should be taken as (1-w)*X/w. The proportion w leaving thus receive a consideration of (1-w)*X from the remaining unit-holders which equates to the (1-w)*X benefit received by the remaining unit-holders. The value placed on the tax losses of (1-w)*X/w was thus correct in that the remaining unit-holders are left unaffected by the exits.

A numerical example (a Scenario 2 type example) would be a fund with 40% tax losses and 10% exits and perfect foresight future taxable investment return of 50% (critically>44.44%). The value of the tax losses passed on per remaining policyholder is X=0.2 * (40%/0.9-40%)=0.888888%. Applying the formula (1-w)*X/w gives 8% as the value placed on the tax losses i.e. a full value of 20% of the tax losses of 40% which is the expected answer with no discounting applied.

The amount of the tax losses foregone is w * [Tax Losses] and so it can be seen that the value placed on tax losses is of the form [Tax Rate] * (1-w) * X / {[Tax Losses Foregone] * [Tax Rate]} * [Tax Losses] i.e. [Tax Loss Value Proportion] is of the form (1-w) * X / {[Tax Losses Foregone] * [Tax Rate]}. The importance of this formula is in the context of Section 4.7 where it might not be intuitively clear that the difference in the projections (which is the (1-w) * X factor) should be divided by {[Tax Losses Foregone] rather than [Tax Losses] in deriving the [Tax Loss Value Proportion].

Given that X in general would be [Tax Rate] * [Additional Tax-Free Investment Return], then if we express (1-w)*[Additional Tax-Free Investment Return]/w as a proportion of [Tax Losses] and use that as the value of the [Tax Loss Value Proportion] item, then the formula: [Tax Loss Value Proportion] * [Tax Rate] * [Tax Losses] would give (1-w)*[Additional Tax-Free Investment Return] * [Tax Rate]/w, which is (1-w)*X/w as required.

Thus we want to quantify (1-w)*[Additional Tax-Free Investment Return]/w as a proportion of [Tax Losses] and use it as the value of the [Tax Loss Value Proportion].

The [Additional Tax-Free Investment Return] figure itself is dependent on w. Consider the position of the 40% tax losses. If w is 0.1, then the tax losses become 44.44% of the value of the unit fund following the withdrawal of the 10% of the unit holders and the [Additional Tax-Free Investment Return] is approx 4.44% (44.44%-40%) times the probability that the fund's future investment return exceeds 44.44% (plus a bit for the probability that the investment return is between 40% and 44.44%). If w=0.5, then the tax losses become 80% of the value of the unit fund following the withdrawal of the 50% of unit holders and so the [Additional Tax-Free Investment Return] is 40% (80%-40%) times the probability that the fund's future investment return exceeds 80% plus a summation of (x-40) % times the probability of a x% investment return where 40<=x<=80.

The [Additional Tax-Free Investment Return] figure would thus need to be determined on the basis of an investment return distribution and the relevant w figure. Whilst the [Additional Tax-Free Investment Return] figures would increase with w, the question arises as to how do the (1-w)*[Additional Tax-Free Investment Return] /w figures vary with w.

It is clear that the [Tax Loss Value Proportion] figures would be dependent on the value of w selected.

However there is a fundamental problem with the approach in that it doesn't allow for further withdrawals. It is thus superceded by the approach set out in Section 4.7.

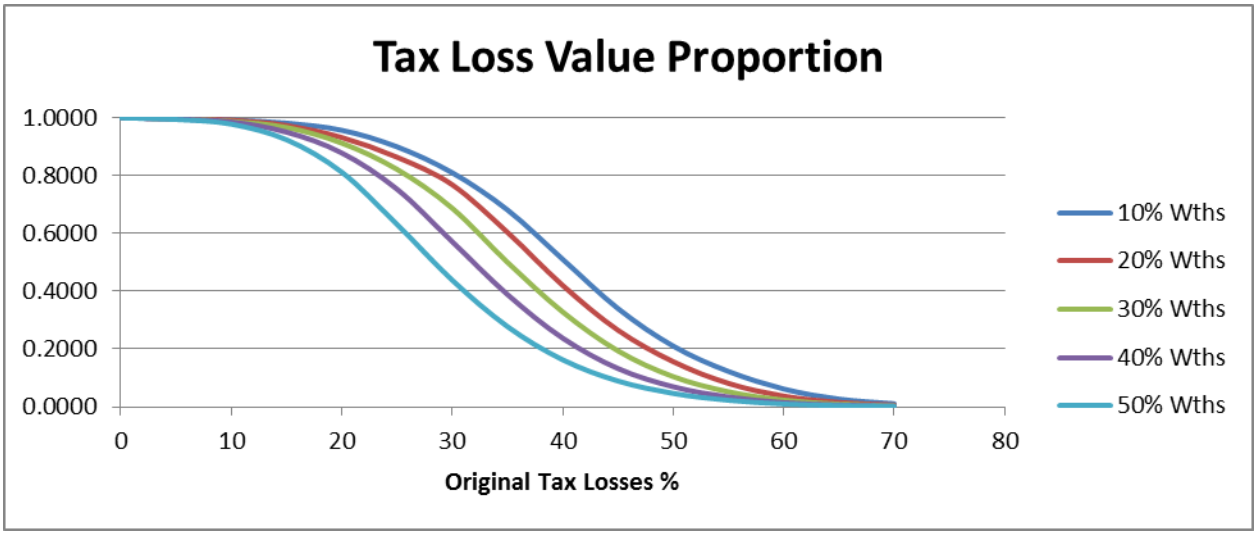
4.6. Quantifying the [Tax Loss Value Proportion]

A problem with the approach as set out in Section 4.5 is that the [Tax Loss Value Proportion] figures would be on an undiscounted basis but the results are still of interest. That approach will be superseded by a more comprehensive method as set out in Section 4.7.

If probabilities are given to various future investment returns, it should be possible to quantify the [Tax Loss Value Proportion] (where [Tax Loss Value Proportion] is taken to correspond to (1-w)*[Additional Tax-Free Investment Return]/w as a proportion of [Tax Losses]) for various values of [Tax Loss Percentages].

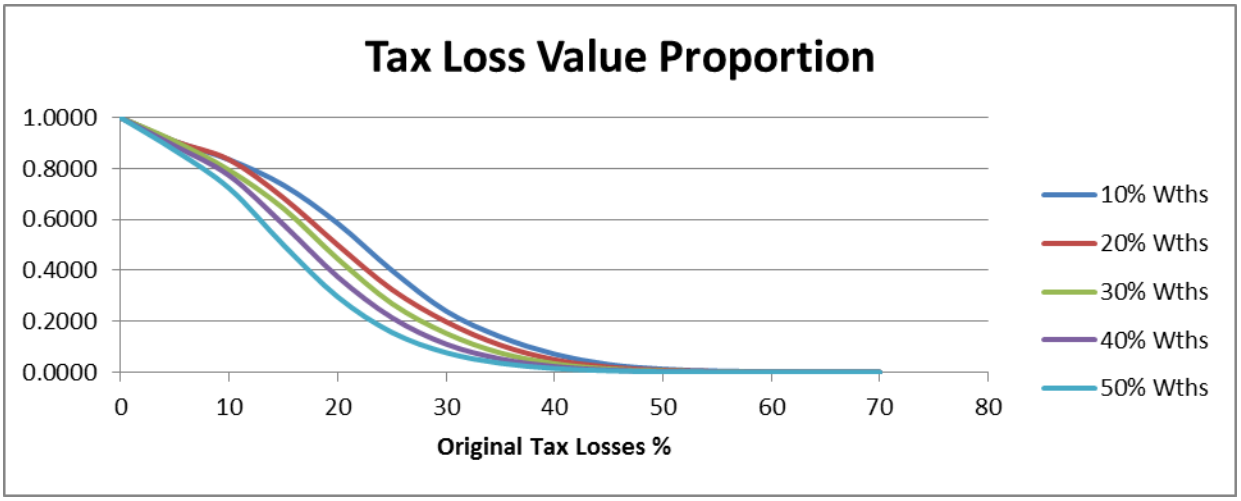
This is clearly dependent on the probability distribution of investment return.

Based on a mean investment return of approx 40%, the graph of [Tax Loss Value Proportion] would be expected to have the shape shown in the graph below.



Graph 4.6.1: ROI, 40% Mean, Contracting

Based on a mean investment return of approx 20%, the graph of [Tax Loss Value Proportion] would be expected to have the shape shown in the graph below.



Graph 4.6.2: ROI, 20% Mean, Contracting

Whilst the values will vary according to the investment return distribution, the shape is likely to be similar and we can conclude that the higher the withdrawal rate w the lower the tax loss value proportion.

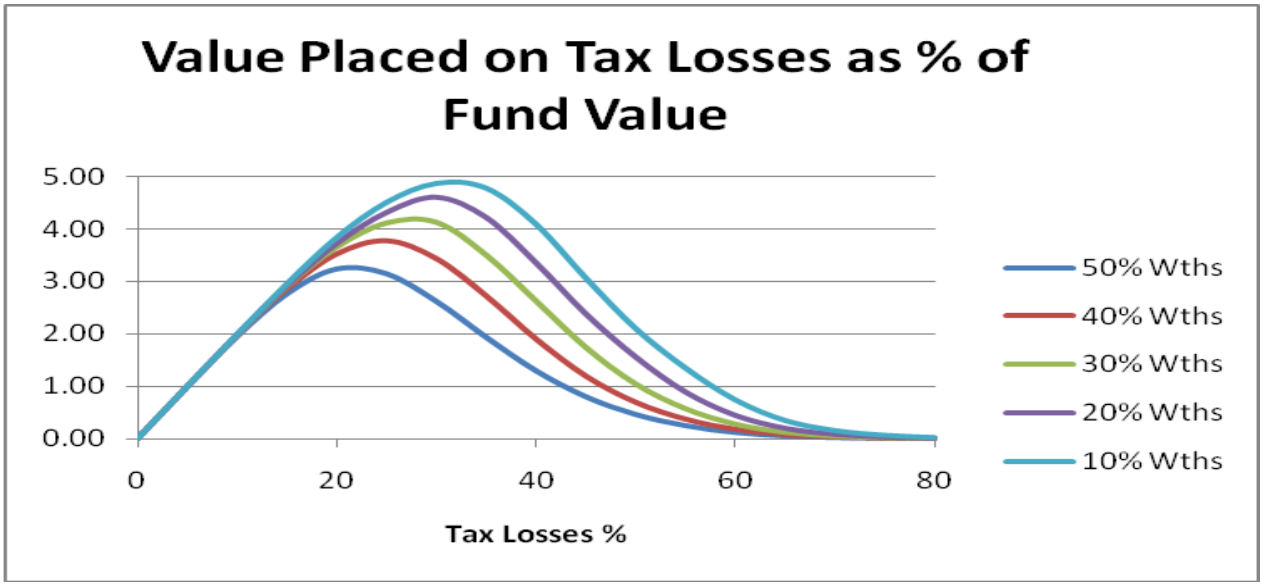
This would appear to be intuitive on the basis that say a 10% withdrawal rate to a 40% tax loss scenario would increase tax losses to 44.44% whereas a 20% withdrawal rate would increase tax losses to 50%. The value arising from the additional tax losses is dependent on the higher tail of the investment return distribution. The greater the withdrawal rate the more value is dependent on the higher tail.

The conclusion that the higher the withdrawal rate w the lower the tax loss value proportion is effectively the same as saying that for a cumulative 50% withdrawal, the continuing unit-holders would pay a higher compensation price to the first 10% withdrawals, a lower price to the next 10% and a further lower price to the next 10% and so on i.e. it gets increasingly unlikely that value will accrue from the tax losses left behind.

In effect there is a hurdle rate before future investment return is received tax-free by the continuing unit-holders as a result of exits. At the outset for 40% tax losses, it is 40% but after the first 10% withdrawals it is 44.44% and after the next 10% it is circa 50% and so on. For 40% tax losses, the hurdle rate is a 5-year investment return rate of 6.96% p.a. with no exits, it increases to 7.63% p.a. for 10% exits and 8.44% for 20% exits.

The higher the hurdle rate, the less likely that value will arise from tax losses left behind by exiting unit-holders.

We can graph the value placed on tax losses (on a cancellation pricing basis) by such a tax loss value algorithm as a percentage of fund value. Based on a mean investment return of 40% the results are as follows for various withdrawal rates underlying the tax loss value algorithm.

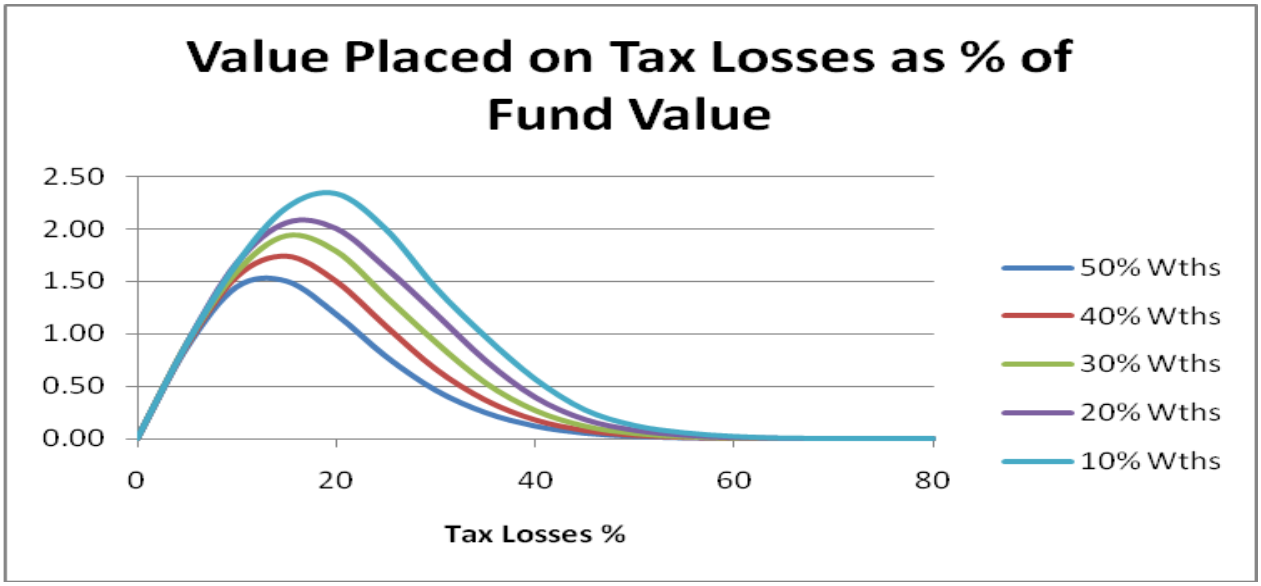


Graph 4.6.3: ROI, 40% Mean, Contracting

The significant feature is that there is a peak to the graph. Initially the value placed on tax losses as a percentage of fund value increases with the tax losses percentage but this then hits a peak and then tapers off. The reason for this is that there is a hurdle rate of investment return before value can be properly attributed in respect of the tax loss transfer transaction and that hurdle rate becomes increasingly onerous as the tax losses percentage increases. The results are that the higher the withdrawal rate w, the lower the value that can be placed on tax losses.

The conclusion is that for a fund in a net outflow position, there should be a maximum value placed on the [Value of Tax Losses as a Percentage of Fund Value] figure but that furthermore the value placed should converge to 0 as the [Tax Loss %] increases.

Based on a mean investment return of 20%, the value placed on tax losses as percentage of fund value would be as follows:-



Graph 4.6.4: ROI, 20% Mean, Contracting

This demonstrates that the magnitude of the peak will vary by fund according to the investment return distribution. It is also clear from the results that the magnitude of the peak also varies by the withdrawal rate assumed in the tax loss transfer transaction.

If we were to proceed to calculate the [Tax Loss Value Proportion] figures on this basis, we would need to decide how best to select the withdrawal rate w to use. However there is a fundamental problem with the approach in that it doesn't allow for further withdrawals. The [Additional Tax-Free Investment Return] figure itself needs to allow for the size and incidence of further withdrawals from the (1-w) proportion. The previous analysis was on the basis that there were no such further withdrawals and that the (1-w) proportion remained in force for the full investment term.

We have said that, in a contracting fund scenario, we believe that the most equitable approach would be to derive the value placed on tax losses in unit pricing based on a quantification of the benefit received by continuing unit-holders from the tax losses left behind by the exiting unit-holders. The quantification of the benefit is dependent not only on future investment return but also on the future withdrawals of the continuing unit-holders. The potential value of the tax losses to a unit-holder intending to exit after 6 months would be significantly different to that of a unit-holder intended to exit after 5 years. Ultimately the value placed is some weighted average of the potential values to various time cohorts of the continuing unit-holders.

Another fundamental issue is that the [Tax Loss Value Proportions] should vary over time as the [Additional Tax-Free Investment Return] figure will vary over time as the projected residual lifetime of the fund shortens. It is suggested that an appropriate way of dealing with this issue would be to leave the [Tax Loss Value Proportions] unchanged over time and introduce a [Residual Term Weighting Factor] factor. This issue is discussed in more detail in Section 4.12.

The conclusion is that we need a different method of quantifying the [Tax Loss Value Proportion] figures which has regard to future withdrawals and which doesn't also favour earlier exits at the expense of later exits.

4.7. Quantifying the [Tax Loss Value Proportion] for Contracting Funds

A straight-forward method (the "Transaction Value Method") to derive for a fund the [Tax Loss Value Proportion] figures would be as follows:

- Assumptions
    - [Investment Return Rates]
    - [Central Withdrawals Rates]
    - [Lifetime of Fund]
- Project the fund over its assumed lifetime (with no value placed on tax losses for exits) using the investment return rates and the withdrawals assumptions on two bases viz Projection 1 with the existing tax losses and Projection 2 with the existing tax losses with the difference that on exit the tax losses of those exiting are removed from the fund with no compensation to those exiting the fund
- Derive the investment return amounts and tax charges for each period for Projection 1 and in Projection 2
- Derive the [Tax Losses Removed] as the total of the tax losses removed from the fund in Projection 2 (they also represent the tax losses transferred on within the fund in Projection 1)
- For each period, determine [Tax Charge (Projection 2) – Tax Charge (Projection 1)] + [Tax Rate] * {[Taxable Investment Return (Projection 1)] - [Taxable Investment Return (Projection 2)]}. Note: The second part of the term is required to adjust for the fact that the taxable investment return in the two projections differs because the fund values in the two projections differ as a result of the different tax charges. For this purpose [Taxable Investment Return] is computed without any regard to tax losses for both Projection 1 and Projection 2.
- Discount the result at the [Investment Return Rate] net of tax. This is the [Adjusted Reduction in Tax Charges (Period)] figure.
- Total the discounted results for [Adjusted Reduction in Tax Charges (Period)] over all periods to derive [Total Adjusted Reduction in Tax Charges]. Note: If discounting was not applied, the total would be determined as [Sum of Tax Charges (Projection 1)] – [Sum of Tax Charges (Projection 2] + [Tax Rate] * {[Taxable Investment Return (Projection 1)] - [Taxable Investment Return (Projection 2)]}.
- The [Total Adjusted Reduction in Tax Charges] is expressed as a ratio of the [Tax Losses Removed]. Dividing this by the [Tax Rate] then gives the value of the [Tax Loss Value Proportion] figure.

It can be demonstrated that when this method is followed in practice with no discounting [Tax Loss Value Proportion] figures of 0 are obtained for low investment return rate (relative to the

tax loss percentage) scenarios and [Tax Loss Value Proportion] figures of 1 are obtained for high investment return rate (relative to the tax loss percentage) scenarios

That is probably the simplest way to derive the [Tax Loss Value Proportion] figures.

An alternative way would be to:

- Project the fund using the investment return rates and the withdrawals assumptions
- Determine the [Proportion Exiting] at each time period
- At each time period, split the [Investment Return %] obtained to that period into its three parts of [Tax Free Investment Return % <=Original Tax Losses %] ; [Tax Free Investment Return % >=Original Tax Losses %] and [Taxable Investment Return %]
- For each time period, compute [Proportion Exiting] * [Tax Free Investment Return % <=Original Tax Losses %] and sum over all time periods to derive [Figure A]
- For each time period, derive as zero if [Tax Free Investment Return % >=Original Tax Losses %] is zero and otherwise derive as [Compound Proportion in Force (end period)] * { [Tax Free Investment Return % >=Original Tax Losses %](Current Period) - [Tax Free Investment Return % >=Original Tax Losses %](Previous Period)} *[Discount Factor(end period)] and sum over all time periods to derive [Figure B]
- Derive the [Tax Loss Value Proportion] figures as [Figure B] / {[Tax Loss %] –[Figure A]}

It can be shown that the figures obtained in this alternative way are identical to those of the first method. The alternative way may also be used as an independent check on the first method. The first method is much easier to apply in practice.

Multiplying the expression [Figure B] / {[Tax Loss %] – [Figure A]} above and below the line by [Fund Value] is instructive.

The revised denominator of [Fund Value] * {[Tax Loss %] – [Figure A]} in practice is the same figure as [Tax Losses Removed].

The revised numerator of [Fund Value] *[Figure B] is the discounted value of the tax-free investment return in excess of the original tax losses percentage.

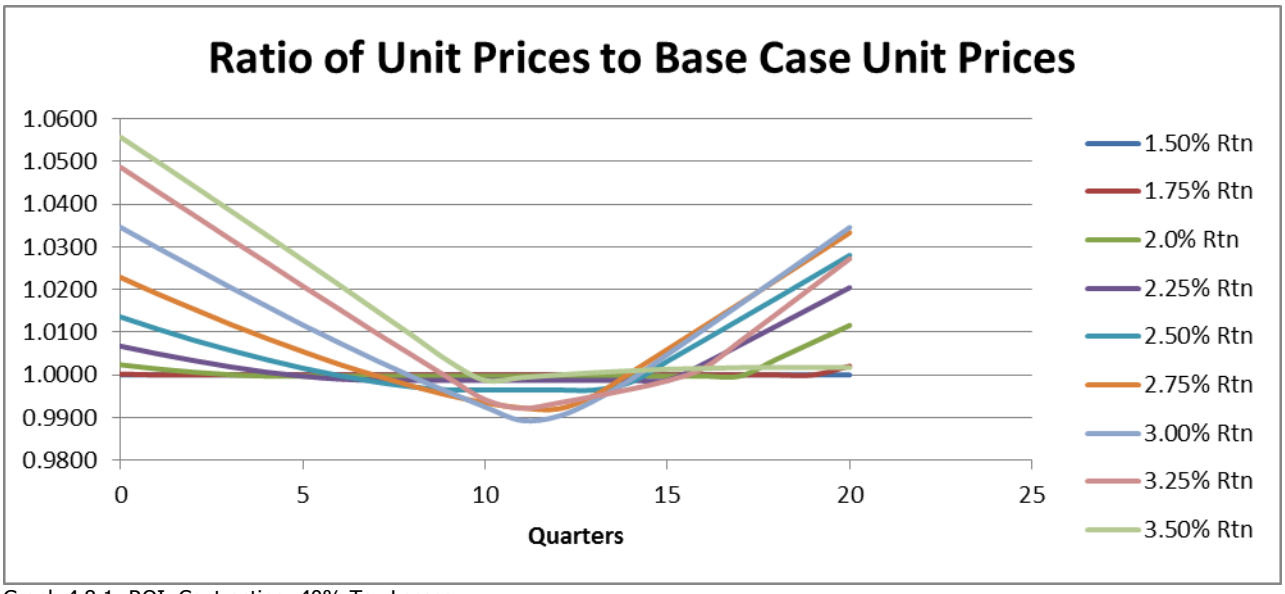
The relevance of this alternative approach is that the [Tax Loss Value Proportion] figures are seen to be directly proportional to the discounted value of the tax-free investment return in excess of the original tax losses %. Thus it is crystal clear that if the investment return is less than the original tax losses % that the [Tax Loss Value Proportion] figure should be zero.

Implicit in the methods is that the [Tax Loss Value Proportion] figures are the weighted averages of the [Tax Loss Value Proportion] figures that would apply to the 20 separate tax loss transfer transactions. Thus the [Tax Loss Value Proportion] figure derived at a point in time using the method is a weighted average of the remaining tax loss value transfer transactions.

In deriving the [Tax Loss Value Proportion] figures at a point in time, one could seek to derive the [Tax Loss Value Proportion] figure for the actual tax loss transfer transaction at that time and also the [Tax Loss Value Proportion] figure for each of its subsequent tax loss transfer transactions using the approach of (1-w)*[Additional Tax-Free Investment Return] /w as set out in Section 4.5. The approach would be modified to incorporate the effect of subsequent withdrawals on each tax loss transfer transaction where the effect is primarily on the amount of [Additional Tax-Free Investment Return] that is obtained (i.e. no tax losses are assumed to transfer on the subsequent tax loss transfer transactions other than their share of the original tax loss transfer transaction). If this is done for intermediate scenario investment return rates, the [Tax Loss Value Proportion] figure for the first set of tax loss transfer transactions would be close to 1 but the values for subsequent tax loss transfer transactions rapidly reduce as the effective hurdle rate for value increases. If the derived [Tax Loss Value Proportion] figures are weighted by the [Tax Losses Transferred] figures at each tax loss transfer transaction, the resultant [Tax Loss Value Proportion] figure is found to be close to the results obtained by the previous methods.

4.8. Transaction Value Results for Various Scenarios

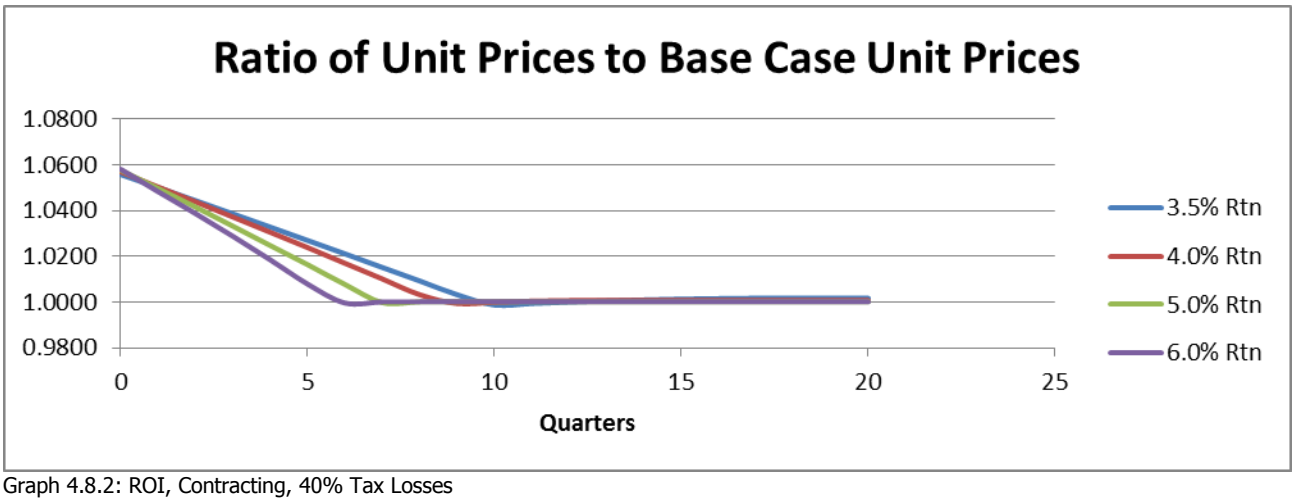
Using the method outlined in Section 4.7 (to derive the value placed on tax losses at each unit pricing point) and on the basis of our central withdrawals assumption, we can graph the ratio of actual unit prices to base case unit prices for various investment scenarios.



Graph 4.8.1: ROI, Contracting, 40% Tax Losses

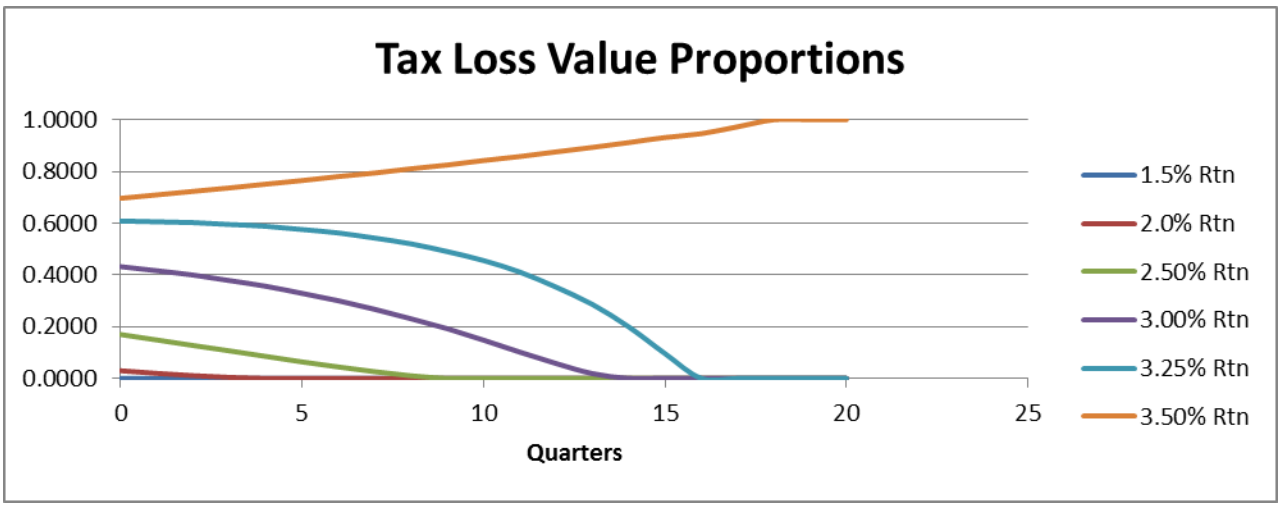
Note: The 1.5% return graph is a constant value of 1. The results for smaller values than 1.5% would be identical to the 1.5% case.

The results of higher levels of investment return are very similar to the 3.5% case other that the higher the investment return the faster the ratios converge to the eventual constant value (and that ratio is closer to 1) as shown below.



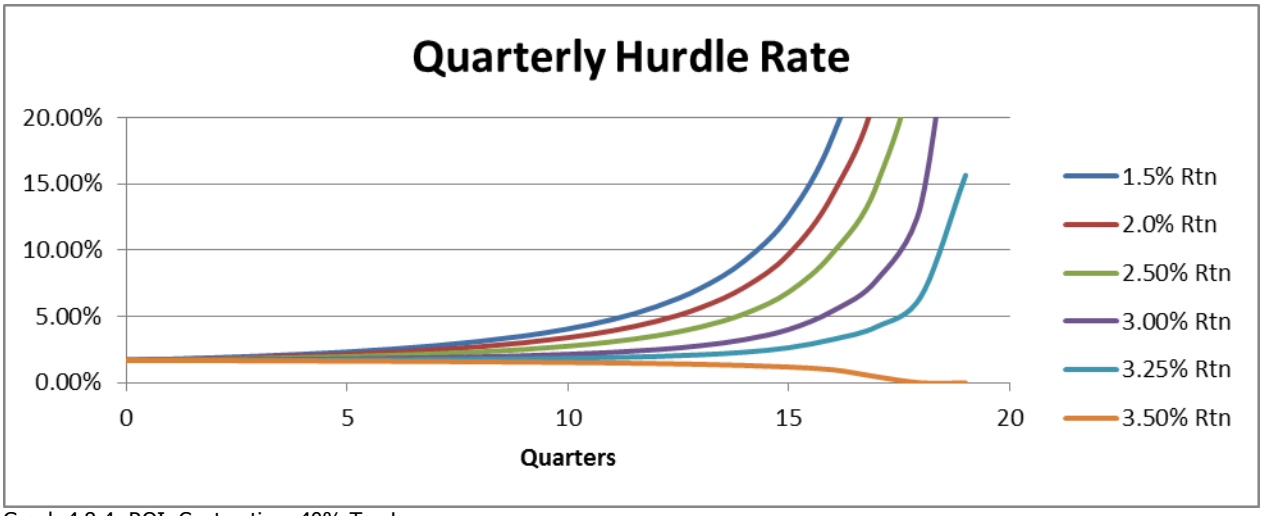
Graph 4.8.2: ROI, Contracting, 40% Tax Losses

The [Tax Loss Value Proportion] figures are:



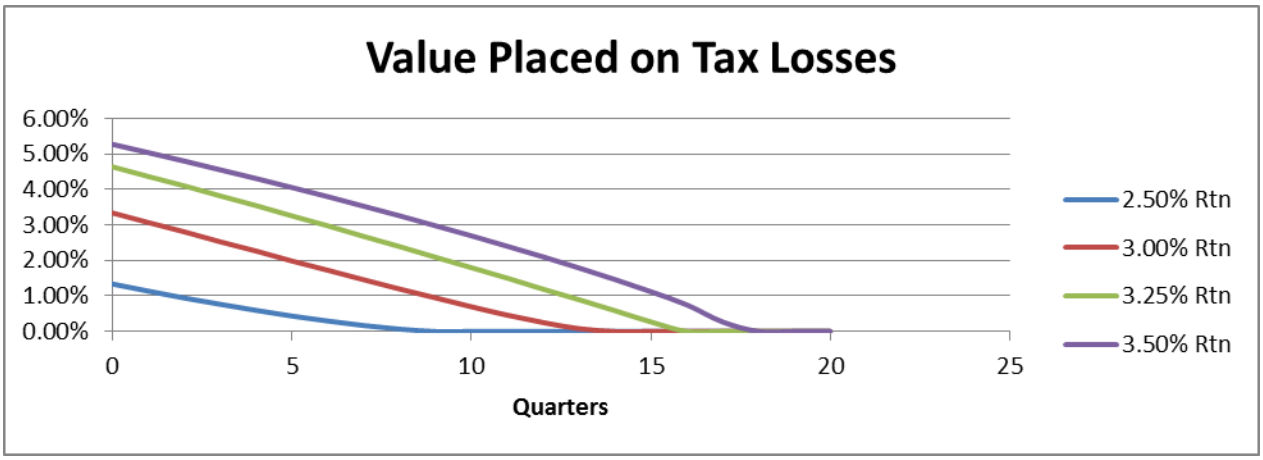
Graph 4.8.3: ROI, Contracting, 40% Tax Losses

The reason for the shape of the [Tax Loss Value Proportion] curves is because, for intermediate rates of investment return, the hurdle rate increases over time as the residual term to maturity reduces (because no value will be placed on the tax losses by the Transaction Value Method if the projected future investment return is less than the then tax losses %). The effect is magnified even more if one allows for the fact that the withdrawals rates increase over time.



Graph 4.8.4: ROI, Contracting, 40% Tax Losses

The value placed on tax losses is: -

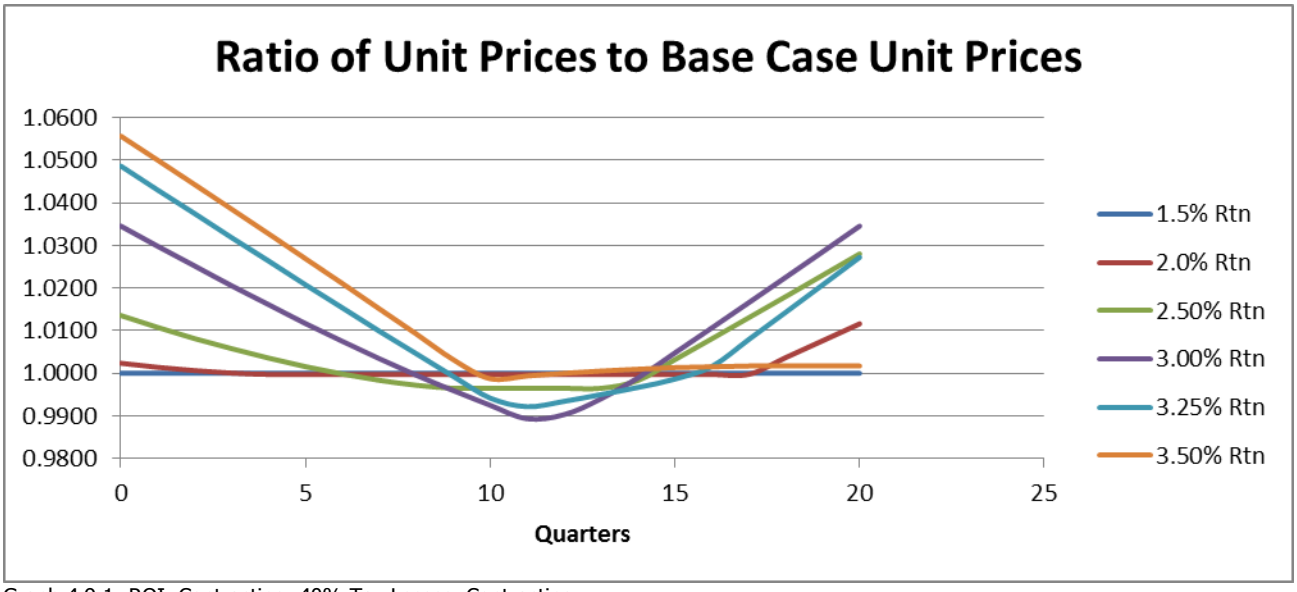


Graph 4.8.5: ROI, Contracting, 40% Tax Losses

4.9. Review of Transaction Value Results for Various Scenarios

For scenarios 1 (Section 3.10 – Investment Return <= Tax Losses as a Percentage of Fund Value) and 2 (Section 3.11 – Tax Losses Fully Relieved), the results in graph 4.8.1 are identical to the no value and full value approaches as would be expected. The results are thus rational for the two extremes of investment returns.

A prominent feature of the graphs is the upward sloping feature at the later durations for intermediate values of investment returns. It would appear that the graphs undershoot the target base line at durations 10-15 and then overshoot it at later durations. This can be seen more clearly in (the less cluttered) graph 4.9.1 below.



Graph 4.9.1: ROI, Contracting, 40% Tax Losses, Contracting

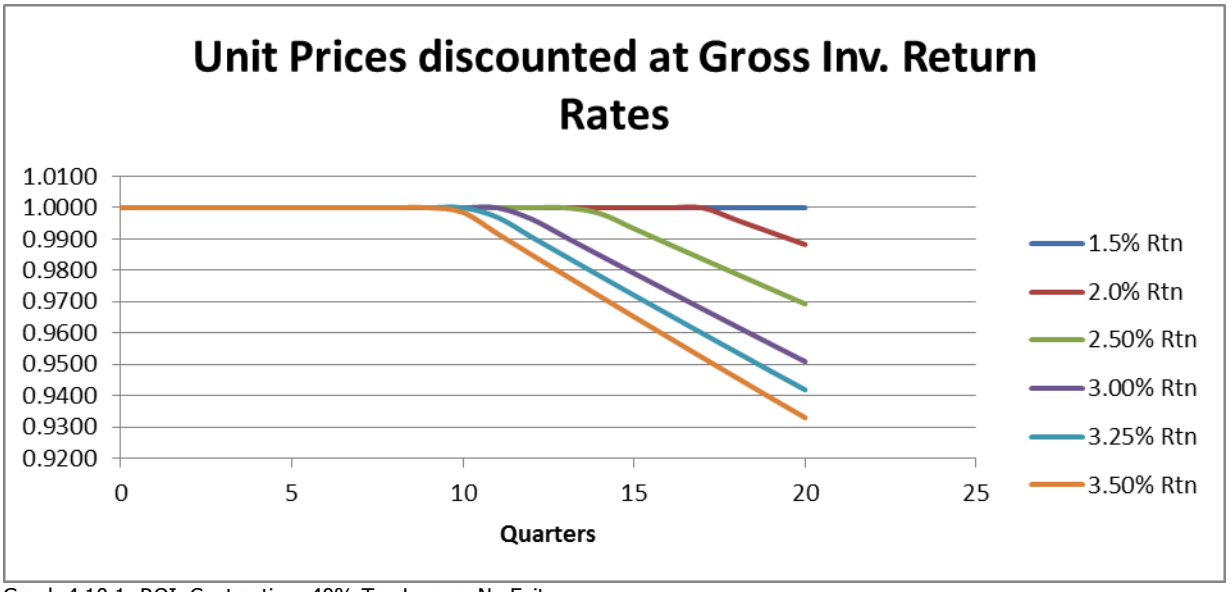
This might appear to suggest that there is an error in the process for calculating the tax loss value proportions. However the upward sloping feature is expected. The reason is that for the intermediate scenarios tax becomes payable at the later durations for the no exit base case. Hence the base case unit prices at later durations are growing at the net investment return rate whereas the actual unit prices (with exits) would be growing at the gross investment return rates.

When considering the graphs, it is important to bear in mind that the proportion in force is much smaller at the later durations.

4.10. Transaction Value Unit Prices discounted at Gross Investment Return Rates

It can be instructive to examine the unit prices discounted at the gross investment return rate to gain an insight into when the tax losses run out and tax has to be paid on investment returns.

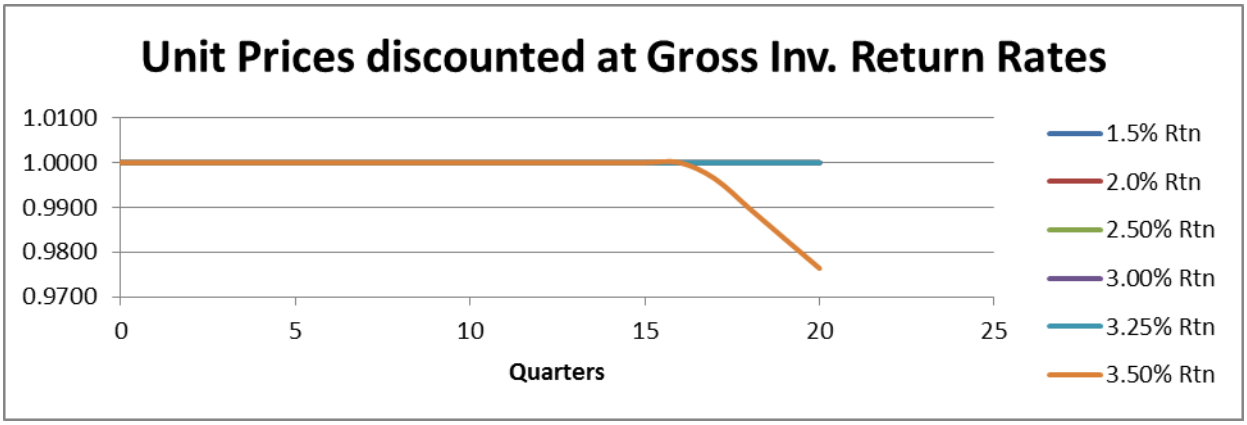
With no exits, if no value was placed on tax losses, the situation would be as follows:



Graph 4.10.1: ROI, Contracting, 40% Tax Losses, No Exits

Effectively a gross investment return rate is obtained until the point that tax becomes payable and that point is earlier for higher values of investment return rates.
Note: A quarterly investment return rate of 1.7% eliminates the tax losses with no exits.

For the central withdrawals assumption, if no value was placed on tax losses, the situation would be as follows:



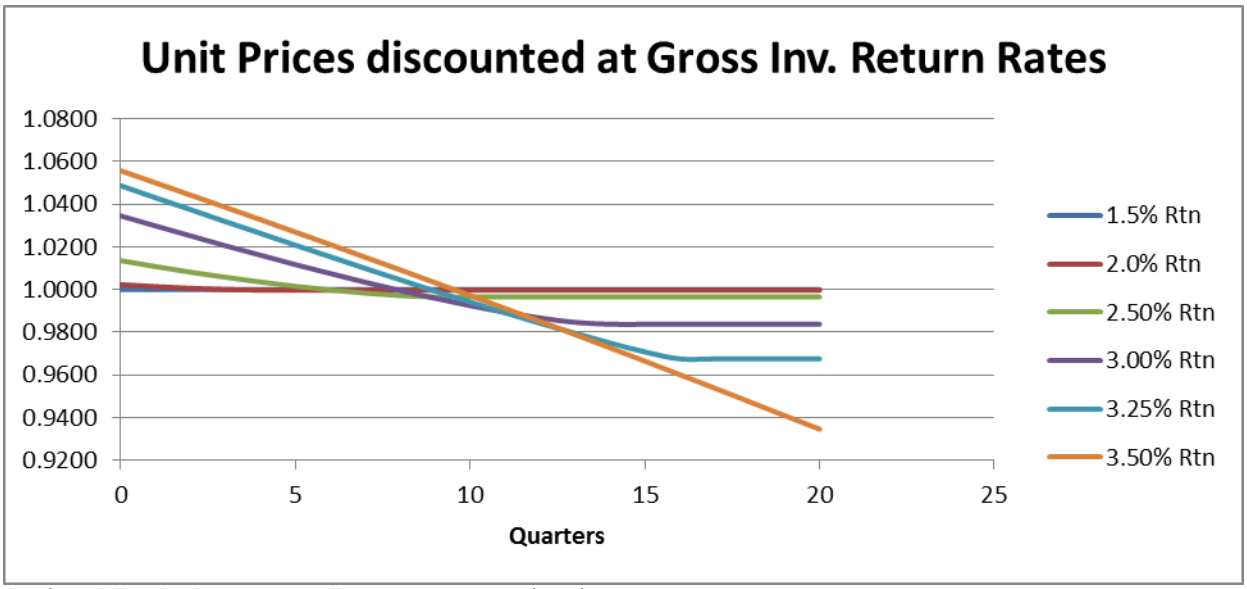
Graph 4.10.2: ROI, Contracting, 40% Tax Losses, Central Withdrawals, No Value placed on Tax Losses

It can be seen that the effect of exits (if no value is placed on tax losses) is two-fold. It firstly extends the period for which a gross investment return is obtained and secondly unit prices are a higher percentage of the gross unit prices.

It is only in the 3.5% return case (in the context of the central withdrawals assumption) that tax becomes payable and so unit prices eventually fall below those of gross investment return.

However, as per graph 4.10.1 shown above, with no exits that would apply for all the above rates except the 1.5% return rate.

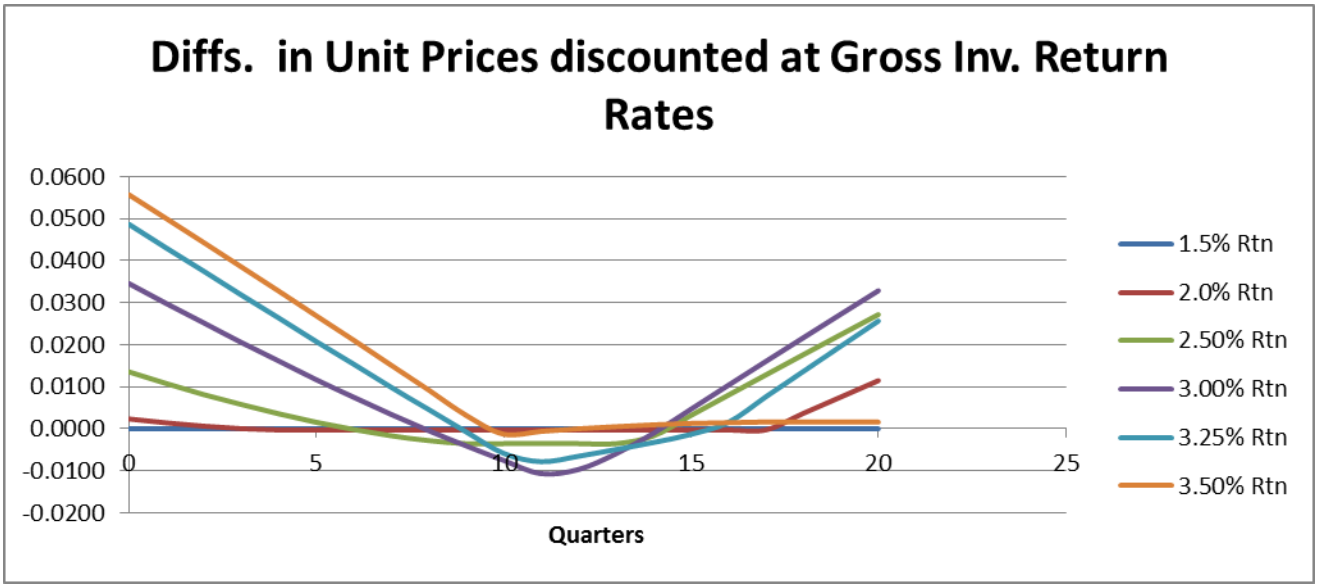
For the central withdrawals assumption, placing value on tax losses (based on perfect foresight), the situation would be as follows:



Graph 4.10.3: ROI, Contracting, 40% Tax Losses, Tax Algorithm

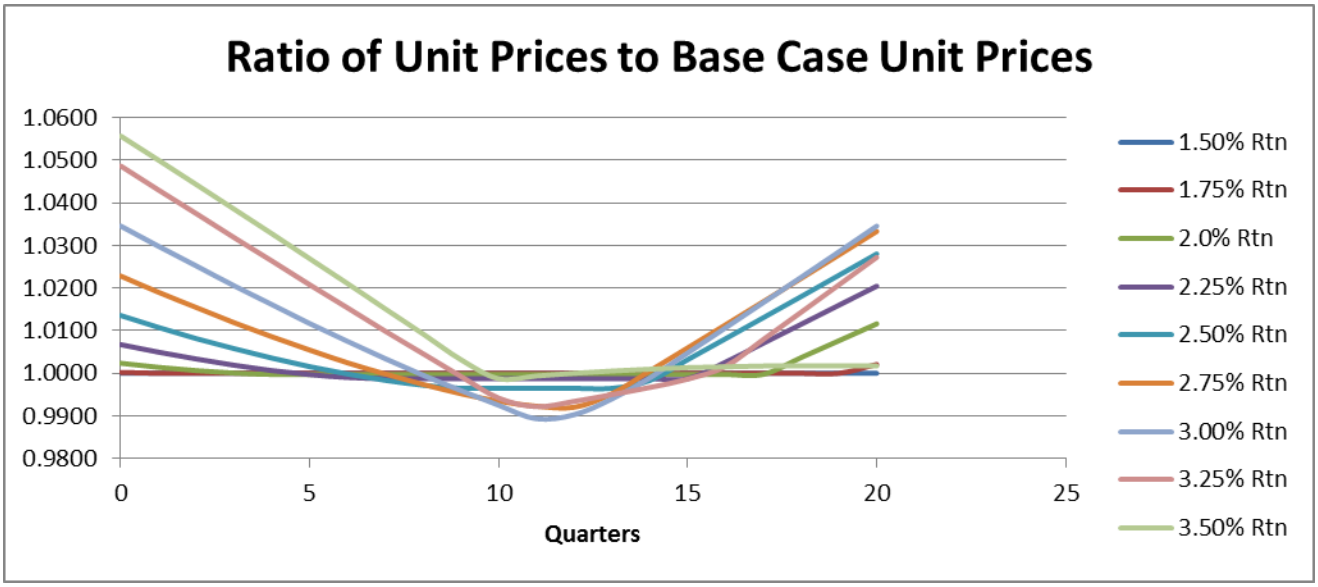
There are two prominent features of this graph compared to the no value, no exits graph. Firstly, the unit prices are clearly higher than the no value, no exits graph at earlier durations. Secondly, on closer inspection, the unit prices are also higher at the later durations.

If we graph the differences between the two graphs, we get the following:



Graph 4.10.4: ROI, Contracting, 40% Tax Losses

Graph 4.10.4 is of the same shape as observed in section 4.8 as re-shown below.



Graph 4.8.1: ROI, Contracting, 40% Tax Losses

The question arises as to what is the reason for the observed feature of a dip in the graphs around durations 10-15.

The reason is to do with the value placed on tax losses as per graph 4.8.5 in section 4.8. Considering the 2.5% investment return case, the value placed on tax losses is zero from duration 9 onwards despite the fact that tax losses at that stage are around 31% of fund value. With no exits, tax would have become payable from about duration 14 onwards.
Thus for durations 10-15, the unit prices are lower than the base case because of the combination of three effects

- Consideration has been paid for prior exits
- No value is being placed on tax losses at that stage
- No additional tax-free investment return has been received by that stage.

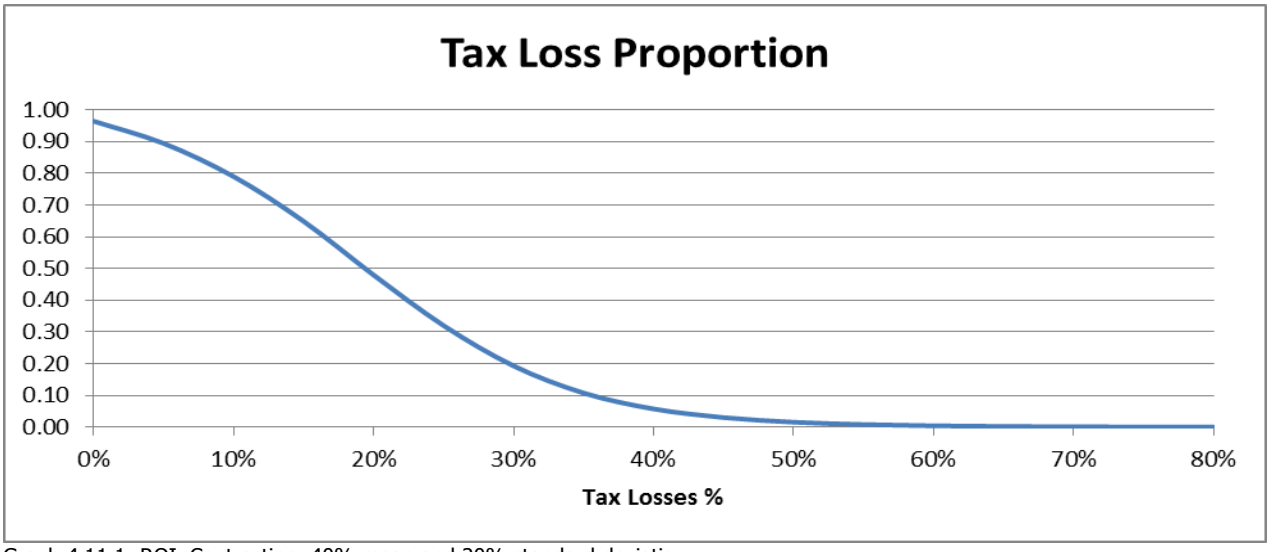
When additional tax-free investment return starts to accrue, the graph turns upwards.

Thus the observed feature is because the value placed on tax losses is computed as a weighted average of what different groups of continuing unit-holders would theoretically pay for the tax losses transferred to them. The 10-15 duration cohorts would theoretically pay nothing to prior exits whereas the later duration cohorts would pay consideration.

4.11. Tax Loss Value Proportions with no Residual Term Weighting

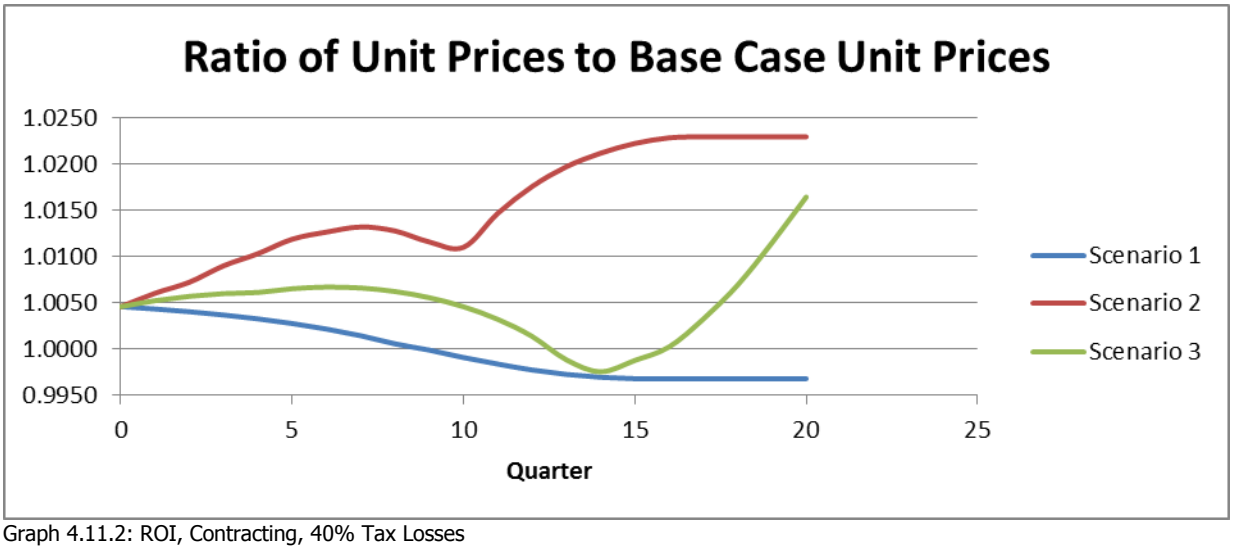
Using the method described in section 4.7 (and using the central withdrawals assumption), we can derive tax loss value proportions for various investment return rates. Using an investment return distribution, we can derive a schedule of tax loss value proportions corresponding to tax loss percentages.

We can then graph the results for various scenarios.
Assuming a normal distribution for the 5-year investment return with a 40% mean and 20% standard deviation and assuming that investment return is uniform over the five year period, the results are as follows: -
Firstly the [Tax Loss Value Proportion] figures are:



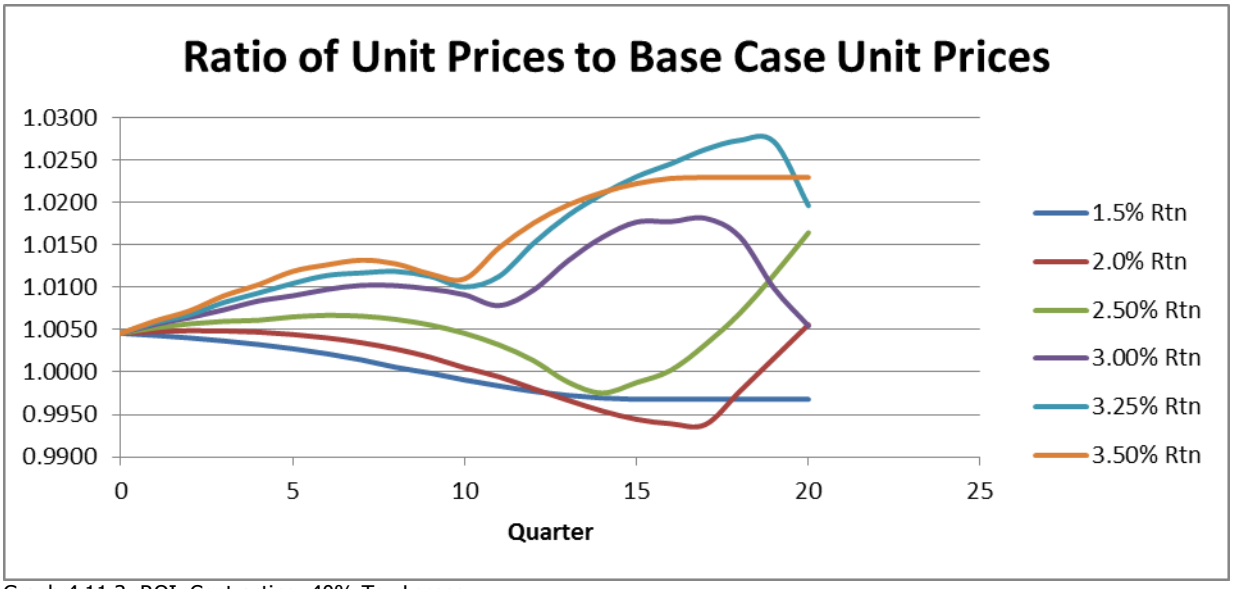
Graph 4.11.1: ROI, Contracting, 40% mean and 20% standard deviation

The ratios of tax algorithm unit prices to the base case unit prices are:



Graph 4.11.2: ROI, Contracting, 40% Tax Losses

The complete set of results is shown below.

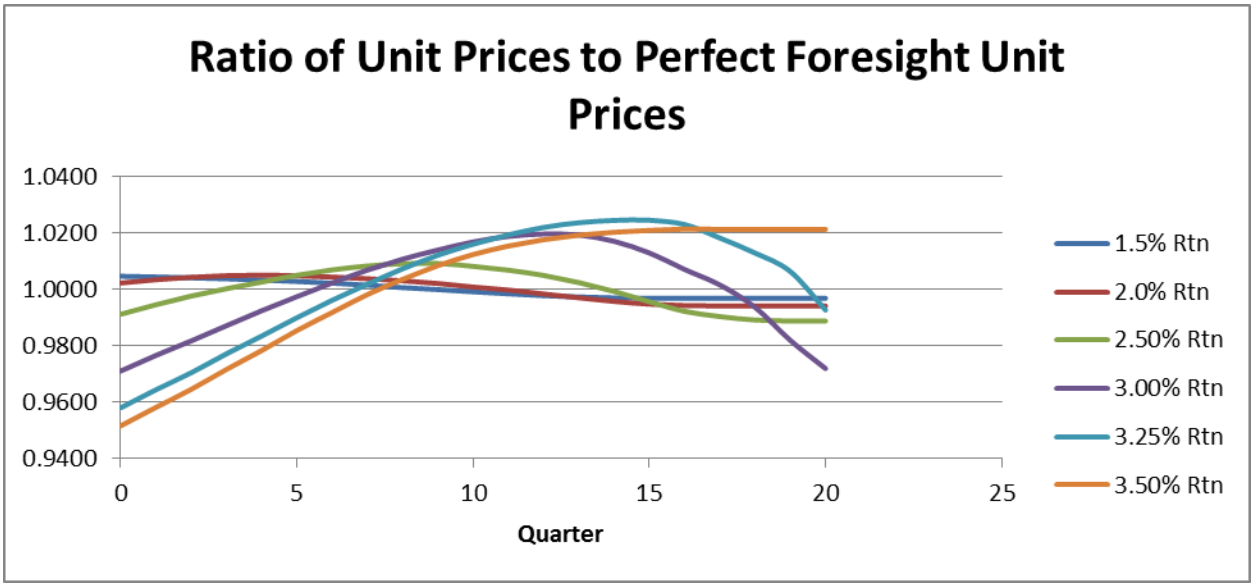


Graph 4.11.3: ROI, Contracting, 40% Tax Losses

There are some poor features in the graph 4.11.3.

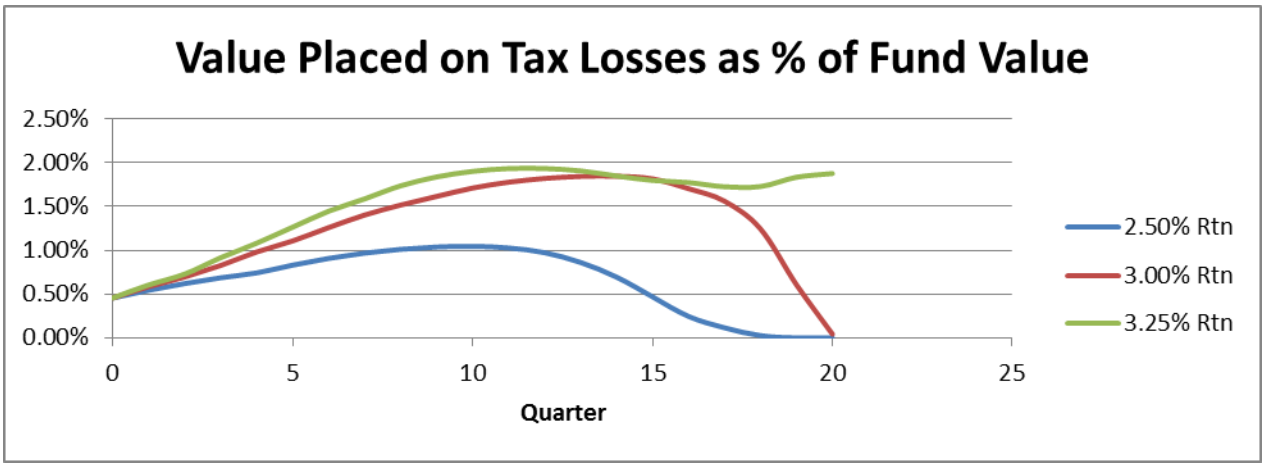
- The shape of the 3% return and 3.25% return graphs is disappointing with the fall at the later durations.
- The lack of relative consistency in the various graphs is disappointing

The results can be analysed in the context of the ratios of the actual prices (on the basis of the tax loss value algorithm) to the perfect foresight unit prices.

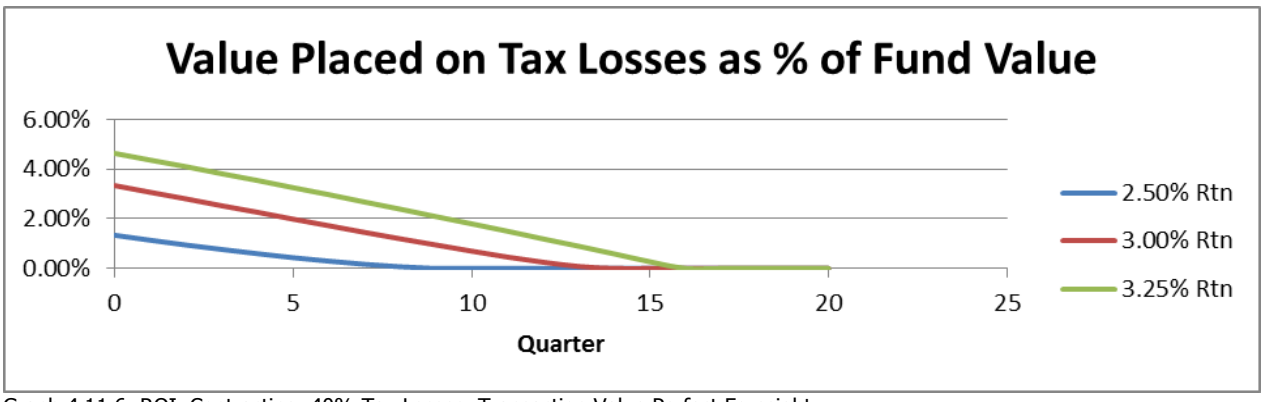


Graph 4.11.4: ROI, Contracting, Tax Algorithm, 40% Tax Losses

The reason for the disappointing features can be seen from the following graphs.
Graph 4.11.5 is the value placed on tax losses using the algorithm.
Graph 4.11.6 is the value placed on tax losses in the perfect foresight scenario.



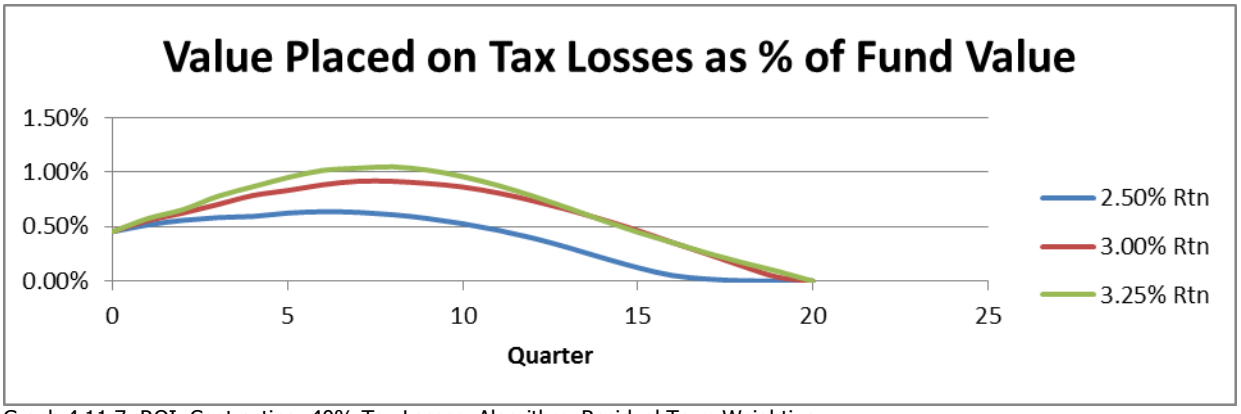
Graph 4.11.5: ROI, Contracting, 40% Tax Losses, Algorithm



Graph 4.11.6: ROI, Contracting, 40% Tax Losses, Transaction Value Perfect Foresight

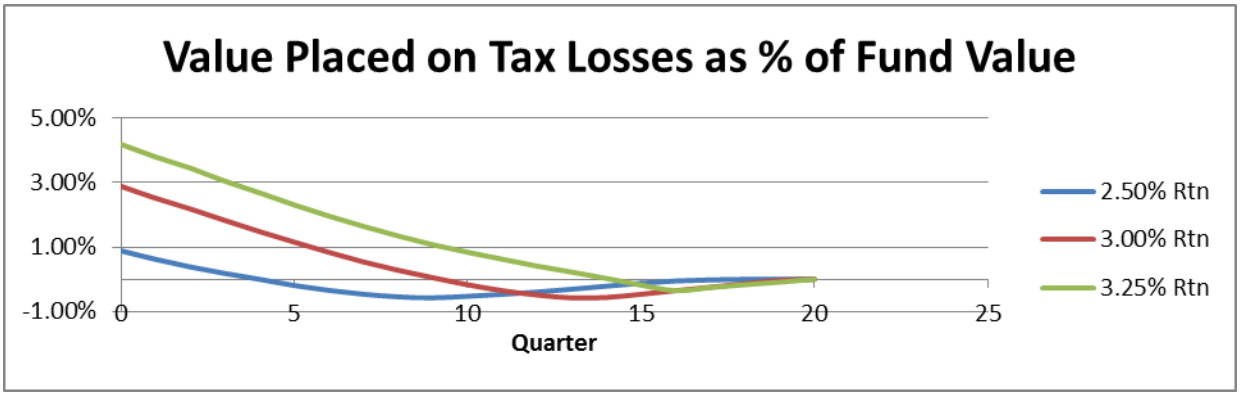
The problem is that the values placed by the algorithm at later durations are too high.

If however, we apply residual term weighting (as per the next section) in the tax algorithm, we get:-



Graph 4.11.7: ROI, Contracting, 40% Tax Losses, Algorithm, Residual Term Weighting

At later durations, graph 4.11.7 is closer to graph 4.11.6 as can be seen in the graph below which shows the excess of the value placed on the Transaction Value perfect foresight basis over that of the tax algorithm with residual term weighting.



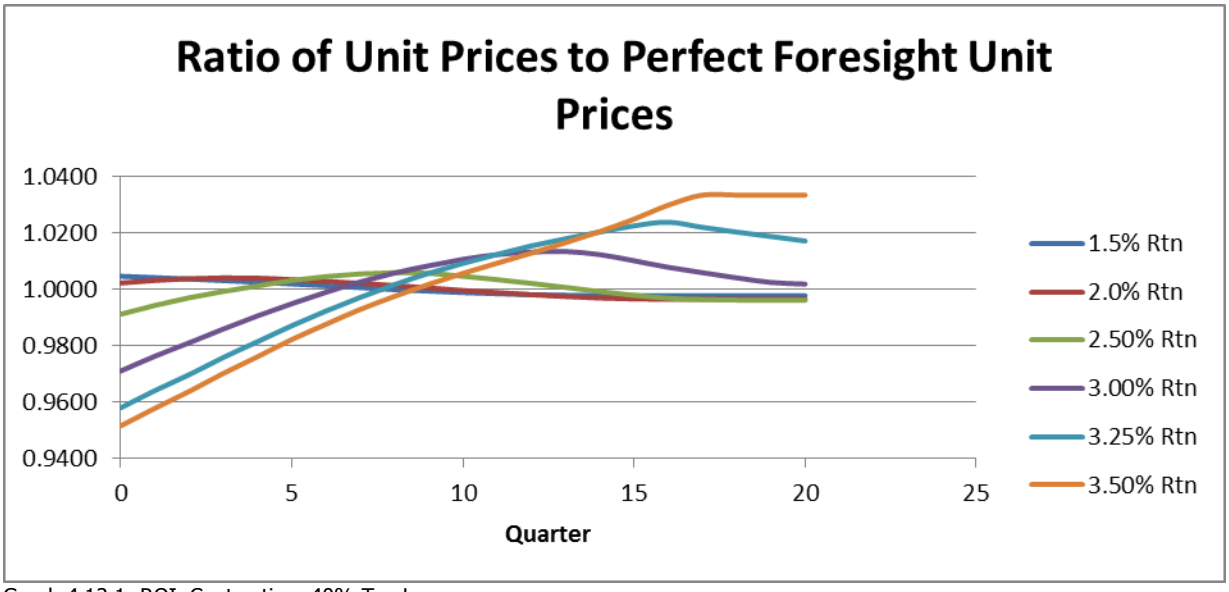
Graph 4.11.8: ROI, Contracting, 40% Tax Losses

It was to be expected that the tax algorithm without residual term weighting would be imperfect as the [Tax Loss Value Proportion] figures being used at various durations are all based on the computed figures assuming constant 5-year duration whereas they ought to be based on the residual part of the 5-year term. Residual term weighting is an approximate way to adjust for this imperfection.

4.12. [Tax Loss Value Proportions] with Residual Term Weighting

A possible variation for the tax loss value algorithm is to postulate a fixed term for the fund and consequently to apply a weighting factor of [Residual Term] / [Residual Term at Basis Outset] (e.g. [Residual Term] /20) to the [Tax Loss Value Proportion]. Thus the value placed on tax losses would tend towards zero at the end of the term irrespective of the then tax loss percentage.

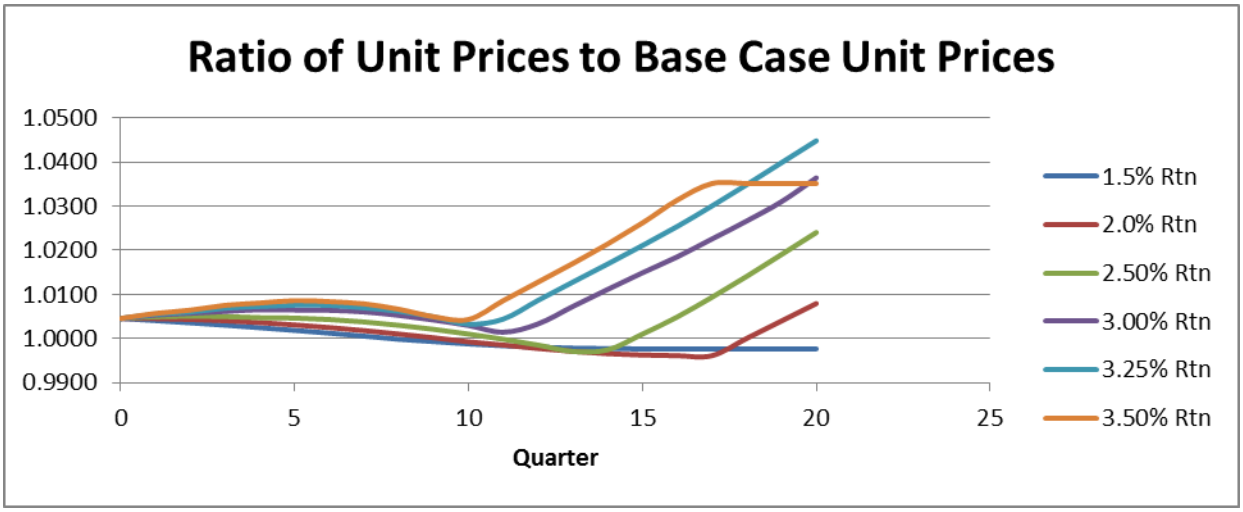
Utilising the assumptions of section 4.11 and applying a [Residual Term Weighting Factor], the results are as follows:-



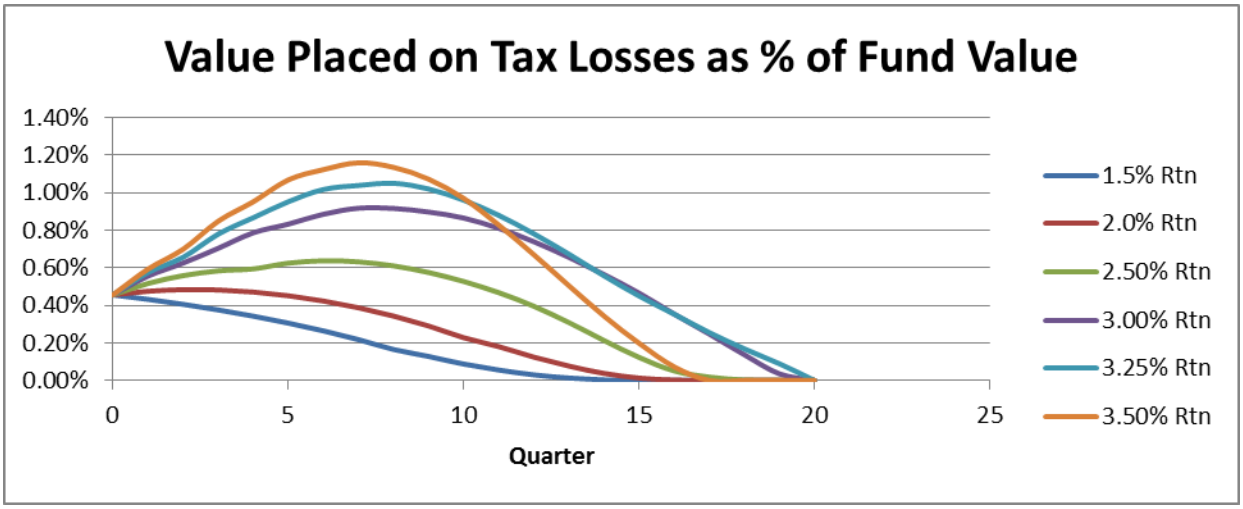
Graph 4.12.1: ROI, Contracting, 40% Tax Losses

It can be seen from graph 4.12.1 that using a [Residual Term Weighting Factor] gives much more consistent results than graph 4.11.4

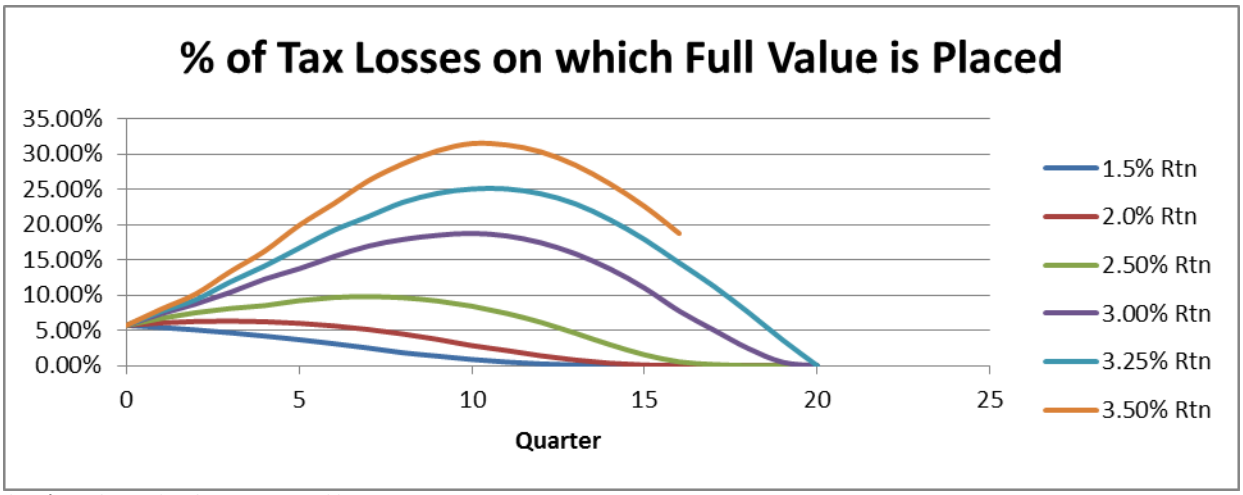
For high values of investment return at the high tail of the investment return distribution, the unit prices would be expected to be much lower than the perfect foresight unit prices at the early durations. This is understandable as at the outset we don't know whether the outcome is going to be a scenario-1 type outcome or a scenario-2 type outcome or some intermediate scenario-3 type outcome. For high tail outcomes, it would be unreasonable to expect the tax loss value algorithm to match the perfect foresight results.



Graph 4.12.2: ROI, Contracting, 40% Tax Losses



Graph 4.12.3: ROI, Contracting, 40% Tax Losses



Graph 4.12.4: ROI, Contracting, 40% Tax Losses

4.13. Review of Results with Residual Term Weighting

The results meet the specified criteria (as per Section 3.8) of a good tax loss value algorithm in that:

- The unit prices (other than higher tail investment returns) converge over time towards the base case unit prices
- For higher rates of investment return, the unit prices are somewhat higher than the base case unit prices
- The unit price discontinuity on change of basis is small.
- At later durations, the unit prices are close to the perfect foresight unit prices.

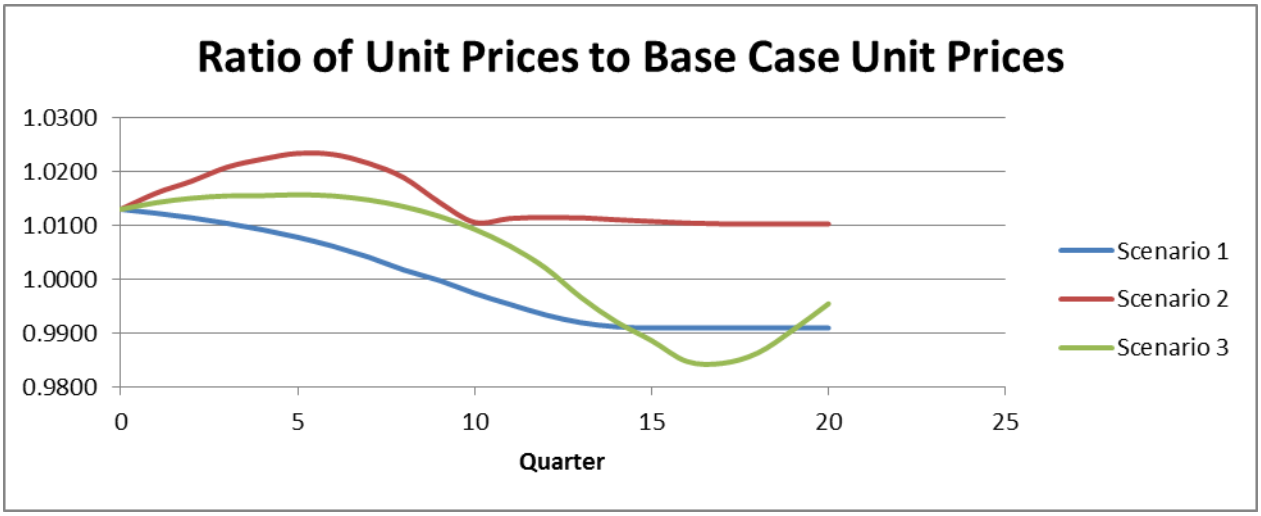
4.14. Summary of Results on Various Methods

We can show the changes in the graphs as we incorporate additional assumptions.

The first set of results is based on the approach as per section 4.5 based on tax loss transfer transactions where no account is taken of subsequent withdrawals.

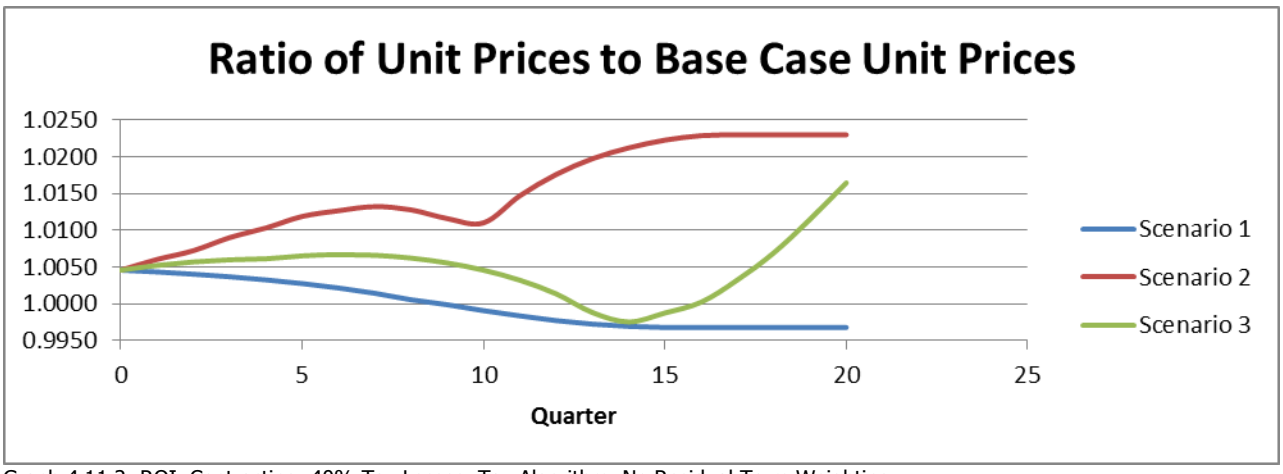
The results are based on:

- A mean investment return of approx 40%
- A 50% withdrawal rate in setting the [Tax Loss Value Proportion] figures.



Graph 4.14.1: ROI, Contracting, 40% Tax Losses

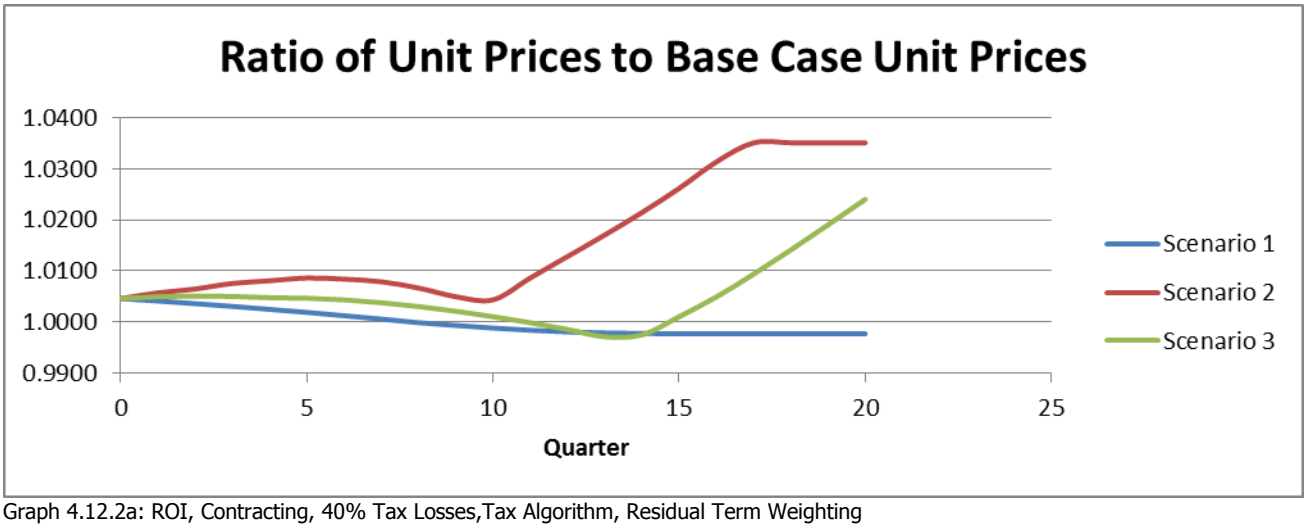
The second set of results is based on the approach as per section 4.11 with no [Residual Term Weighting Factor].



Graph 4.11.2: ROI, Contracting, 40% Tax Losses, Tax Algorithm, No Residual Term Weighting

For scenario 3, graph 4.11.2 has a lower set of prices at early durations and a higher set of prices at later durations than graph 4.11.1.

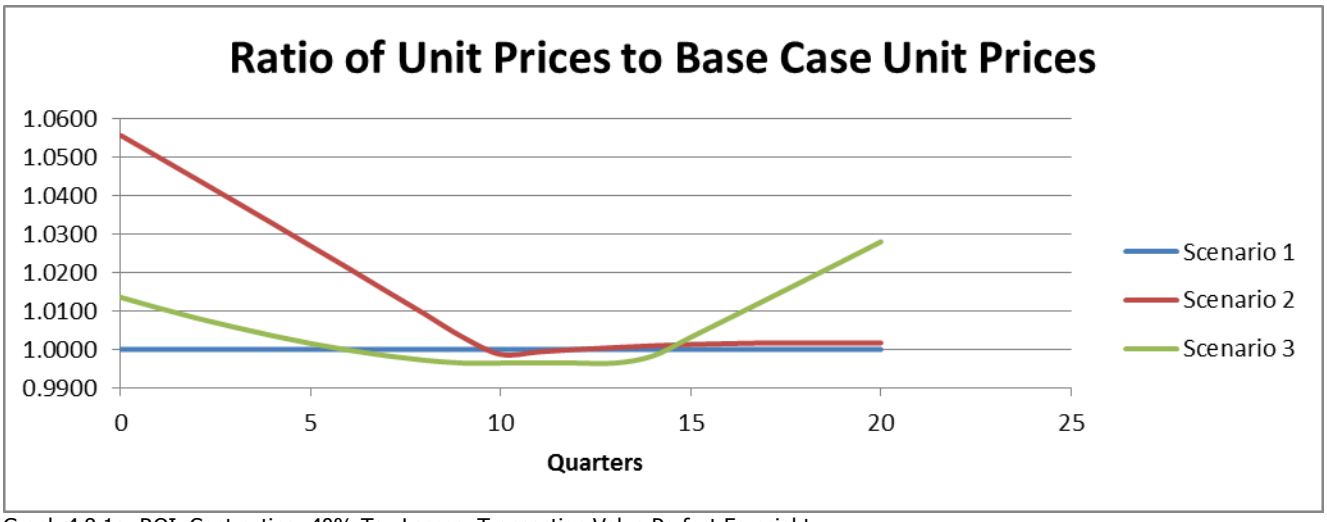
The third set of results is based on the approach as per section 4.12 with [Residual Term Weighting Factor].



Graph 4.12.2a: ROI, Contracting, 40% Tax Losses,Tax Algorithm, Residual Term Weighting

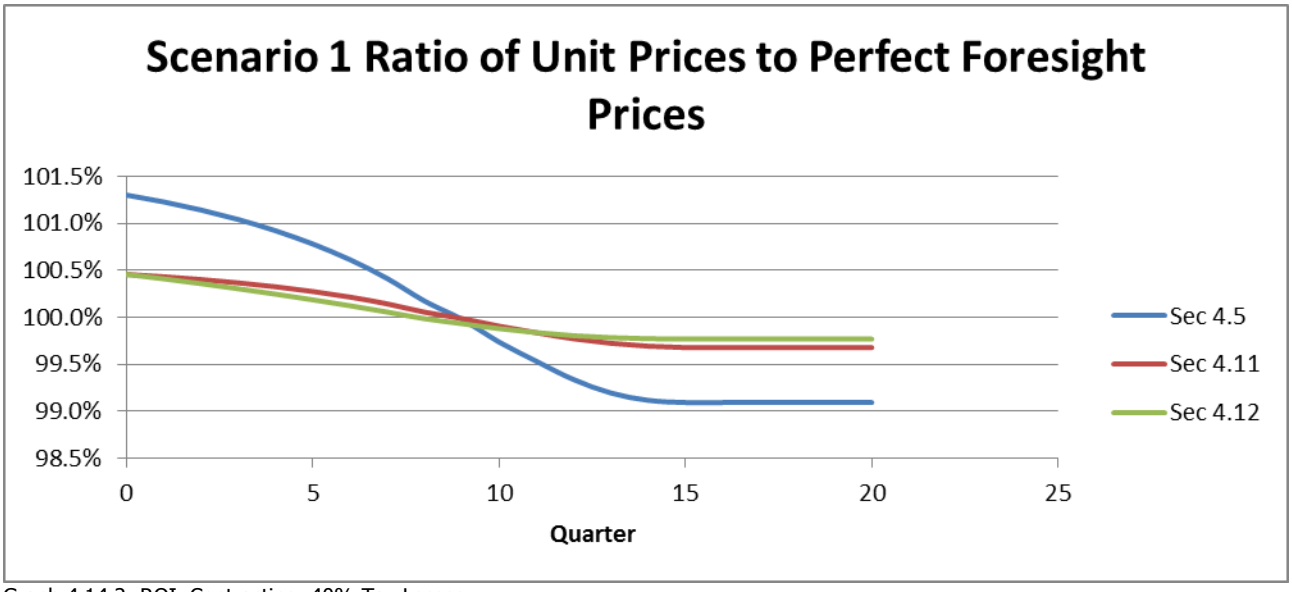
For scenario 3, graph 4.12.2a has a lower set of prices at intermediate durations and a higher set of prices at later durations than graph 4.12.2.

The fourth set of results is based on the Transaction Value Perfect Foresight approach as per section 4.8.



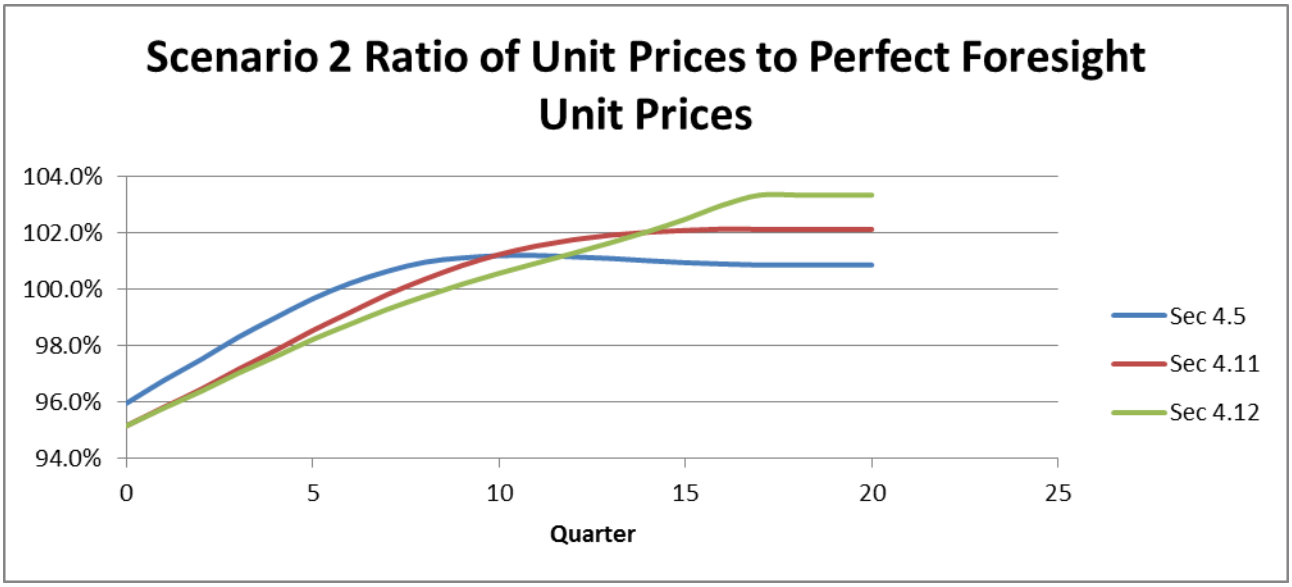
Graph 4.8.1a: ROI, Contracting, 40% Tax Losses, Transaction Value Perfect Foresight

We can compare the unit prices for the various approaches to the perfect foresight unit prices.



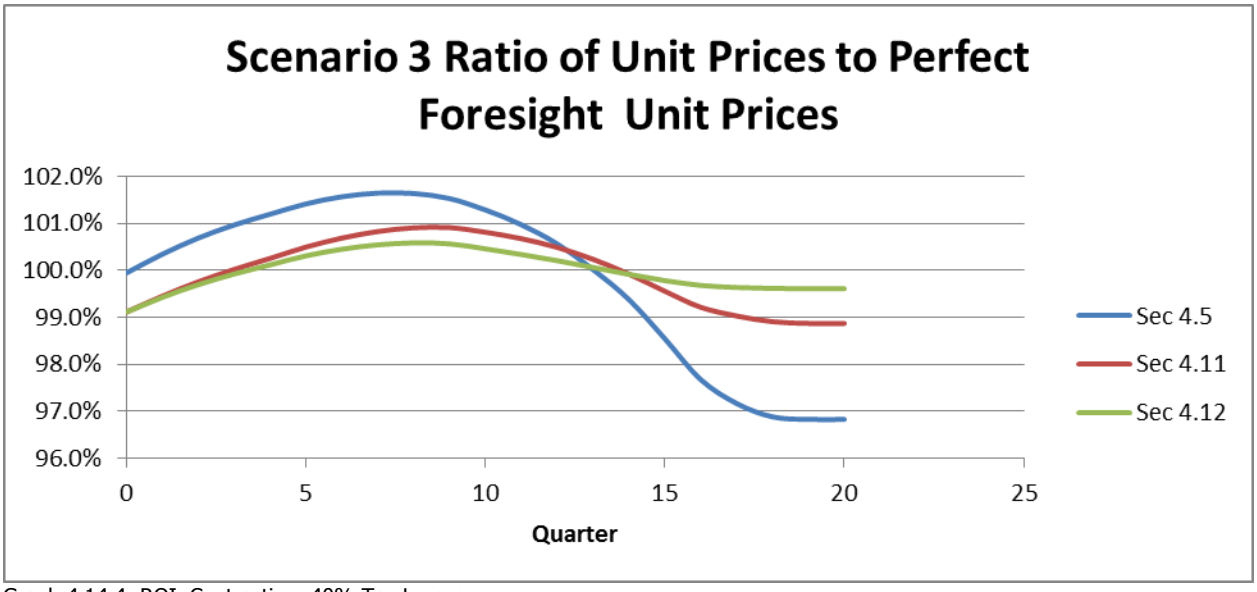
Graph 4.14.2: ROI, Contracting, 40% Tax Losses

It can be seen from graph 4.14.2 that the results of the approaches of section 4.11 and 4.12 are superior to that of section 4.5 for scenario 1 (i.e. for lower investment return rates).
The results of the section 4.12 approach are slightly better than the section 4.11 approach



Graph 4.14.3: ROI, Contracting, 40% Tax Losses

It can be seen from graph 4.14.3 that the approach of section 4.5 gives better results than the approach of section 4.11 or section 4.12 for scenario 2 (i.e. high tail investment return rates).



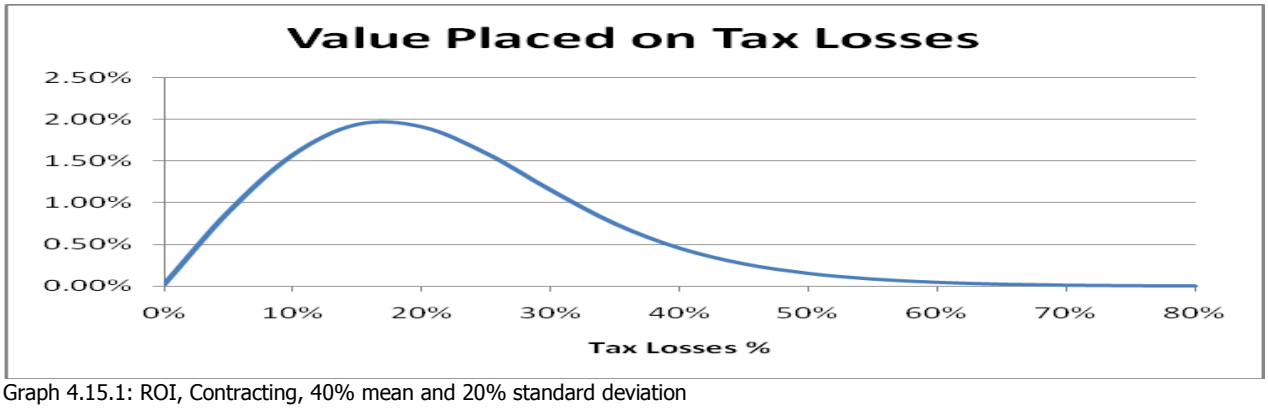
Graph 4.14.4: ROI, Contracting, 40% Tax Losses

It can be seen from graph 4.14.4 that the results of the approaches of section 4.11 and 4.12 are superior to that of section 4.5 for scenario 3 (i.e. for intermediate investment return rates). The results of the section 4.12 approach are slightly better than the section 4.11 approach.

4.15. Value Placed on Tax Losses

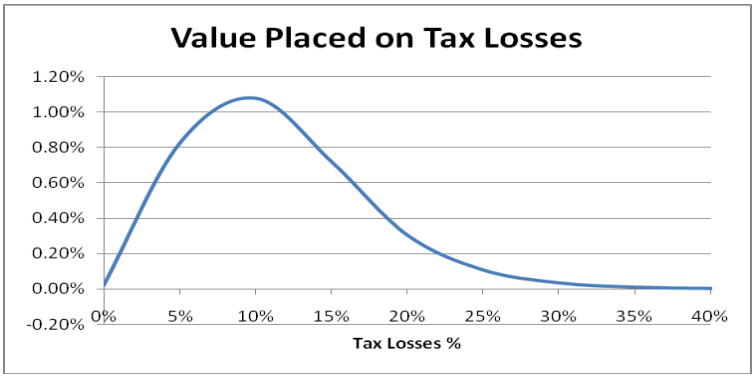
Using the method described in section 4.7 (and using the central withdrawals assumption), we can derive tax loss value proportions for various investment return rates. Using an investment return distribution, we can derive a schedule of tax loss value proportions corresponding to tax loss percentages and then derive the value placed on tax losses.

Assuming a normal distribution for the 5 year investment return with a 40% mean and 20% standard deviation and assuming that investment return is uniform over the five year period, the results are as follows: -

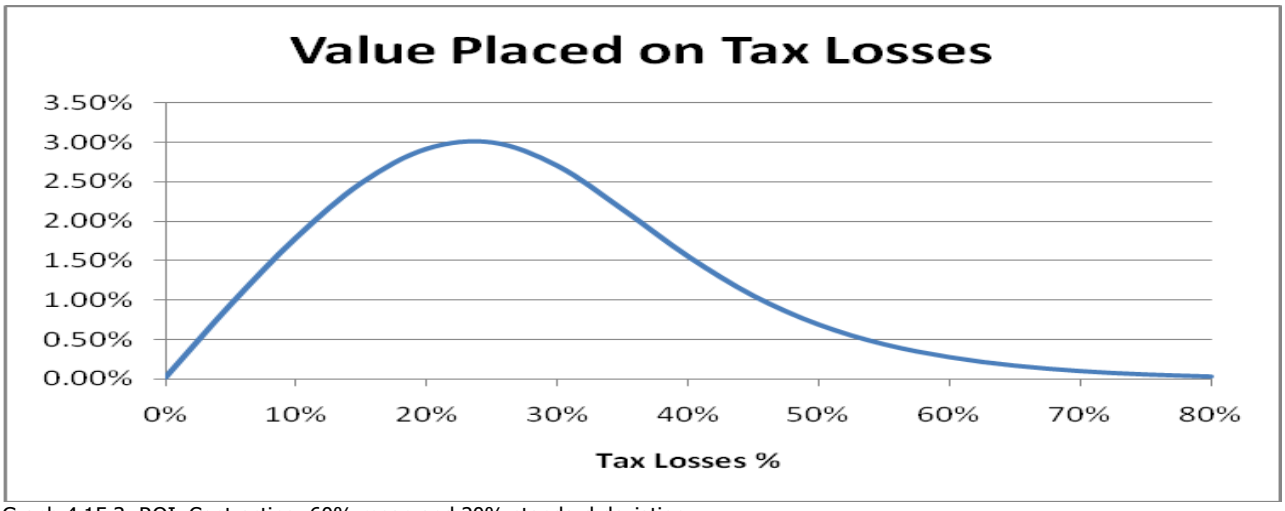


Graph 4.15.1: ROI, Contracting, 40% mean and 20% standard deviation

We can consider various alternative investment return distributions.



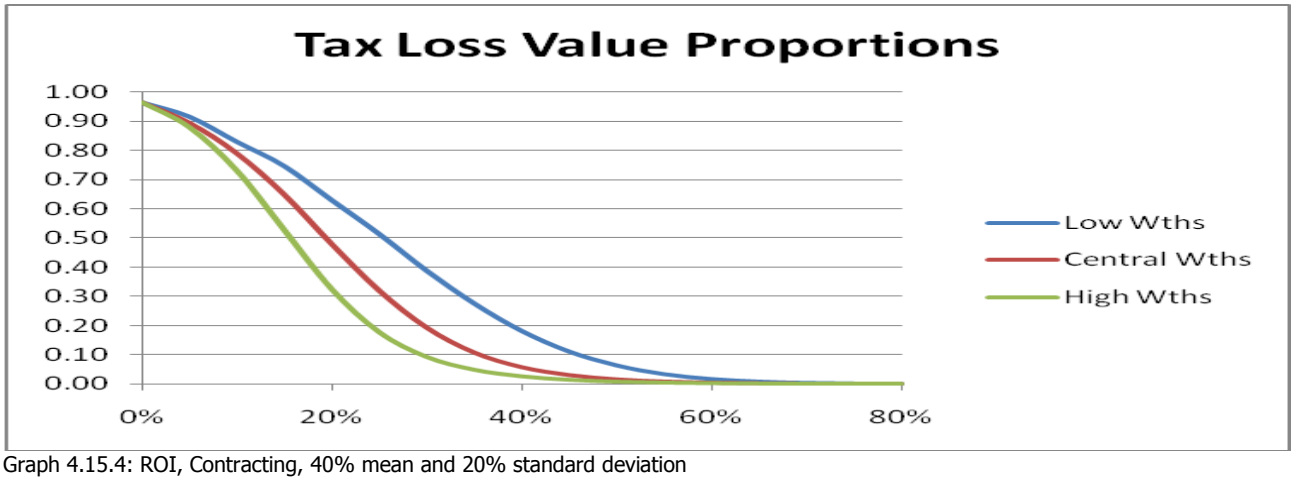
Graph 4.15.2: ROI, Contracting, 20% mean and 10% standard deviation



Graph 4.15.3: ROI, Contracting, 60% mean and 20% standard deviation

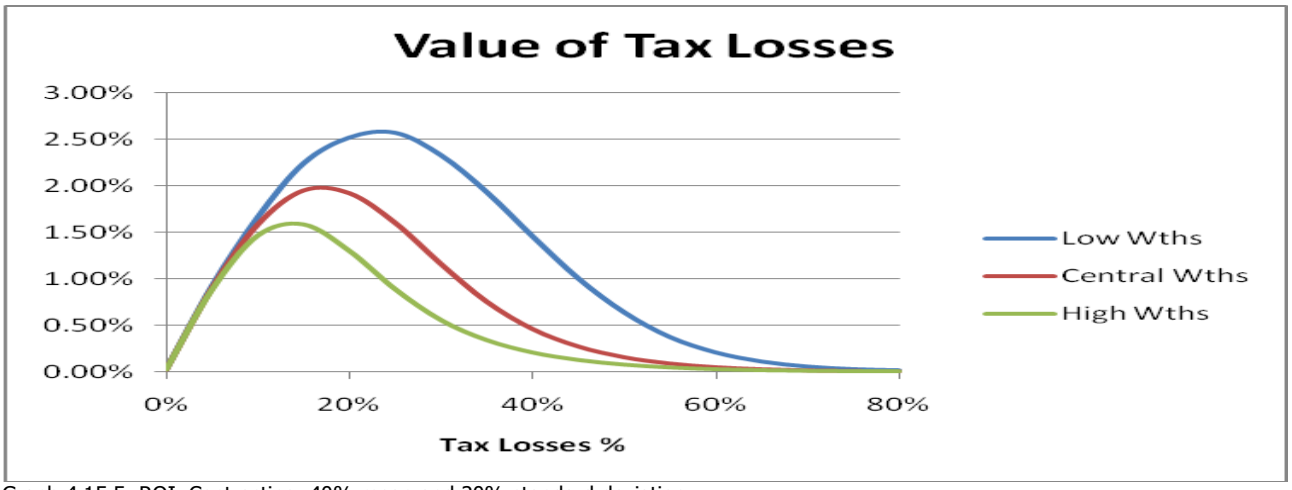
We can also show how the tax loss value proportions vary according to the withdrawals assumptions.

Withdrawal Rates (per 1 in force at outset)	Year 1	Year 2	Year 3	Year 4	Year 5
Low	10%	10%	10%	10%	55%
Central	20%	20%	20%	20%	15%
High	30%	30%	15%	15%	5%



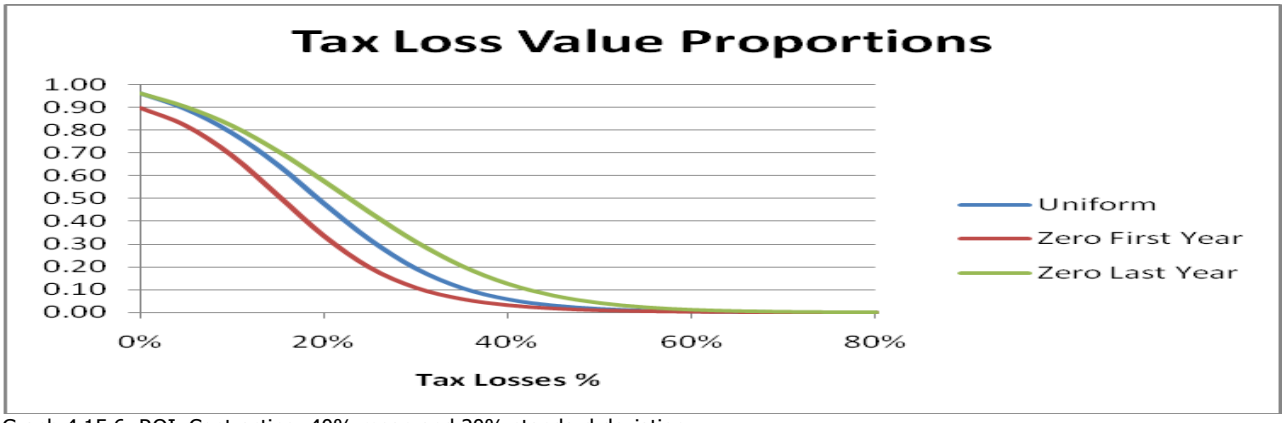
Graph 4.15.4: ROI, Contracting, 40% mean and 20% standard deviation

The tax loss value proportion figures are higher for lower withdrawal assumptions.



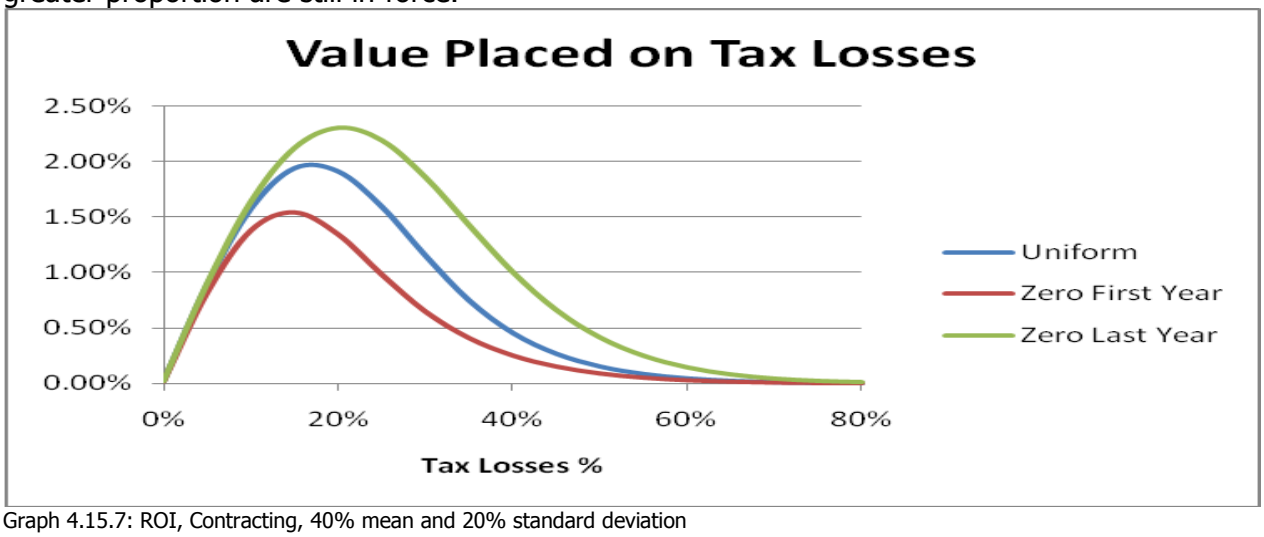
Graph 4.15.5: ROI, Contracting, 40% mean and 20% standard deviation

The values placed on tax losses are higher for lower withdrawal assumptions.
We can also consider how the tax loss value proportions vary according to the incidence of the investment return (with the same cumulative investment return over the five year period). Three senstivities are considered viz the central assumption of uniform return over the five year period and then secondly zero return in the first year and then thirdly zero return in the final year.



Graph 4.15.6: ROI, Contracting, 40% mean and 20% standard deviation

As expected, the tax loss value proportion figures are higher when the investment return accrues earliest. This is because this maximises the investment return at the time that the greater proportion are still in-force.



Graph 4.15.7: ROI, Contracting, 40% mean and 20% standard deviation

As expected, the value placed on tax losses figures are higher when the investment return accrues earliest.

The conclusions are that the tax loss value proportions and the values placed on tax losses (for contracting funds) are dependent on:

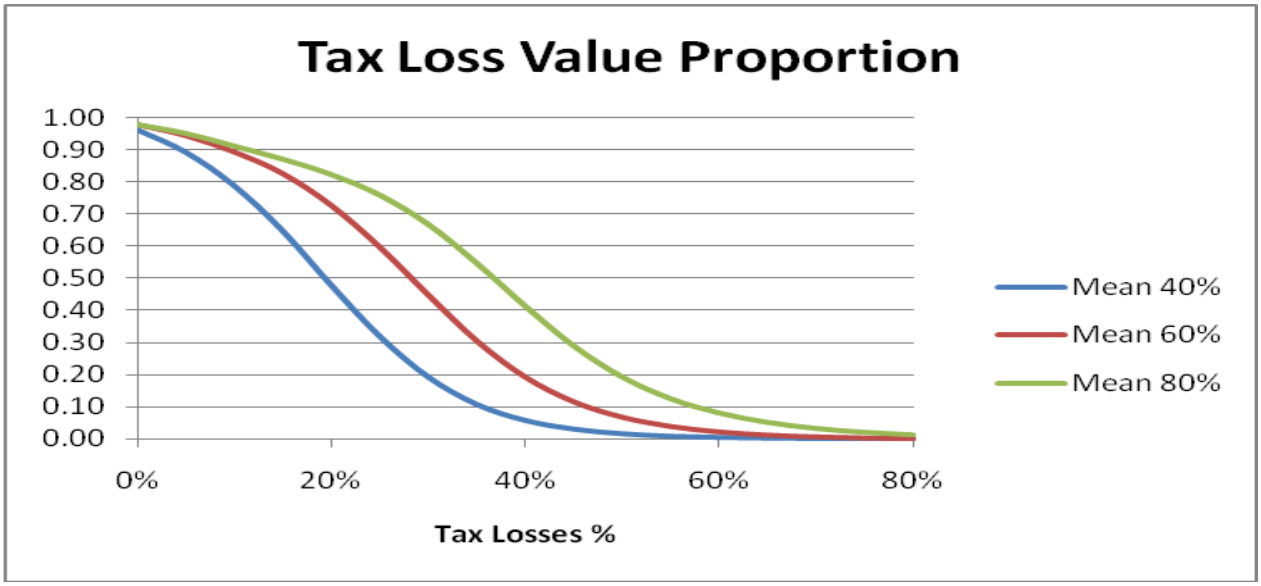
- The investment return distribution
- The assumed level of withdrawals
- The incidence of the investment retrun distribution

No single table of tax loss value proportion figures is correct. It is necessary to make assumptions about the key influencing factors and to monitor the experience of those factors to ensure that the assumptions remain valid in the light of emerging experience.

ROI Sensitivities

5.1. Investment Return Distribution

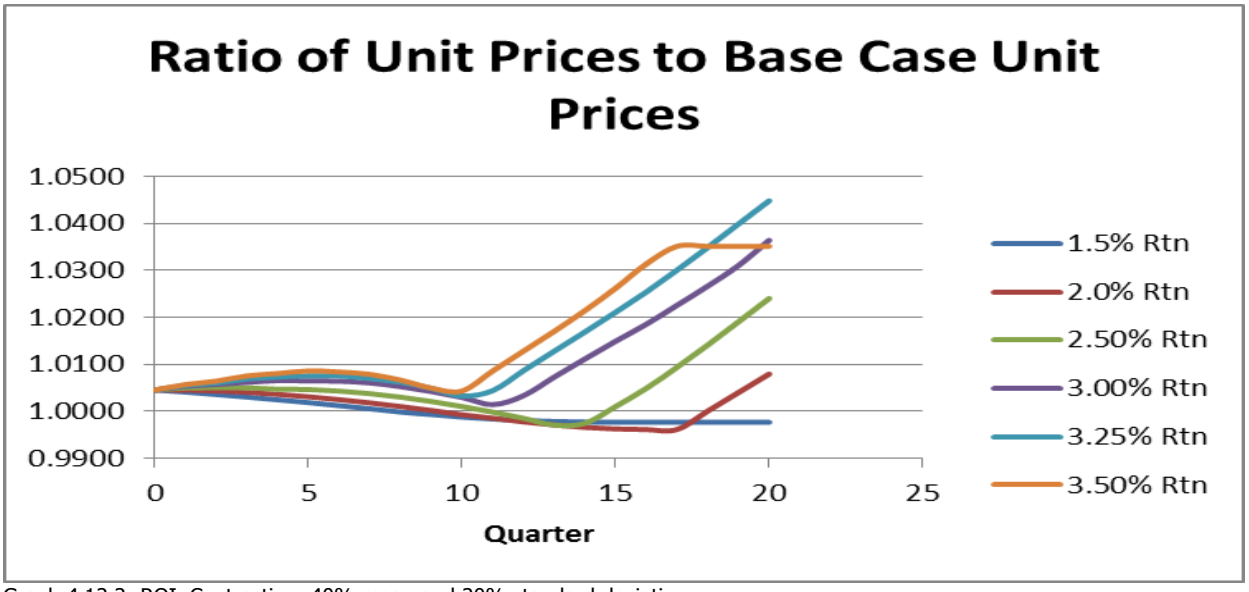
The tax loss value proportion figures based on a normal distribution for the 5-year investment return with a variable mean and 20% standard deviation (and assuming that investment return is uniform over the five year period) are: -



Graph 5.1.1: ROI, Contracting, x% mean and 20% standard deviation

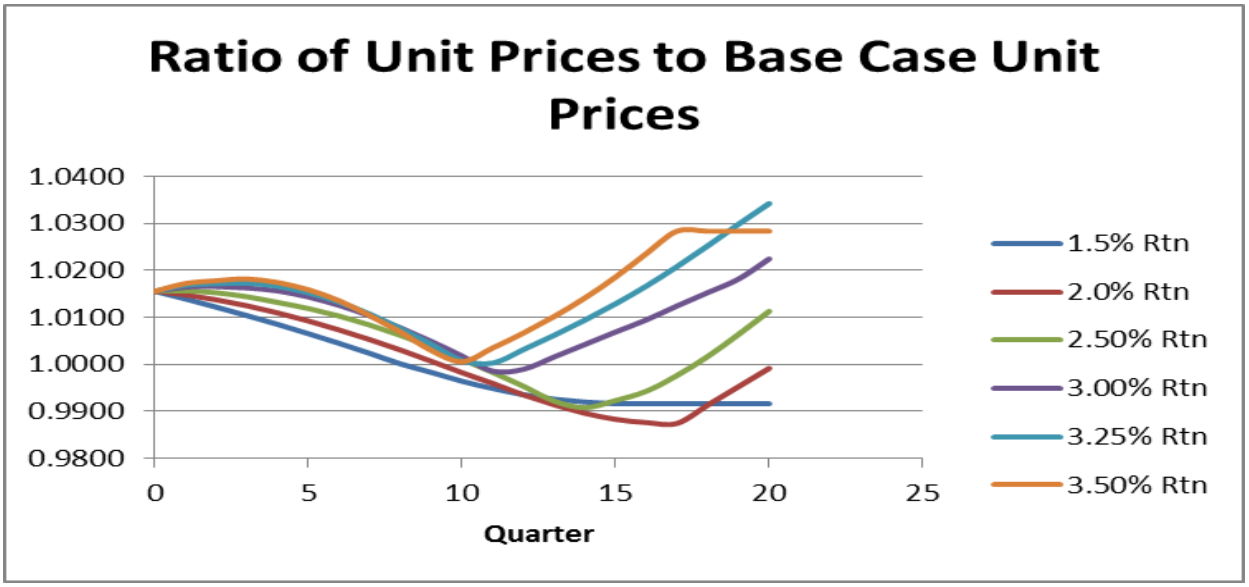
As expected, the higher the mean for the investment return distribution, the higher the tax loss value proportion figures.

The results calculated (based on a normal distribution for the 5-year investment return with a 40% mean and 20% standard deviation and assuming that investment return is uniform over the five year period), with residual term weighting were: -



Graph 4.12.2: ROI, Contracting, 40% mean and 20% standard deviation

However, if the tax loss value algorithm were based on a normal distribution for the 5-year investment return with a 60% mean and 20% standard deviation and assuming that investment return is uniform over the five-year period, the results would be much different.



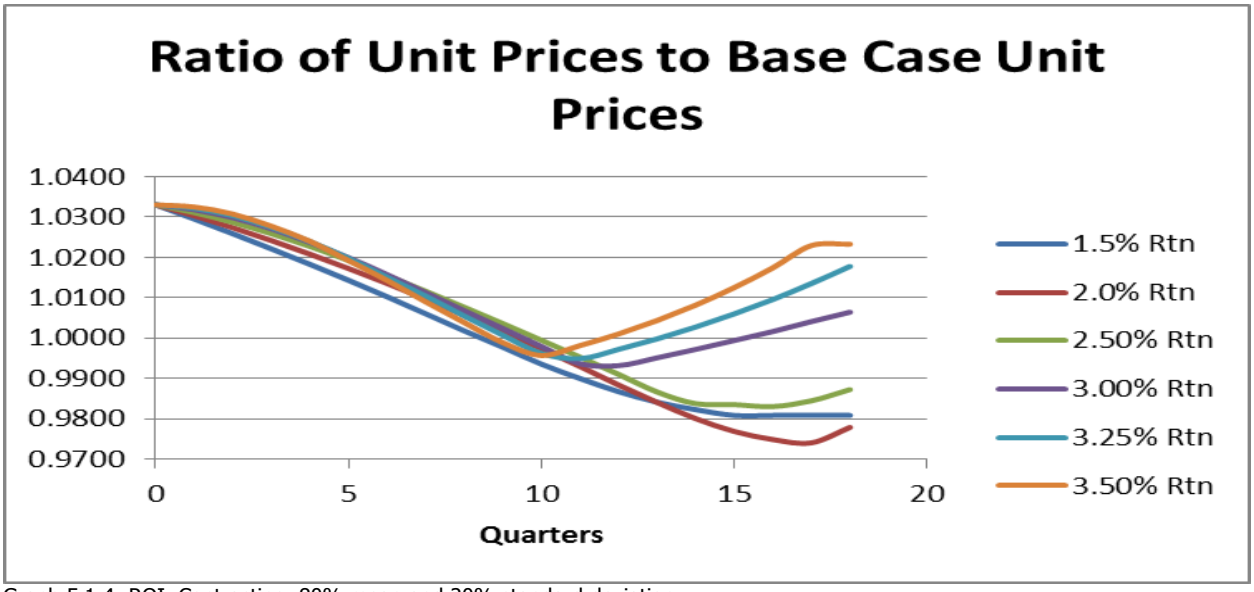
Graph 5.1.2: ROI, Contracting, 60% mean and 20% standard deviation

The key differences between graphs 4.12.2 and 5.1.2 are:

- The 5.1.2. graphs start at a much higher ratio as greater value is placed on the tax losses
- For lower investment return rates, the 5.1.2 graphs converge to smaller ratios (below 1)
- For higher investment return rates, the graphs converge to smaller ratios (above 1)

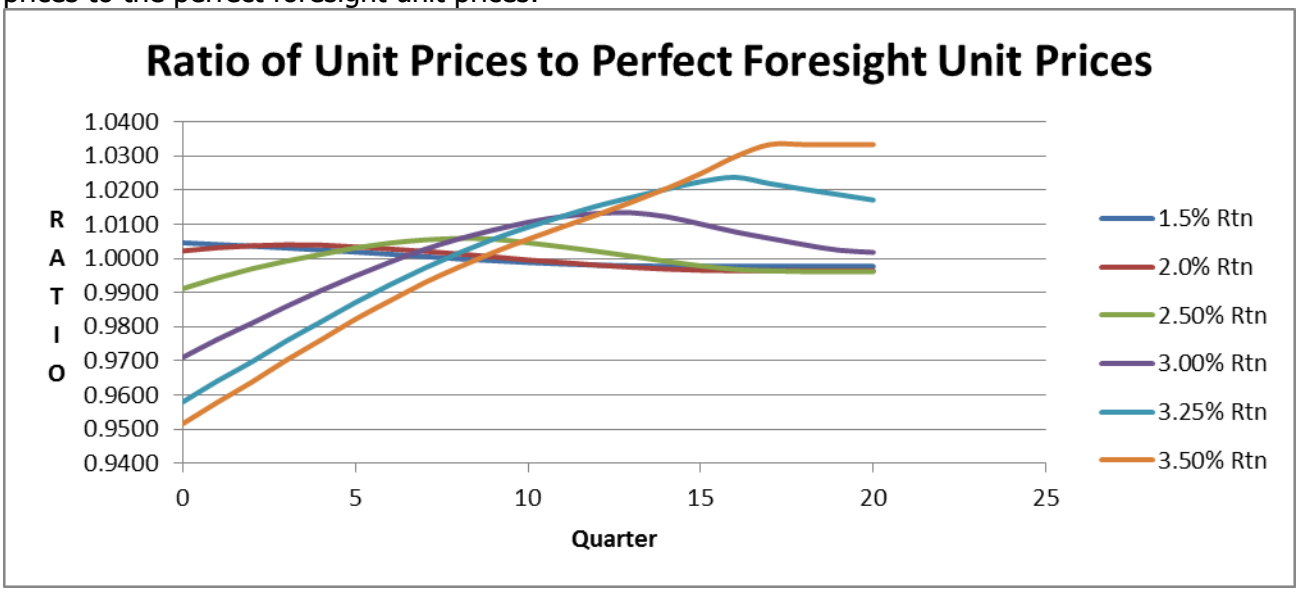
- The results are worse for lower investment return rates and better for higher investment return rates – this is to be expected as the assumed investment return distribution is more consistent with higher investment return rates

The effect is magnified further for an 80% mean.



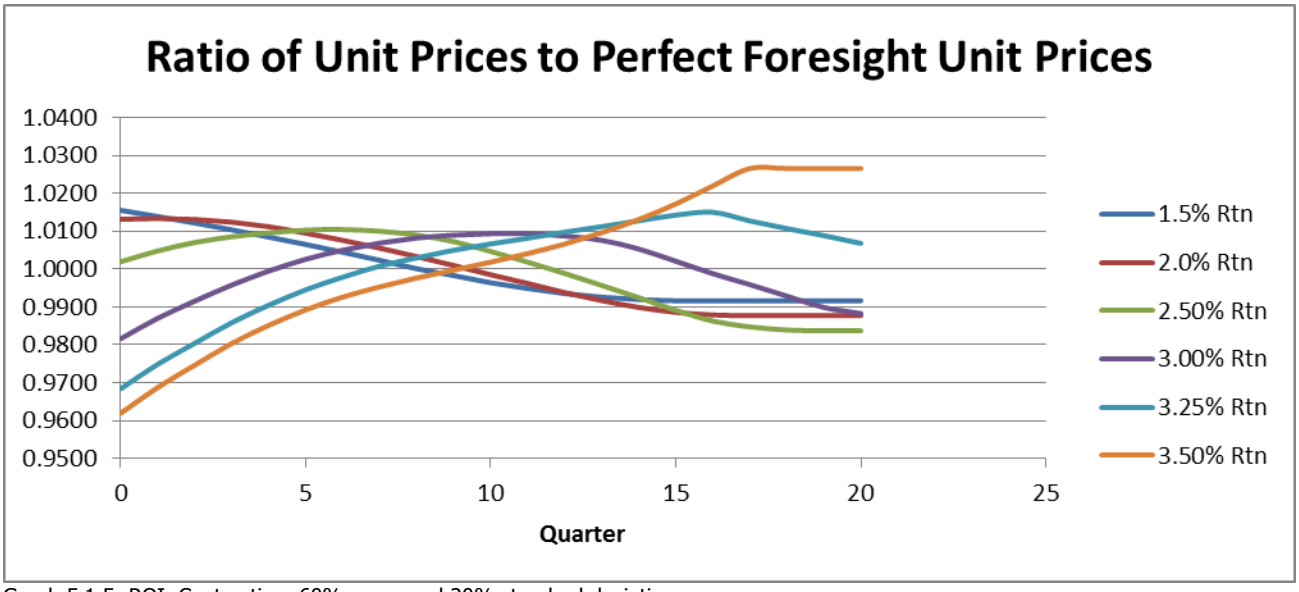
Graph 5.1.4: ROI, Contracting, 80% mean and 20% standard deviation

With the 40% mean, we have the following graphs of the comparison of the tax algorithm unit prices to the perfect foresight unit prices:



Graph 4.12.1: ROI, Contracting, Tax Algorithm, 40% mean and 20% standard deviation

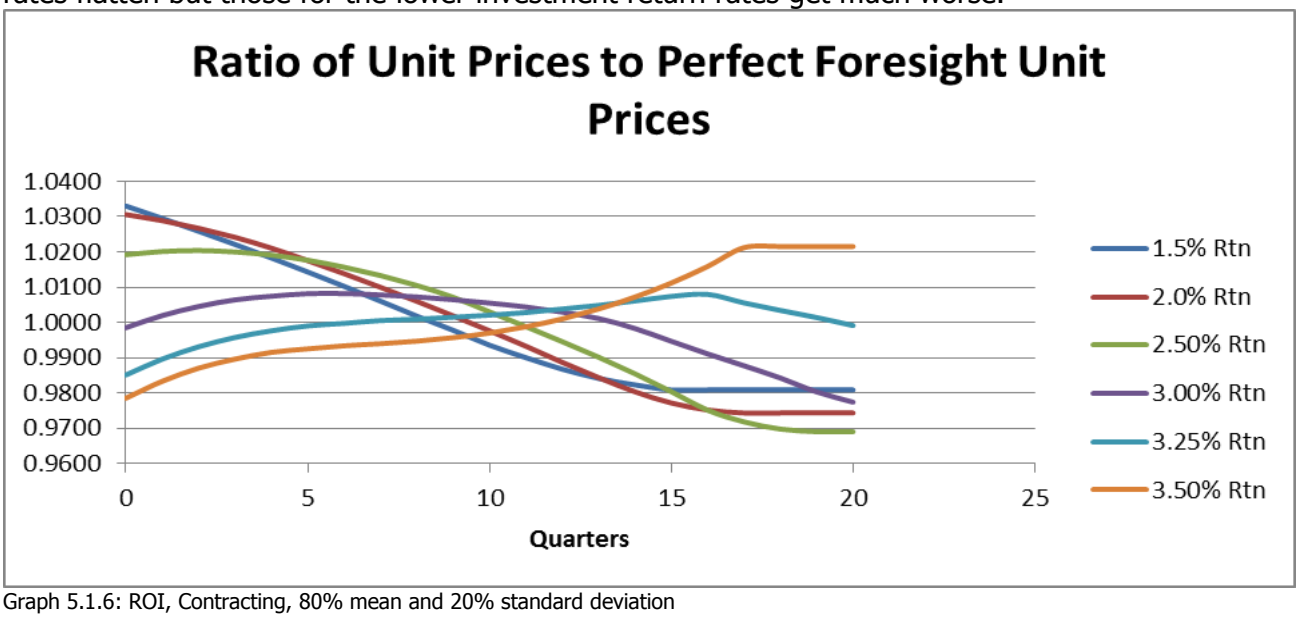
With the 60% mean, we have



Graph 5.1.5: ROI, Contracting, 60% mean and 20% standard deviation

Again we can see that the 40% mean works better for the lower investment return rates and the 60% mean works better for the higher investment return rates.

The effect is magnified further for an 80% mean. The graphs for the higher investment return rates flatten but those for the lower investment return rates get much worse.



Graph 5.1.6: ROI, Contracting, 80% mean and 20% standard deviation

The conclusion is that the accuracy of the investment return distribution underlying the [Tax Loss Value Proportion] figures is important. The (ratio of tax algorithm unit prices to perfect foresight unit prices) graphs will be relatively flat for investment return rates that have a high probability in the investment return distribution and sloping for investment return rates that have a low probability in the investment return distribution. Given that it is better to have

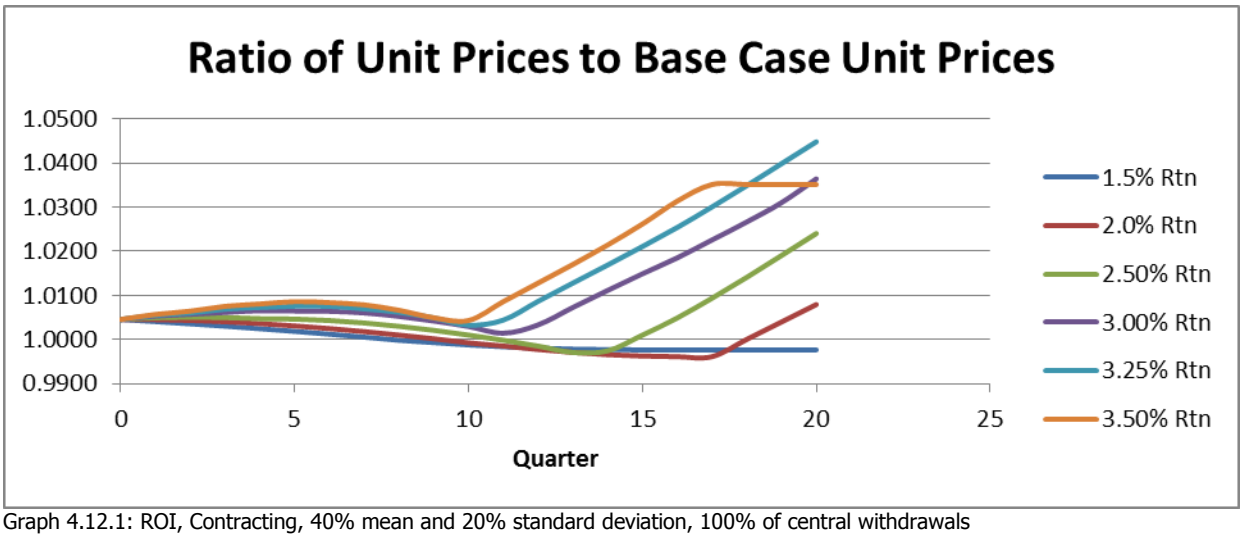
upward sloping rather than downward sloping graphs, care should be taken to ensure that the investment return distribution is conservative.

5.2. Variations in Experience Withdrawal Rates – Lower Rates

The central scenario is based on the approach as per section 4.12 with [Residual Term Weighting Factor] with the [Tax Loss Value Proportion] figures based on a mean investment return of approx 40% and central withdrawal assumptions.

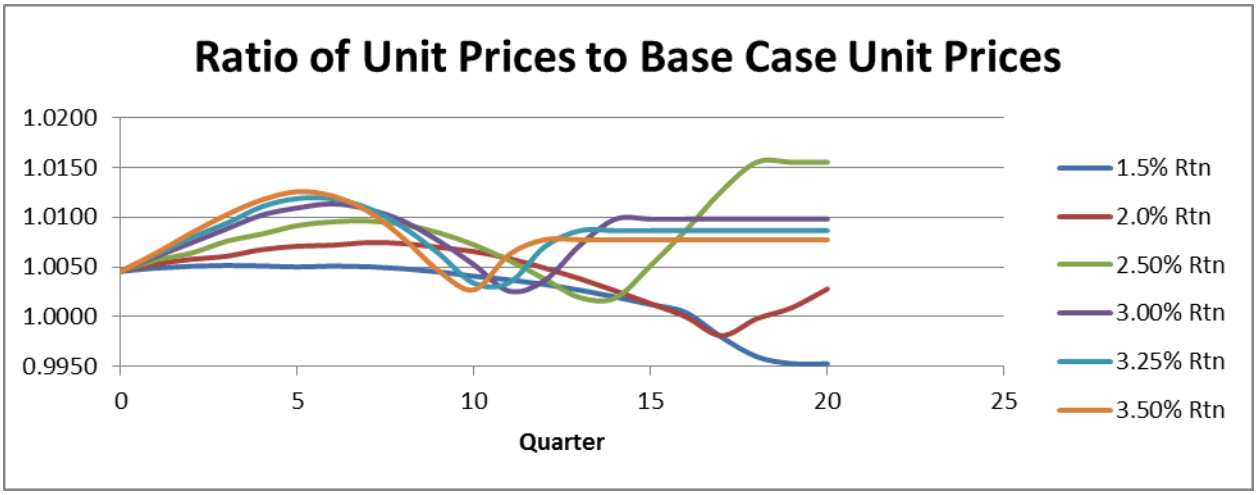
Suppose the withdrawal rates were:

Withdrawal Rates (per 1 in force at outset)	Year 1	Year 2	Year 3	Year 4	Year 5
	10%	10%	10%	10%	55%



Graph 4.12.1: ROI, Contracting, 40% mean and 20% standard deviation, 100% of central withdrawals

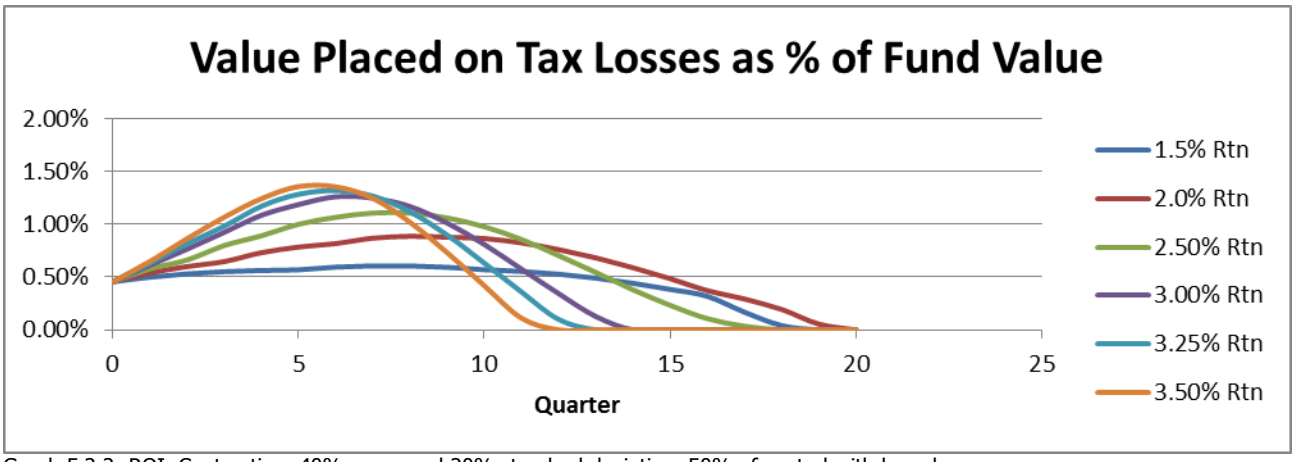
The sensitivity results are as follows:



Graph 5.2.1: ROI, Contracting, 40% mean and 20% standard deviation, 50% of central withdrawals

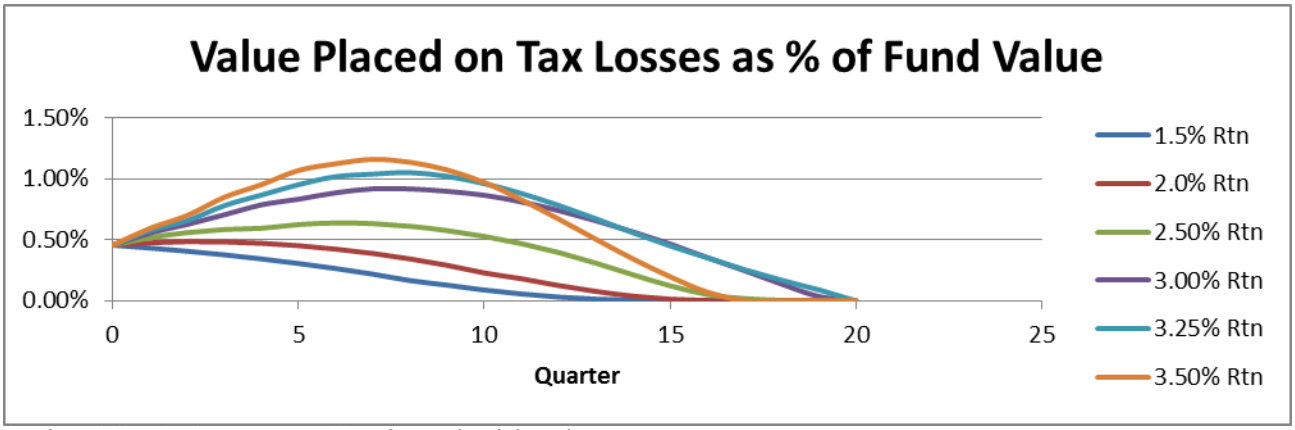
Graph 5.2.1 gives quite different results compared to those of the graph 4.12.1 central scenario.

In all cases, the lower rates of withdrawal result in tax losses as a percentage of the fund value reducing much more quickly and hence a higher value is placed on tax losses by the tax loss value algorithm. In fact, in scenario 3 the tax losses are fully extinguished. This faster rate of reduction in tax losses results in higher ratios in general. However the problem is with scenario 1 where the 55% withdrawal rate (91.7% per in force at start year 5) results in a diminution in unit price unless the unit pricing basis is adjusted for the processing of those exits.



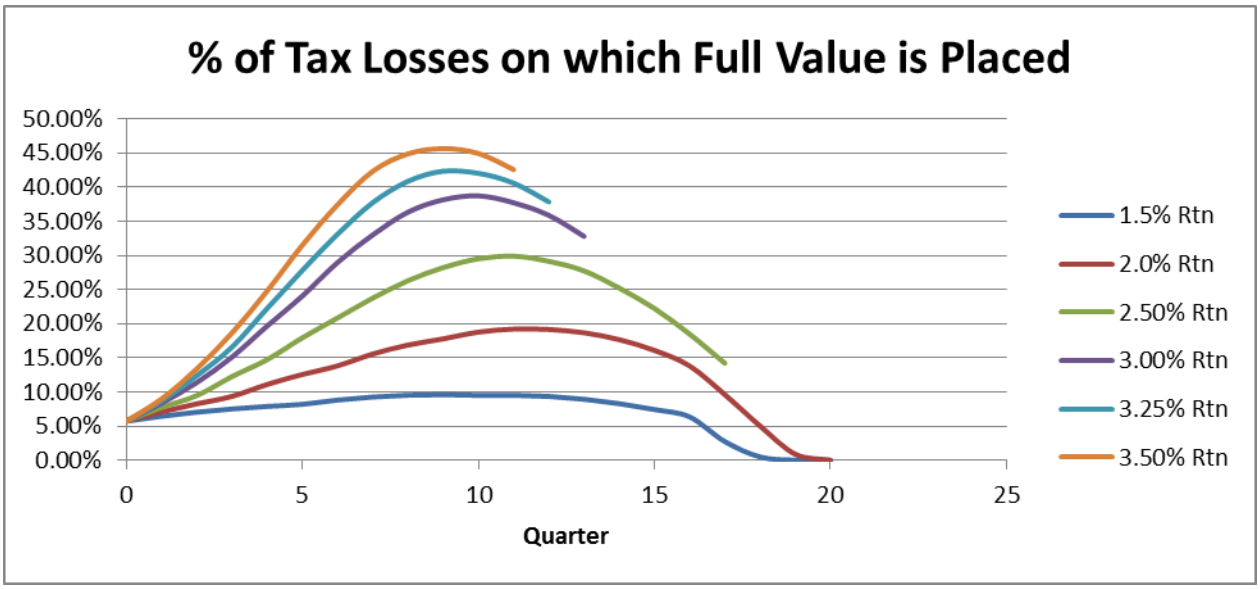
Graph 5.2.2: ROI, Contracting, 40% mean and 20% standard deviation, 50% of central withdrawals

The value placed on tax losses is higher than of the central scenario (results shown below) because the tax losses %'s are lower.

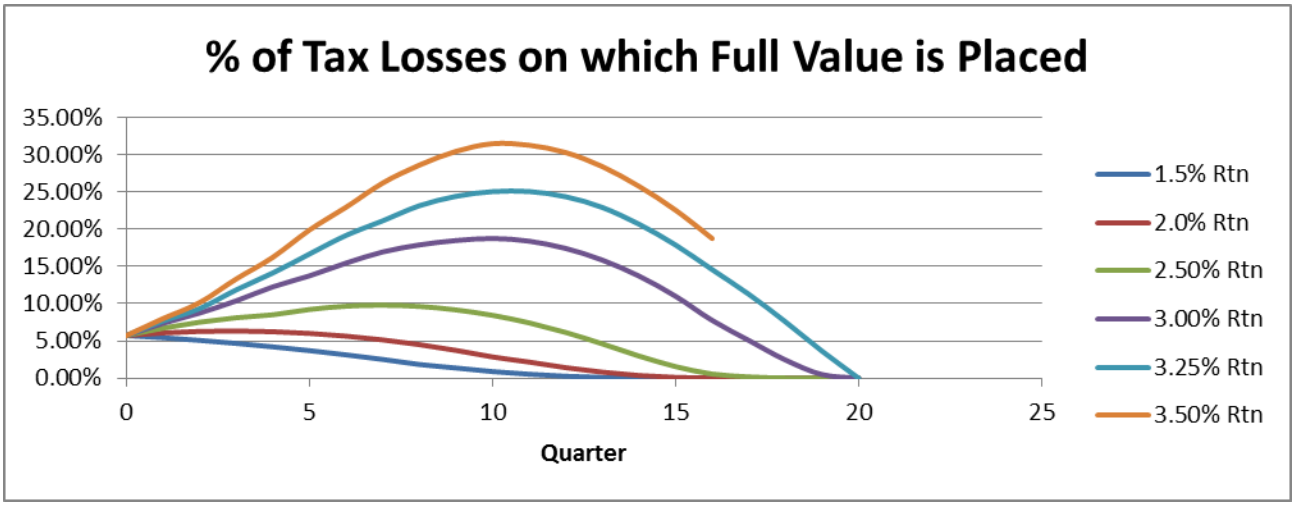


Graph 4.12.3: ROI, Contracting, 100% of central withdrawals

Full value is placed on a greater proportion of tax losses.



Graph 5.2.2: ROI, Contracting, 40% mean and 20% standard deviation, 50% of central withdrawals



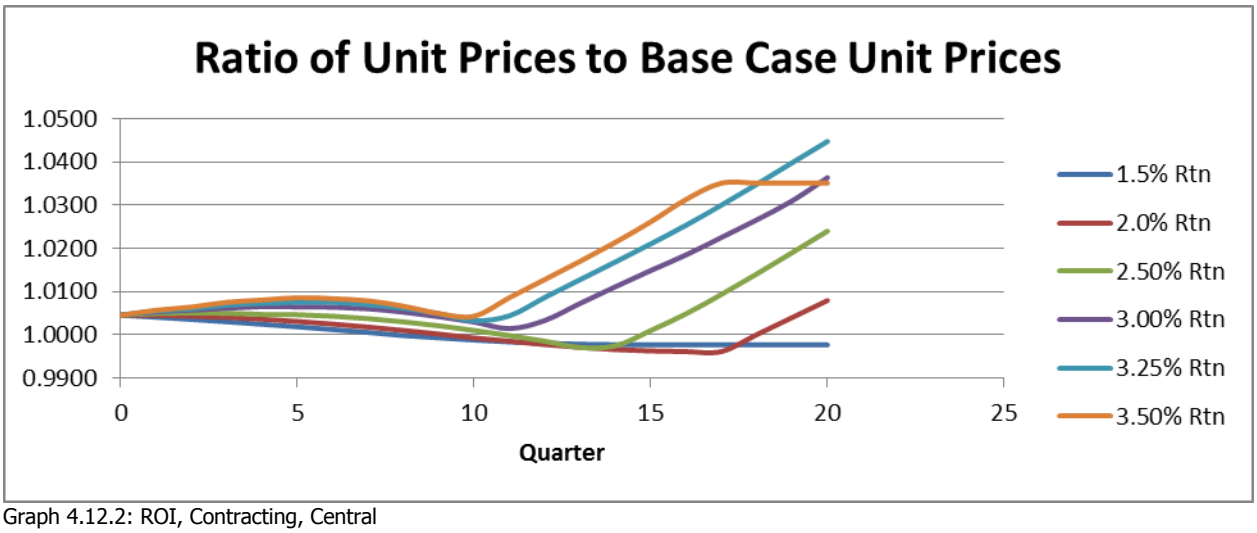
Graph 4.12.4: ROI, Contracting, 100% of central withdrawals

5.3. Variations in Experience Withdrawal Rates – Higher Rates

The central scenario is based on the approach as per section 4.12 with [Residual Term Weighting Factor] with the [Tax Loss Value Proportion] figures based on a mean investment return of approx 40% and central withdrawal assumptions.

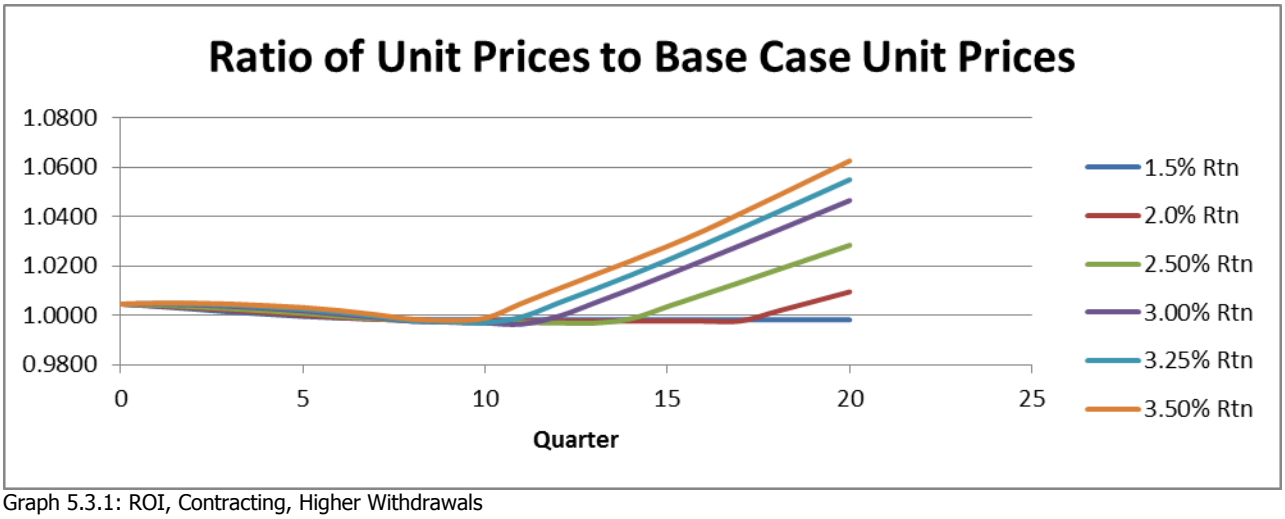
Suppose the withdrawal rates were:

Withdrawal Rates (per 1 in force at outset)	Year 1	Year 2	Year 3	Year 4	Year 5
	30%	30%	15%	15%	5%



Graph 4.12.2: ROI, Contracting, Central

The sensitivity results are as follows:

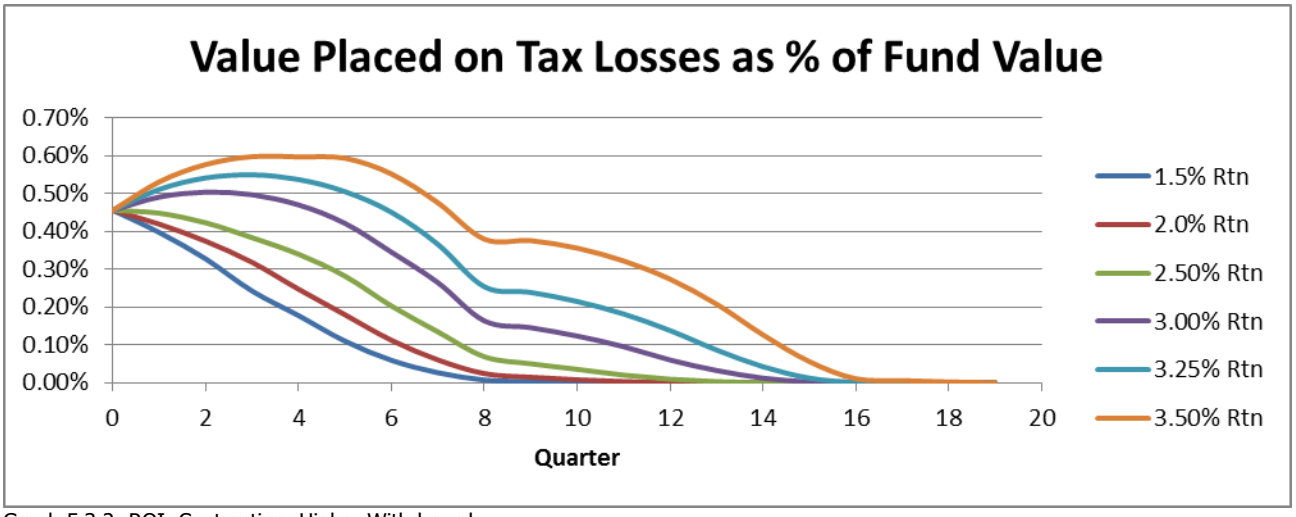


Graph 5.3.1: ROI, Contracting, Higher Withdrawals

The prominent feature here is that the ratios for higher investment return rates at later durations are higher reflecting the fact that the tax algorithm underpays for exits at earlier durations and thus the higher the withdrawals the greater the benefit conferred on the later duration exits.

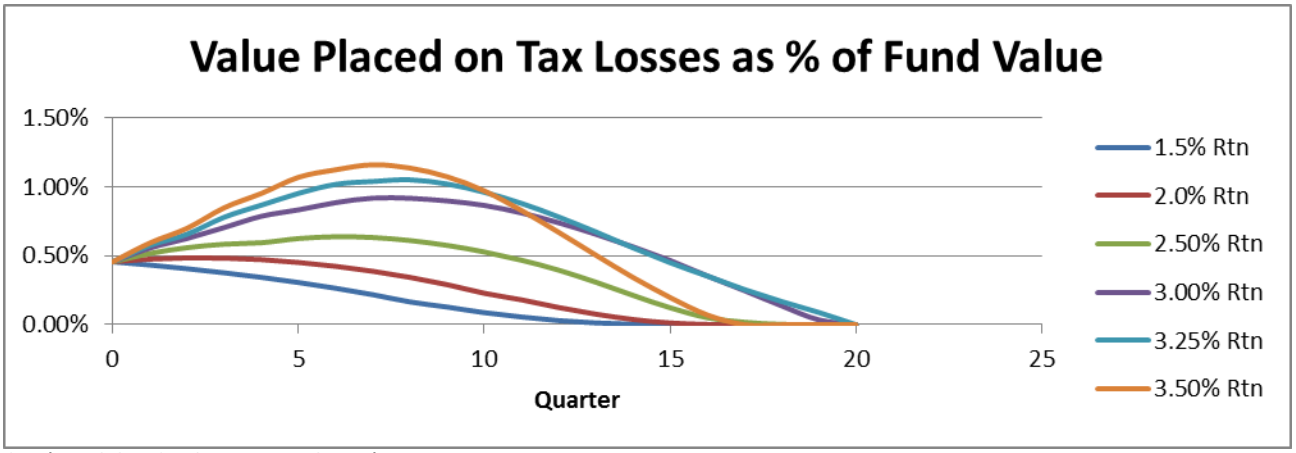
The graphs in graph 5.3.1 are flatter at the earlier durations. This is because the [Value of Tax Losses] is a declining function (see graph 4.15.1 in section 4.15) at the 40% tax losses inflection point and the higher withdrawals result in higher resultant percentage tax losses and hence a smaller value placed on tax losses and hence smaller unit prices.

The tax loss results are:



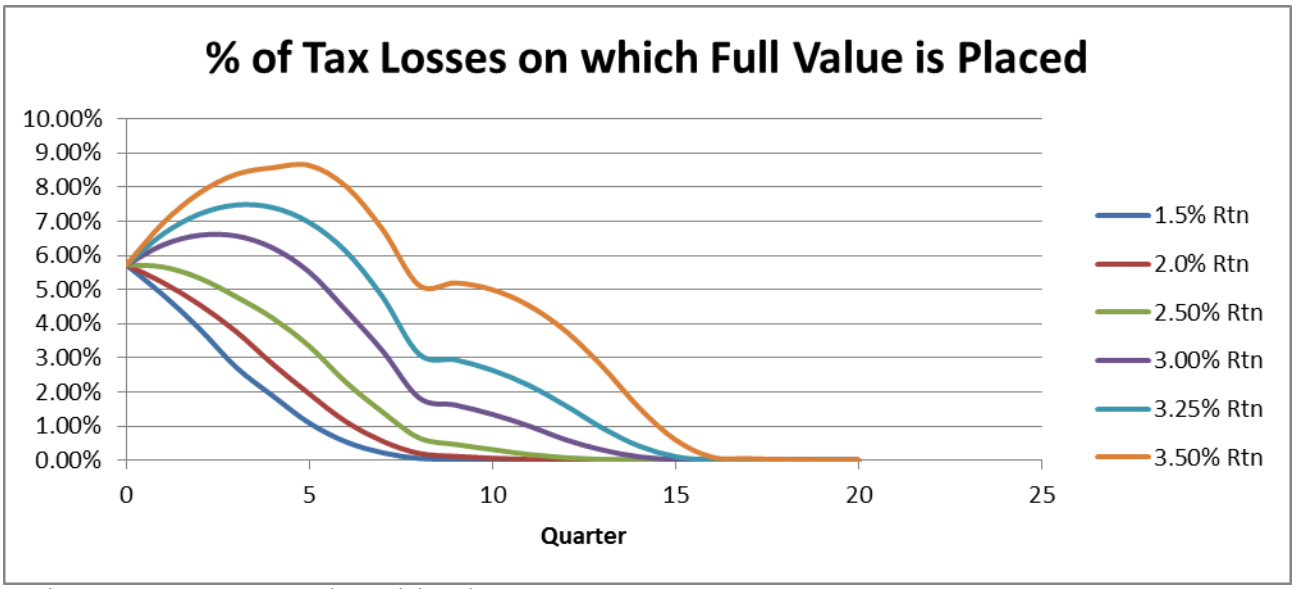
Graph 5.3.2: ROI, Contracting, Higher Withdrawals

The value placed on tax losses is less than of the central scenario (results shown below) because the tax losses percentages are higher.

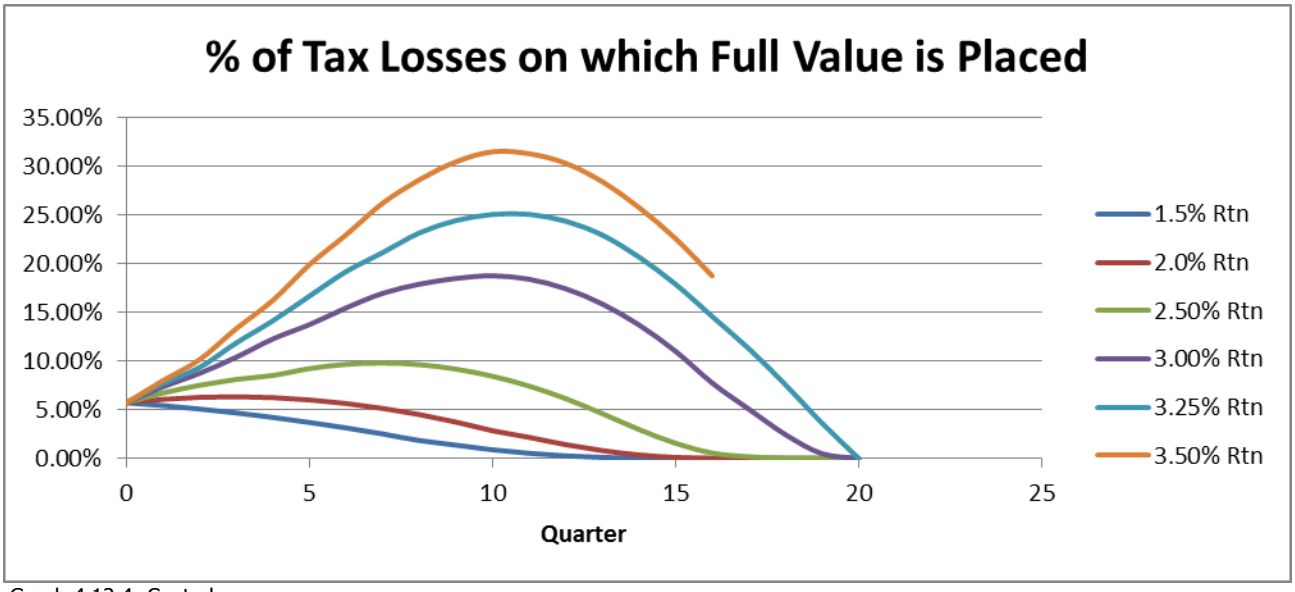


Graph 4.12.3: ROI, Contracting, Central

Full value is placed on a smaller proportion of tax losses.



Graph 5.3.2: ROI, Contracting, Higher Withdrawals



Graph 4.12.4: Central

ROI Funds - Expanding Position

6.1. Generalised Unit Pricing Basis

In general the unit prices are used both for unit transactions between incoming unit-holders and continuing unit-holders and for unit transactions between exiting unit-holders and continuing unit-holders.

For the purpose of our discussion, let us label the most appropriate price for unit transactions between incoming unit-holders and continuing unit-holders as "CRP" i.e. the 'creation price' and the most appropriate price for unit transactions between exiting unit-holders and continuing unit-holders as "CLP" i.e. the 'cancellation price'.

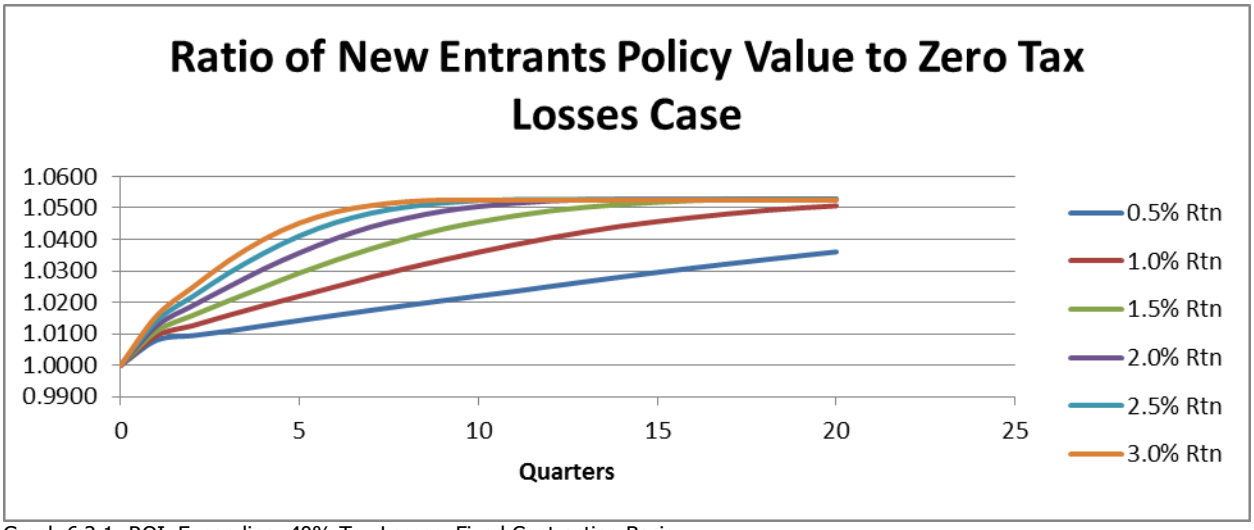
The difficulty is that it may be necessary to operate within the straight-jacket of a single pricing basis to be applied equally to both inflows and outflows. The fairest approach in those circumstances to striking a single unit price would appear to be to use a single price which is a weighted average of the "CRP" and "CLP" prices.

Thus suppose that incoming unit-holders were fraction n of the existing fund and exiting unit-holders were fraction w of the existing fund. The most appropriate single unit price would then be (w* CLP + n * CRP)/ (w + n).

If one accepts that proposition, the approach to valuing tax losses in unit pricing for an expanding fund is relevant even for life companies whose unit funds are in a contracting position. This is because on a generalised unit pricing basis the unit price should be a weighted average of the contracting basis and expanding basis unit prices. It is thus necessary to separately calculate cancellation and creation unit prices and separate [Tax Loss Value Proportion] figures are required for the cancellation and creation unit prices.

6.2. Consequences of Placing No Value on Tax Losses

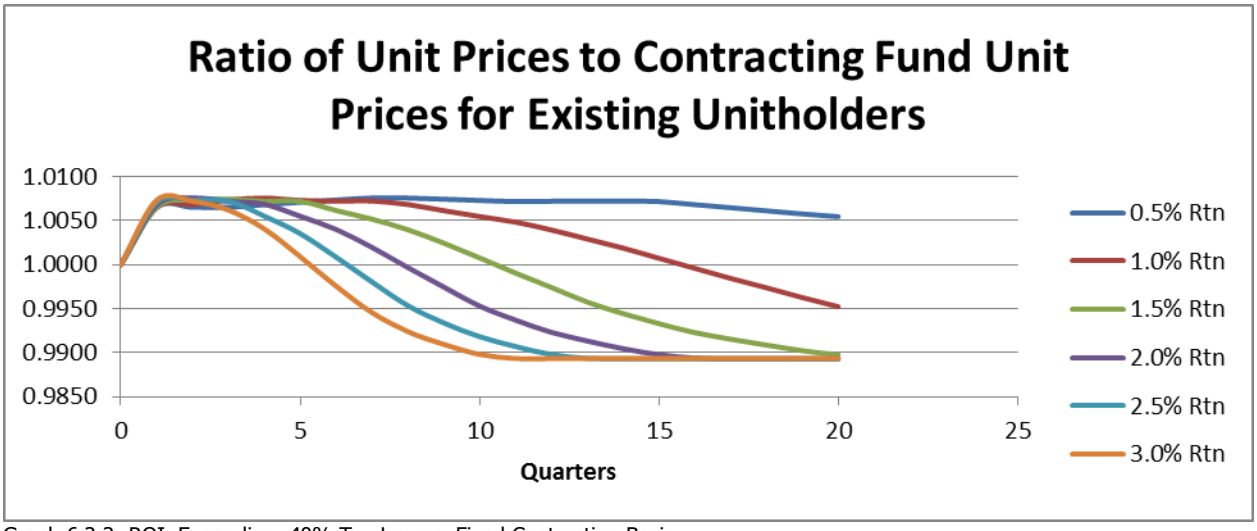
Suppose the fund is in a contracting position with 40% tax losses and value is being placed on tax losses based on the tax loss value algorithm developed for contracting funds.
Suppose the unit pricing basis is left unchanged for a [New Entrant % Inflow] of 25%.
The results would be:



Graph 6.2.1: ROI, Expanding, 40% Tax Losses, Fixed Contracting Basis

The 'Fixed Contracting Basis' means that value is being placed on tax losses based on the tax loss value algorithm developed for contracting funds (other than at the new entrant point itself).

New entrants would clearly benefit (as can be seen from graph 6.2.1) at the expense of existing unit-holders (as can be seen from graph 6.2.2) because they will receive some future investment return tax-free whereas the existing unit-holders will receive less future investment return tax-free than they otherwise would have.

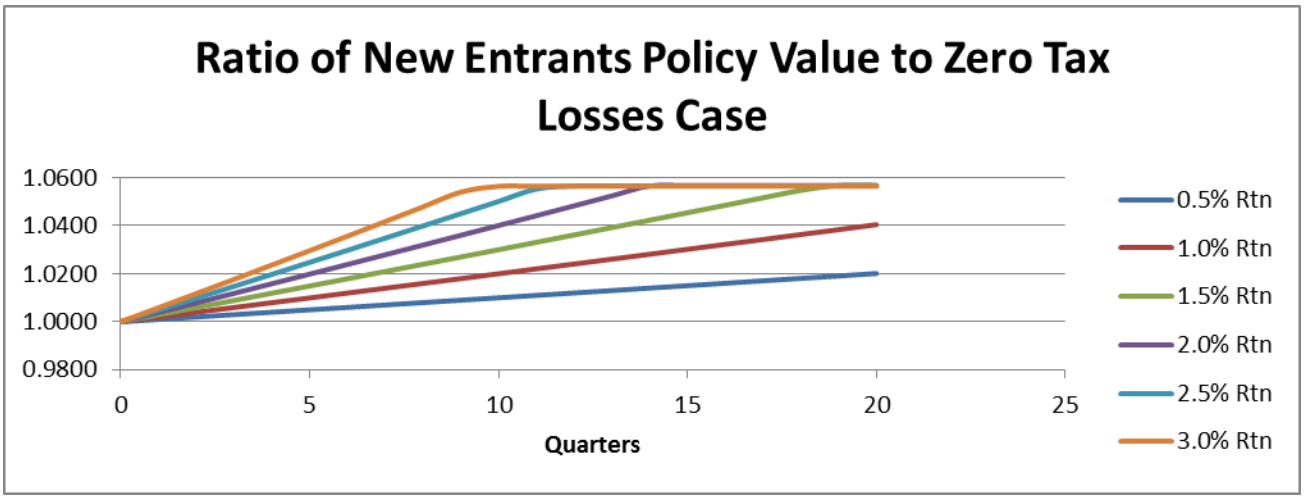


Graph 6.2.2: ROI, Expanding, 40% Tax Losses, Fixed Contracting Basis

Graph 6.2.2 shows the ratio of the resultant unit prices (where no value is placed on the tax losses at the new entrant point and contracting fund value at other pricing points) to the unit prices that would have resulted for the existing unit-holders with no new entrants (based on contracting fund value for tax losses at other pricing points).

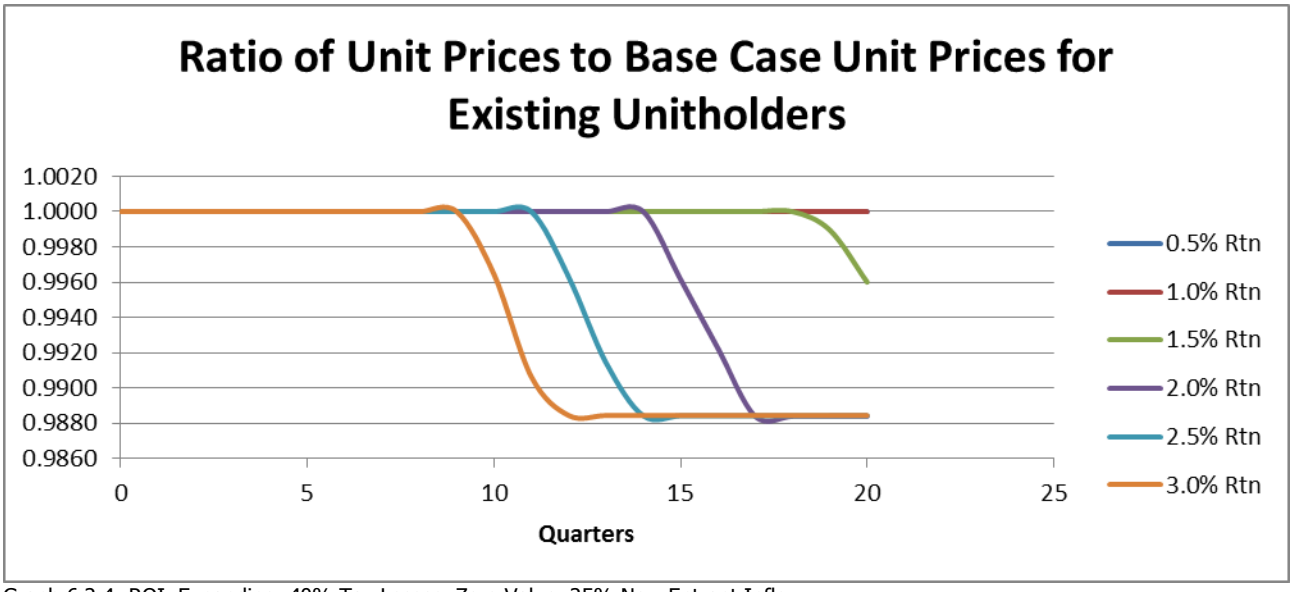
There is an unusual feature for existing unit-holders in that for very low rates of investment return the unit prices increase. This is due to the feature that for a contracting fund (with 40% tax losses) that the value placed on tax losses reduces as the tax loss percentage increases. The effect of the [New Entrant % Inflow] of 25% reduces the tax loss percentage and the resultant increase in the value placed on tax losses is more than 25% resulting in an increase in the unit price.

Note: The same pattern is observed if no value (as distinct from contracting value) is being placed on tax losses as can be seen from graph 6.2.3.



Graph 6.2.3: ROI, Expanding, 40% Tax Losses, Zero Value, 25% New Entrant Inflow

As regards the position of existing unit-holders, it can be seen from graph 6.2.4 below, that there is no effect for lower rates of investment return (this is because at those investment return rates the tax losses do not get extinguished and so no value accrues from the tax losses) but at higher rates an effect arises. Graph 6.2.4 is the 40% tax losses scenario but for lower rates of tax losses the effect on existing unit-holders would arise for lower rates of investment return. This is because clearly the level of investment return required to extinguish the tax losses (and hence for which a unit pricing impact arises) is dependent on the original tax loss percentage.



Graph 6.2.4: ROI, Expanding, 40% Tax Losses, Zero Value, 25% New Entrant Inflow

It is clear from the results that it is necessary to place a different value on tax losses for the purposes of the specific tax loss transfer transaction arising from the [New Entrant % Inflow] of 25%.
A tax loss value algorithm for expanding funds is clearly required.

6.3. Philosophies for Placing Value on Tax Losses

It was more-straightforward to formulate a pricing basis philosophy for funds in a contracting position. It was based on a determination of the value obtained by continuing unit-holders from the tax losses left behind by exiting unit-holders.

The position is more complicated for funds in an expanding fund position. This is because there are a number of possible approaches.

- Approach 1: The incoming unit-holders pay for the value they accrue from the transfer to them of a share of the existing tax losses in the fund
- Approach 2: The incoming unit-holders compensate the existing unit-holders for the reduction in tax-free investment return the existing unit-holders receive as a consequence of the tax losses transferred to the incoming unit-holders

In some circumstances, the two approaches would give similar results. However in other circumstances they could give very different results.

Suppose there were 25% new unit-holders.
Suppose a fund had 20% tax losses. The tax losses would become 16% (20%/1.25) per unit-holder. Suppose with perfect foresight we knew that future investment return would be 20%

per unit-holder. This would mean that all tax losses would be relieved. All unit-holders would receive capital gains 16% tax-free and 4% taxable compared to 20% tax-free previously for existing unit-holders and 20% taxable for incoming unit-holders if there were no tax losses.
Utilising Approach 1, the tax losses would be valued at 3.448% (20% tax losses at 20% tax with discounting at 16.0%). It can be shown that the final unit price (after the investment return) then increases by 20% compared to the original unit price (exclusive of the value placed on tax losses which is clearly the same as would have obtained if there were no new unit-holders. Hence in this scenario, the 3.448% figure is clearly the same answer as Approach 2 would have given because with that figure the existing unit-holders receive the same level of tax-free investment return as if there were no new unit-holders.
Note: The reason that the unit price increases by 20% notwithstanding that the taxable capital gains is 16% tax-free and 4% taxable (rather than 20% tax-free) implying 19.2% is that there is a further effect from the basis on which on which the new entrants were allocated units i.e. placing value on the tax losses reduced the number of units that the new entrants would otherwise have received and hence increased the subsequent unit price. The difference between the ratios of 1.25 and 1+0.25/1.03448 applied to a factor of 1.192 gives a revised factor of 1.20.

If however the fund had 80% tax losses, the tax losses would become 64% (i.e. 80/1.25) per unit-holder. With the same future investment return of 20% per unit-holder, all unit-holders would receive 20% tax-free compared to 20% tax-free previously for existing unit-holders and 20% taxable return for incoming unit-holders if there were no tax losses.
The existing unit-holders would receive 20% tax-free return as before and so Approach 2 would suggest that no compensation is required from the incoming unit-holders. However the incoming unit-holders receive 20% tax-free return and so Approach 1 would require that the incoming unit-holders pay consideration in respect of this. The two approaches would give different results.

The authors recommend that Approach 1 is used.
The rationale is that:

- Approach 1 is designed to ensure that new entrants receive the same after-tax investment returns as if they invested into an otherwise identical fund with no tax losses. It might be that existing unit-holders benefit from this approach but that is because circumstances arose where the tax losses of the existing unit-holders could be reasonably sold to new unit-holders at a fair price i.e. the benefit is arising from the realisation of a contingent asset.
- With Approach 2, the method might result in a zero valued being placed on tax losses notwithstanding that the new entrants would get a clear and significant benefit from receiving a share of the tax losses.

However, it is clear from Graph 6.6.6 in Section 6.6 that Approach 2 on best estimate assumptions would be disadvantageous to new entrants leaving before the expiry of the [New Entrant Investment Term] with no benefit to those remaining until then and afterwards i.e. new entrants would be better off in an otherwise identical fund with no tax losses. Thus some conservatism in the assumptions in favour of new entrants is required in the calculation basis.
This conservatism is reasonable as the new entrants are paying an immediate price for a contingent benefit.

6.4. Parameters for [Tax Loss Value Proportion]

The appropriate value to place on tax losses for the tax loss transfer transaction between new unit-holders and existing unit-holders for a fund is dependent on a number of parameters including:

- The [Tax Loss %]
- The [New Entrant % Inflow]
- The [New Entrant Investment Term]
- The [Investment Return Rate]
- Whether or not to include an adjustment for the value placed on tax losses at the end of the [New Entrant Investment Term] (e.g. perhaps based on the tax loss algorithm figures for a contracting fund.

Using Approach 1, the principle underlying the calculation of the value to be placed on tax losses for the tax loss transfer transaction is that the value of new entrants' policies at the end of the [New Entrant Investment Term] having invested into the fund should be identical to what the value would have been if the new entrants had invested in an otherwise identical fund with no tax losses.

In practice, new entrants will enter over a period of time. This presents computational difficulties in that ideally the calculation of the value to be placed on tax losses at a particular unit pricing point should include assumptions about the proportion of new entrants at each pricing point up to and including the [New Entrant Investment Term] and the value to be placed on tax losses for each of those pricing points. The authors have not sought to generalise the calculation formula to that extent. The authors have made an implicit assumption without mathematical evidence that the results of assuming say a 2.08% non-compound new entrant rate for a period of 12 months is approximately the same as new entrants of 25% at the outset. This explains why the [New Entrant % Inflow] figures in the examples are so high.

6.5. Quantifying the [Tax Loss Value Proportion]

A straight-forward way to derive the [Tax Loss Value Proportion] figures for a specific [Tax Loss %] using Approach 1 would be to:

- Assumptions
    a. [New Entrant % Inflow]
    b. [New Entrant Investment Term]
    c. [Investment Return Rate]

- Project the fund using the [Investment Return Rate] and the [New Entrant % Inflow] on two bases viz Projection 1 with the tax losses and Projection 2 without the tax losses (where the size of the initial fund for both projections is the same)
- Derive the investment return amounts and tax charges for each period for each projection
- For each period, determine [Tax Charge (Projection 2) – Tax Charge (Projection 1)] + [Tax Rate] * {[Investment Return (Projection 1)] - [Investment Return (Projection 2)]}. Note: The second part of the term is required to adjust for the fact that the investment return in the two projections differs because the fund values differ as a result of the different tax charges.
- Discount the result at the [Investment Return Rate] net of tax. This gives the [Adjusted Reduction in Tax Charges (Period)] figure.
- Total the [Adjusted Reduction in Tax Charges (Period)] figures over all periods up to and including the [New Entrant Investment Term] to derive [Total Adjusted Reduction in Tax Charges]. Note: If discounting was not applied, the total would be determined as [Sum of Tax Charges (Projection 1)] – [Sum of Tax Charges (Projection 2] + [Tax Rate] * {[Investment Return (Projection 1)] - [Investment Return (Projection 2)]}.
- The [Total Adjusted Reduction in Tax Charges] figure is expressed as a ratio of the [Tax Losses]. Dividing this by the [Tax Rate] then gives the value of the [Tax Loss Value Proportion] figures.

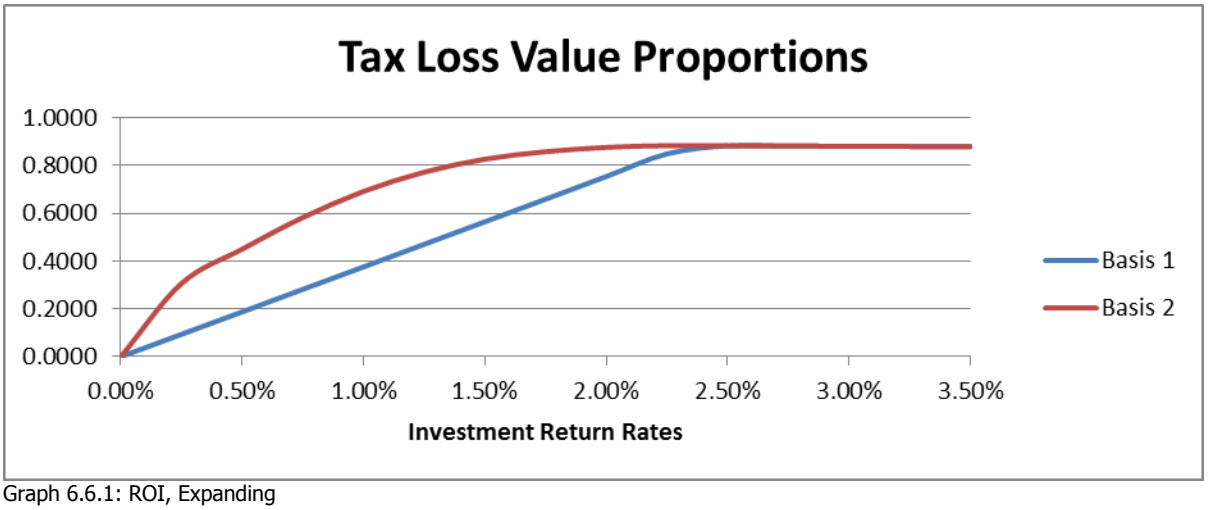
It can be demonstrated that when this approach is followed in practice with no discounting [Tax Loss Value Proportion] figures of 0 are obtained for the zero tax loss value scenario and [Tax Loss Value Proportion] figures of 1 are obtained for the full value scenario. It is necessary to apply discounting but the results with no discounting are a confirmation of the validity of the approach.

A variation on the calculation method would be to calculate the [Total Adjusted Reduction in Tax Charges] figure as follows:

- Exclude the [Tax Rate] * {[Investment Return (Projection 1)] - [Investment Return (Projection 2)]} factor.
- Accumulate the {[Tax Charge (Projection 2) – Tax Charge (Projection 1)]} factor to the end of the [New Entrant Investment Term] at the gross investment return rate and discount back to the start at the net investment return rate. This is the [Adjusted Reduction in Tax Charges (Period)] figure.
- Sum the [Adjusted Reduction in Tax Charges (Period)] figures over all time periods up to the [Investment Term] to drive the [Total Adjusted Reduction in Tax Charges] figure.

6.6. Example Results

For a [Tax Loss %] of 40%, a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 3 years with no further new entrants and no withdrawals, the results are:

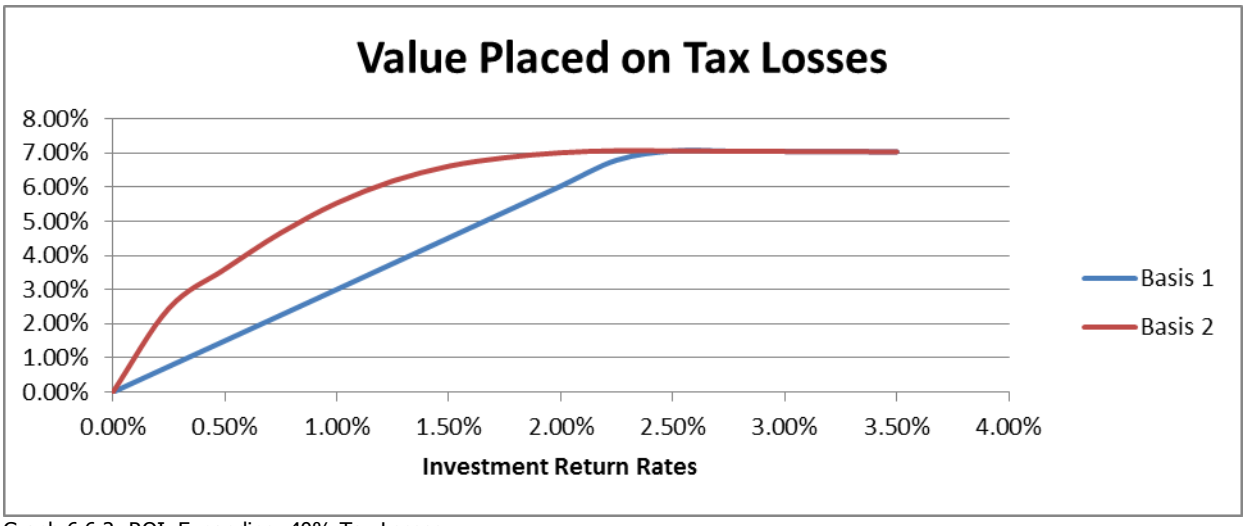


Graph 6.6.1: ROI, Expanding

- Basis 1 is where the [Tax Loss Value Proportion] figures are based on the difference in tax charges over the [New Entrant Investment Term].
- Basis 2 is where the [Tax Loss Value Proportion] figures also allow for the value placed on tax losses at the end of the [New Entrant Investment Term] based on the tax loss algorithm figures for a contracting fund.

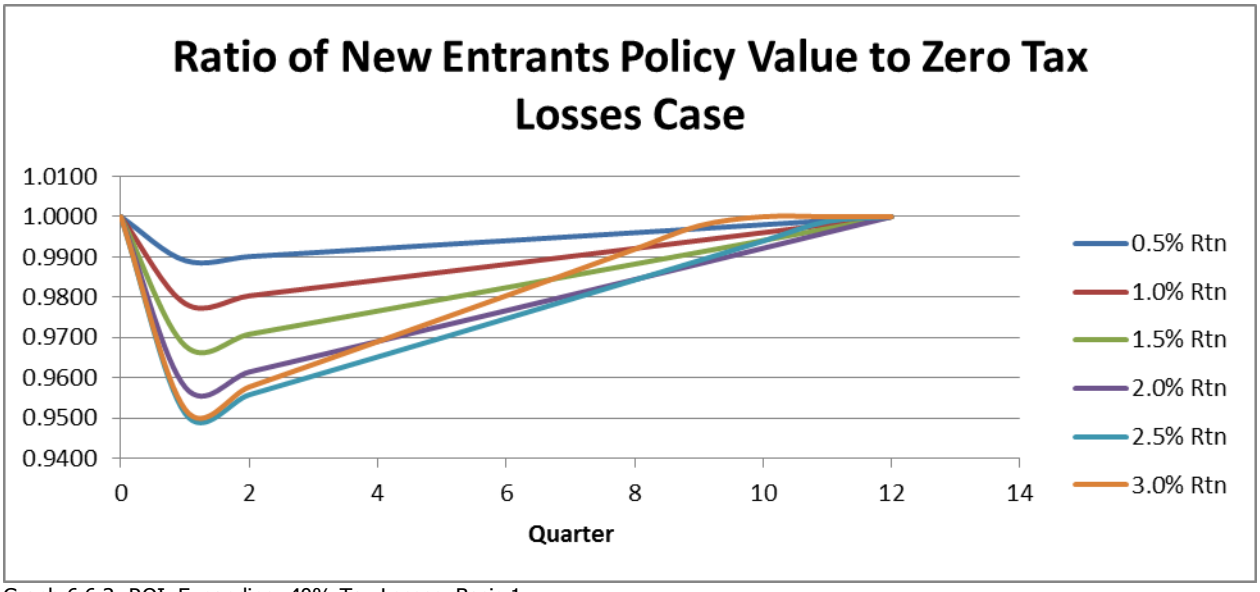
It can be seen that for lower rates of investment return that Basis 2 gives higher values.

The value placed on the 40% tax losses is as follows:-



Graph 6.6.2: ROI, Expanding, 40% Tax Losses

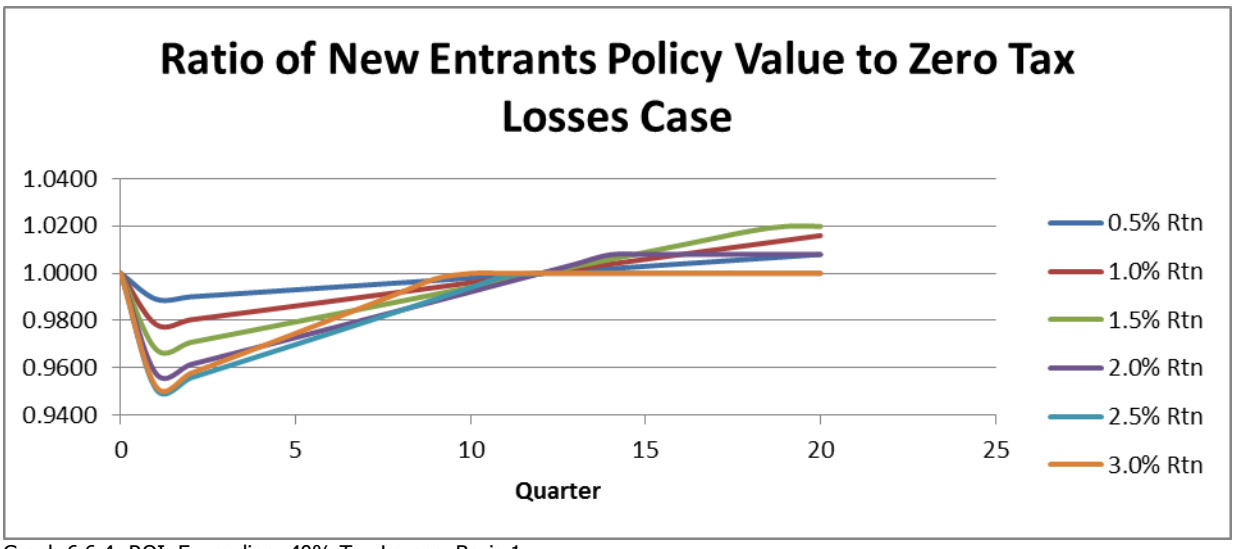
The resultant new-entrants policy value can be graphed against the policy value in the zero tax losses case as shown below.



Graph 6.6.3: ROI, Expanding, 40% Tax Losses, Basis 1

The ratios converge to 1 at duration 12 which is the [Investment Term]. The lower values prior to that duration reflect the fact that the new entrants have paid for a share of tax losses and the resultant value to them from the tax losses accrues gradually over a period of time (and is not being anticipated in this example).

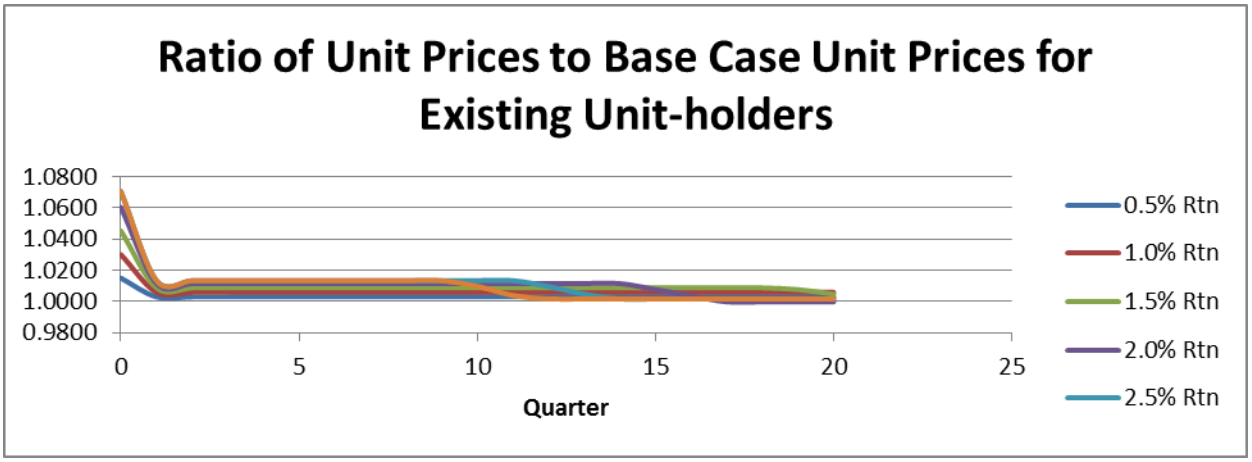
Extending the graph to later durations gives:



Graph 6.6.4: ROI, Expanding, 40% Tax Losses, Basis 1

The upward sloping feature observed in graph 6.6.3 is continued in graph 6.6.4 beyond duration 12 for lower investment return rates. This is because the benefit of the tax losses extends beyond duration 12 for lower investment return rates and so the [Tax Loss Value Proportion] for the tax loss transfer transaction is understated where the actual [New Entrant Investment Term] exceeds 12 quarters.

We can also graph the unit prices compared to the base case (no new entrants, no value placed on tax losses) of existing unit-holders.



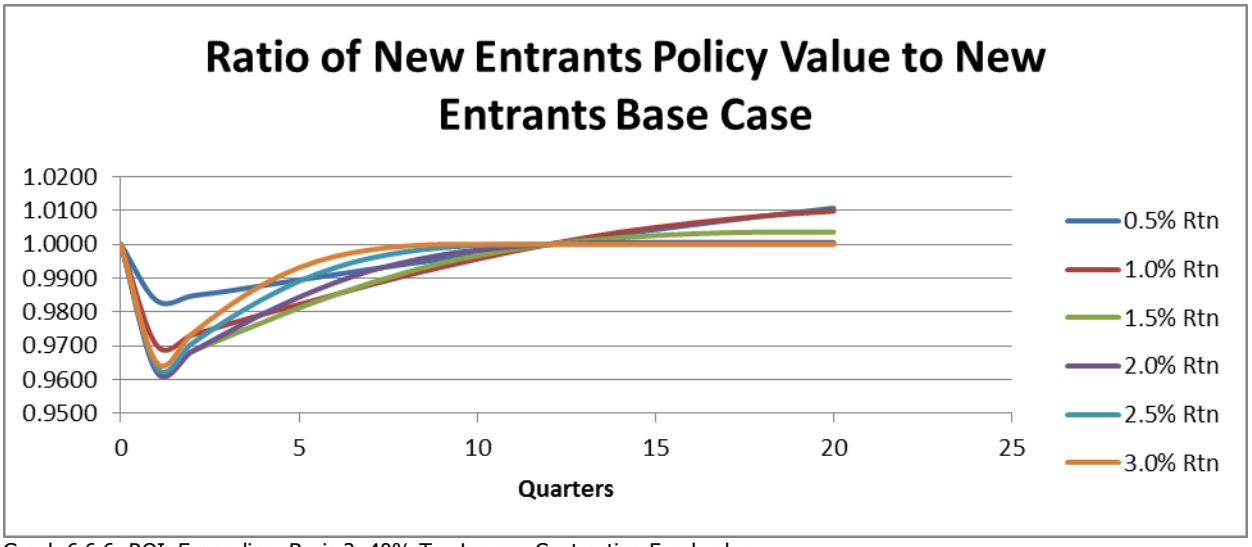
Graph 6.6.5: ROI, Expanding, 40% Tax Losses, Basis 1

It can be seen that the various graphs in graph 6.6.5 converge to 1.

The graph of new-entrants policy value against the policy value in the zero tax losses case is improved if both:

- Allowance is made for the [Value Placed on Tax Losses] (in a contracting fund position) at the expiry of the [New Entrant Investment Term] in computing the [Tax Loss Value Proportion] for the tax loss transfer transaction
- A value is placed on the tax losses in unit pricing using the [Tax Loss Value Proportion] figures computed using the tax loss value algorithm previously developed for a contracting fund.

This can be seen in graph 6.6.6 below



Graph 6.6.6: ROI, Expanding, Basis 2, 40% Tax Losses, Contracting Fund value

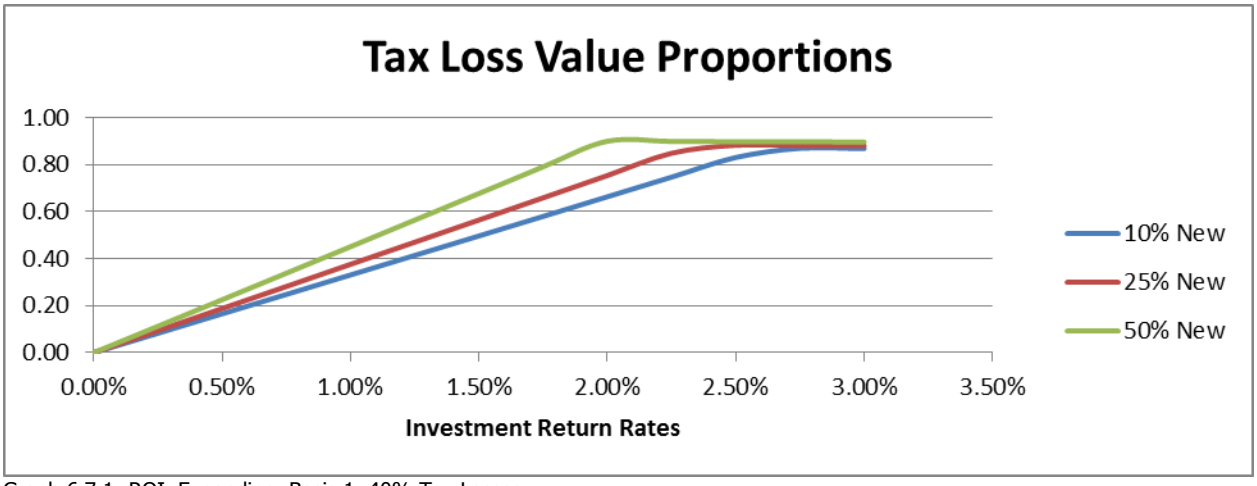
The improvements are:

- The dips below 1 for the higher investment return rates at the shorter durations are smaller (but a bit greater for the lower investment return rates).
- The graphs for the intermediate investment return rates flatten more at later durations
- The graphs for the high investment return rates converge much faster to 1.

Because the value placed on tax losses in a contracting position will generally be less than that in an expanding position, the dip in the graphs at short durations is inevitable.

6.7. Varying the [New Entrant % Inflow] figures

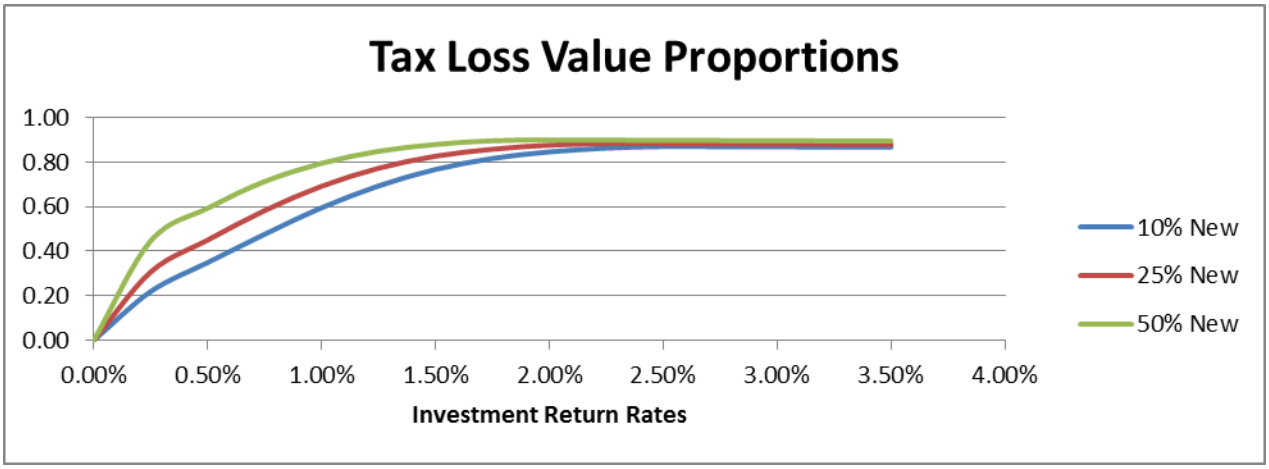
For a [Tax Loss %] of 40% and a [New Entrant Investment Term] of 3 years, the results for various values of [New Entrant % Inflow] are:



Graph 6.7.1: ROI, Expanding, Basis 1, 40% Tax Losses

It can be seen that the [Tax Loss Value Proportion] figures are higher for higher [New Entrant % Inflow] figures. This reflects the fact that the (share of) tax losses per incoming unit-holder are lower for higher [New Entrant % Inflow] figures and so the proportion of tax losses relieved at a particular investment return rate is greater resulting in a greater saving in tax charges and so higher [Tax Loss Value Proportion] figures.

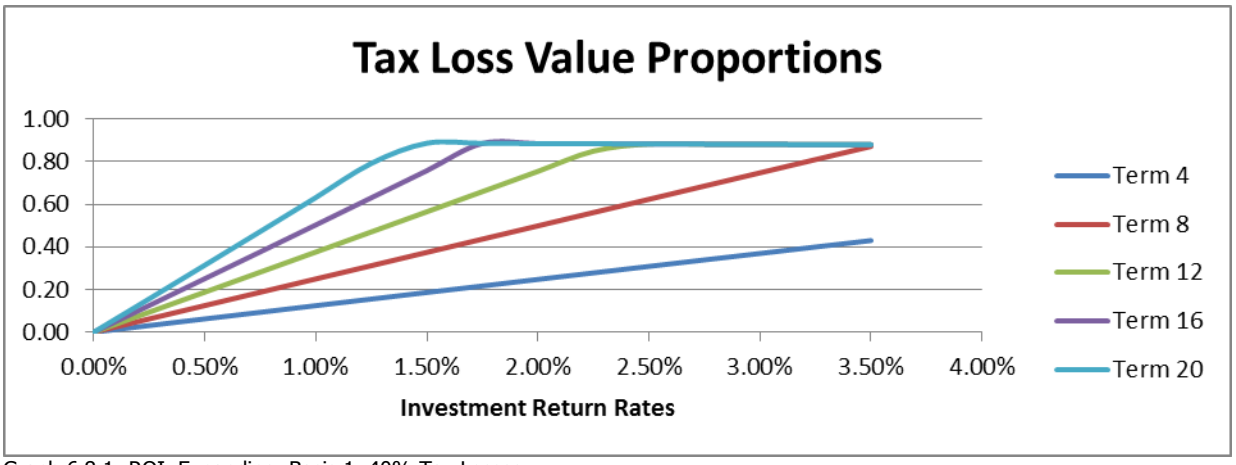
The graphs on Basis 2 shown below are similar.



Graph 6.7.2: ROI, Expanding, Basis 2, 40% Tax Losses

6.8. Varying the [New Entrant Investment Term] figures

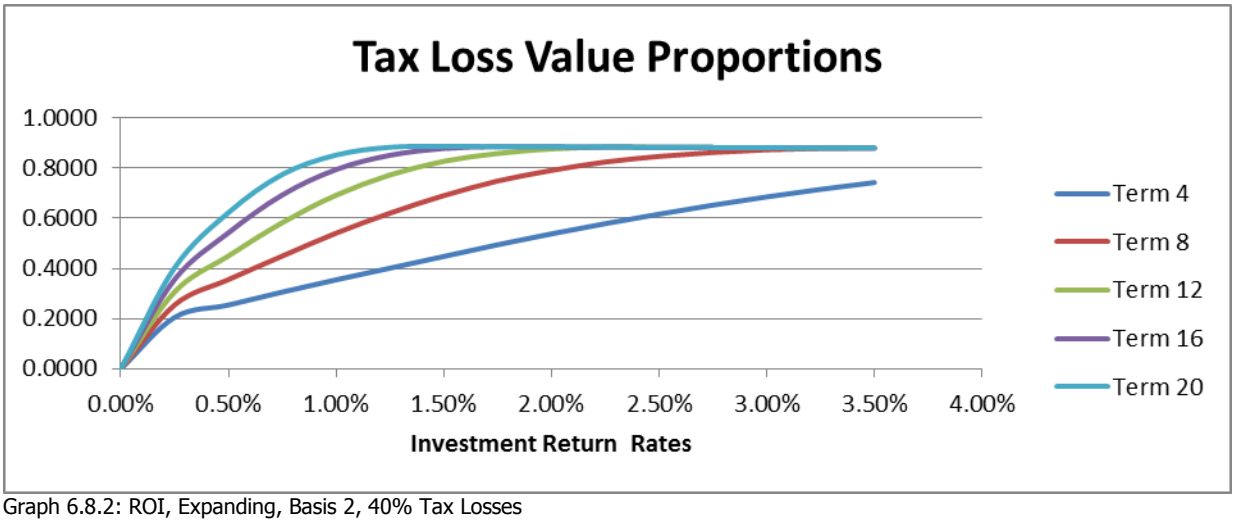
For a [Tax Loss %] of 40% and a [New Entrant % Inflow] of 25%, the results for various values of [New Entrant Investment Term] are:



Graph 6.8.1: ROI, Expanding, Basis 1, 40% Tax Losses

We can see from graph 6.8.1 that on Basis 1 as expected, the shorter the [New Entrant Investment Term] in quarters, the lower the [Tax Loss Value Proportion] figures.

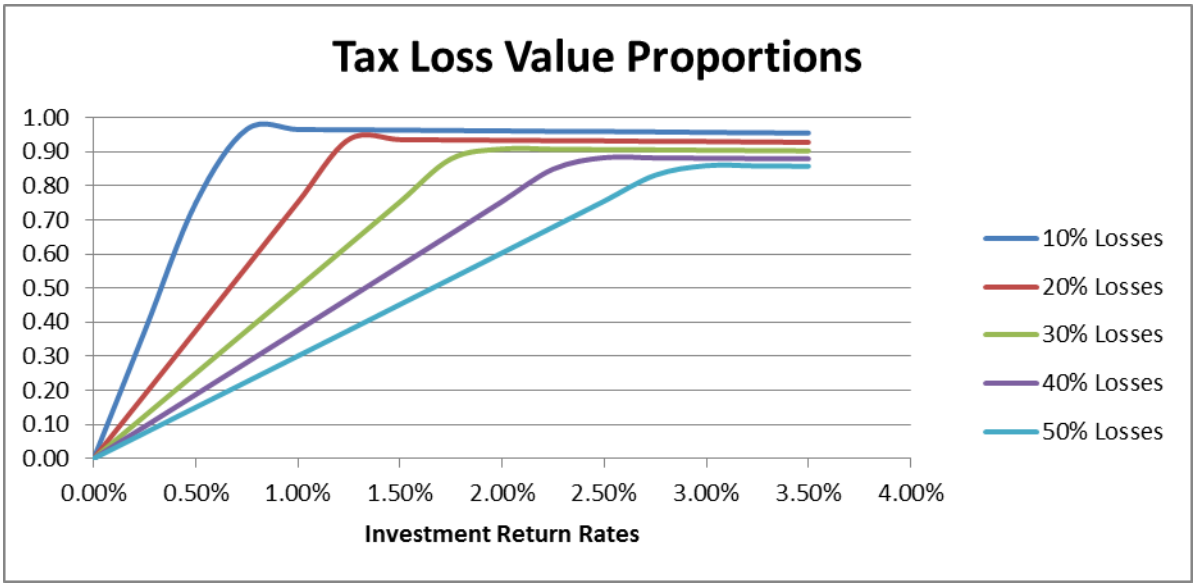
Similarly from graph 6.8.2 on Basis 2 as expected, the shorter the [New Entrant Investment Term] in quarters, the lower the [Tax Loss Value Proportion] figures. However a further noticeable feature from graph 6.8.2 is that the values for the respective [New Entrant Investment Terms] are closer than in graph 6.8.1.



Graph 6.8.2: ROI, Expanding, Basis 2, 40% Tax Losses

6.9. Varying the [Tax Loss %] figures

For a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 12 quarters, the results for various values of [Tax Loss %] are:



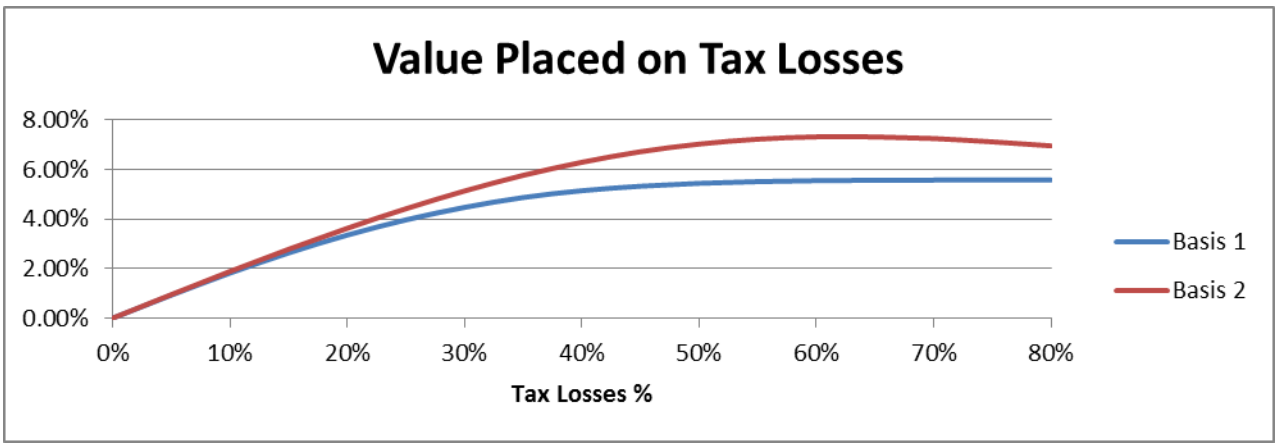
Graph 6.9.1: ROI, Expanding, Basis 1

As expected the lower the [Tax Loss %] figures, the higher the [Tax Loss Value Proportion] figures. This is because the proportion of tax losses relieved at a particular investment return rate is greater for lower [Tax Loss %] figures.

6.10. Value Placed on Tax Losses

Using the method described in section 6.5 (with central assumptions of a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 12 quarters), we can derive tax loss value proportions for various investment return rates. Using an investment return distribution, we can derive a schedule of [Tax Loss Value Proportion] figures corresponding to [Tax Loss %] figures and then the value placed on tax losses.

Assuming a normal distribution for the 3-year investment return with a 25% mean and 12.5% standard deviation and assuming that investment return is uniform over the three-year period, the results are as follows: -



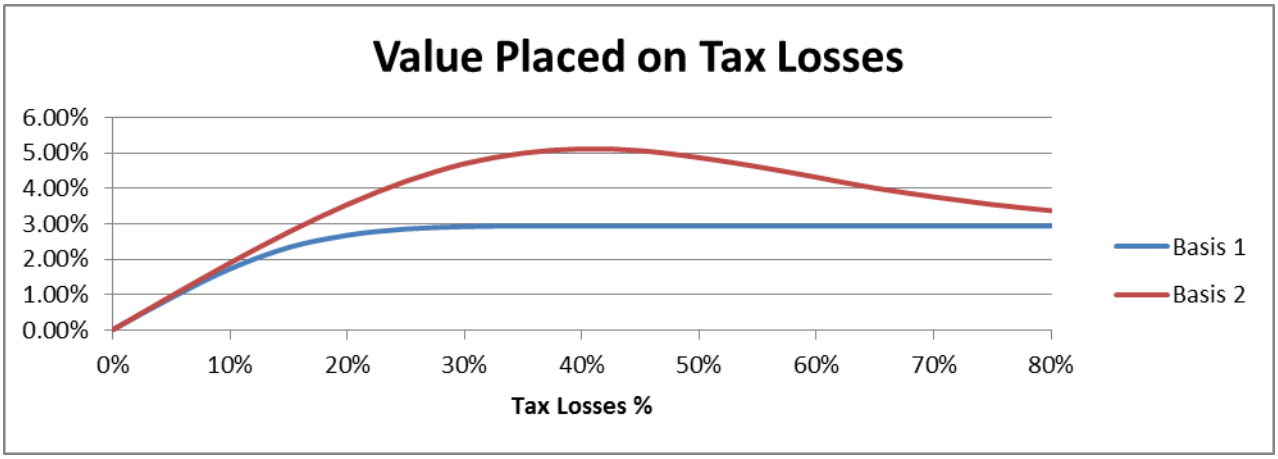
Graph 6.10.1: ROI, Expanding, 25% mean and 12.5% standard deviation

Basis 1 is where the [Tax Loss Value Proportion] figures are based on the difference in tax charges over the [New Entrant Investment Term]

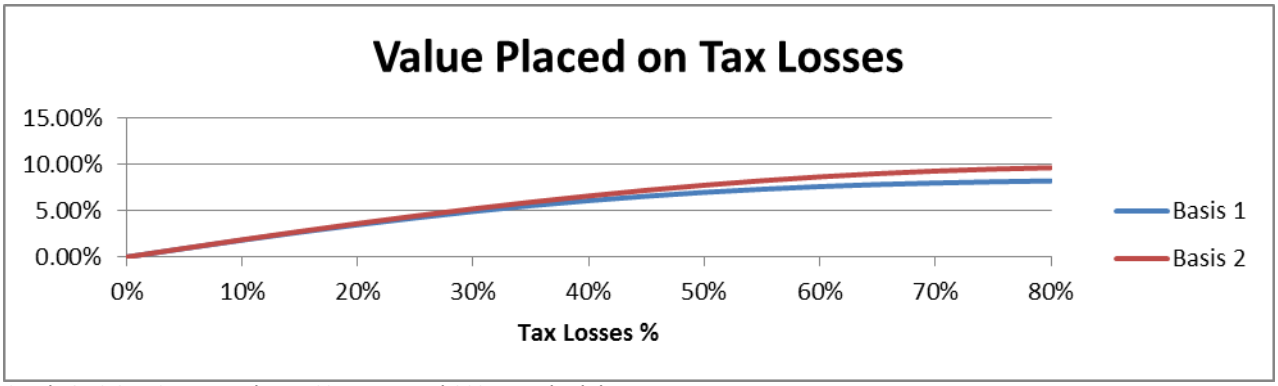
Basis 2 is where the [Tax Loss Value Proportion] figures also allow for the value placed on tax losses at the end of the [New Entrant Investment Term] based on the tax loss algorithm figures for a contracting fund.

Note: It might seem strange that the results on basis 2 start to decline at higher values of [Tax Loss %]. However this is because the value placed on tax losses for the tax loss transfer transaction on entry is a combination of both the value arising from the tax saving from the tax losses and from the value placed on tax losses at exit at the end of the [New Entrant Investment Term] on a contracting fund basis. This latter item reduces as the [Tax Loss %] increases for high values of [Tax Loss %]. This explains why the graph dips for higher values of [Tax Loss %] on Basis 2.

We can also look at other investment return distributions:



Graph 6.10.2: ROI, Expanding, 12.5% mean and 6.25% standard deviation



Graph 6.10.3: ROI, Expanding, 40% mean and 20% standard deviation

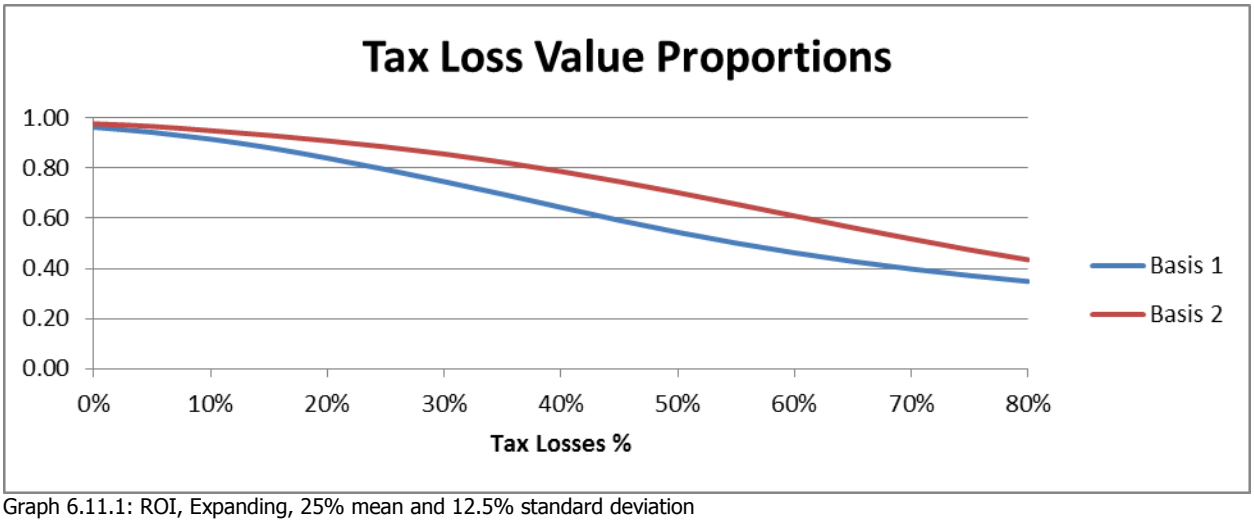
6.11. Tax Loss Value Algorithm

Using the method described in section 6.5 (with central assumptions of a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 12 quarters), we can derive tax loss value proportions for various investment return rates. Using an investment return distribution, we can derive a schedule of [Tax Loss Value Proportion] figures corresponding to [Tax Loss %] figures.

We can then graph the results for various scenarios.

Assuming a normal distribution for the 3-year investment return with a 25% mean and 12.5% standard deviation and assuming that investment return is uniform over the three-year period, the results are as follows: -

Firstly the [Tax Loss Value Proportion] figures are:

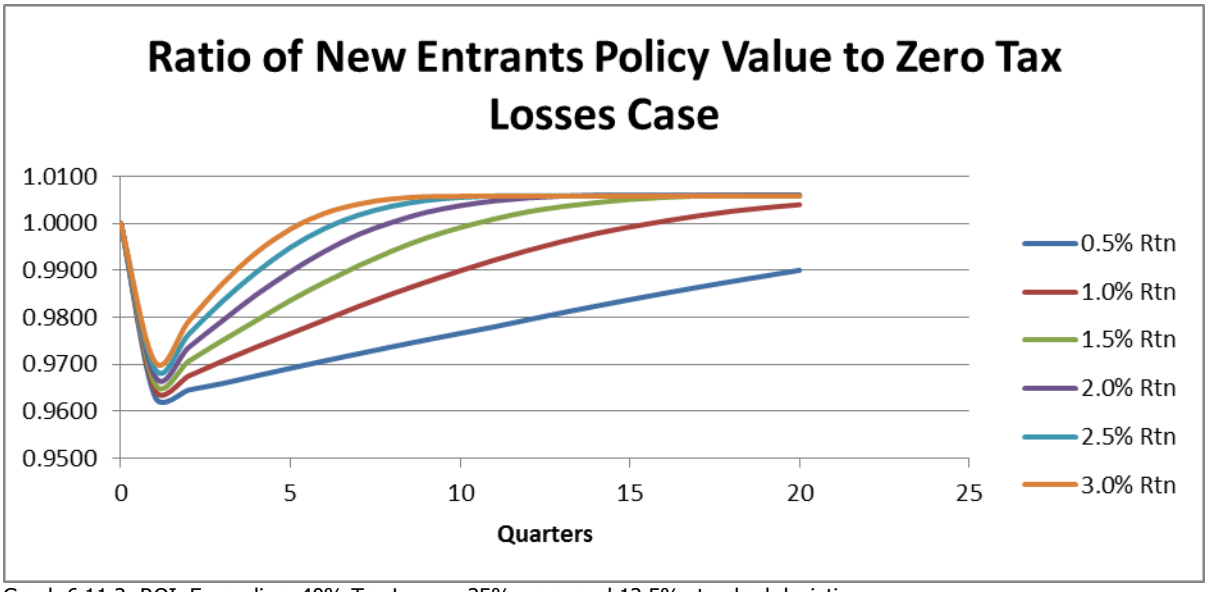


Graph 6.11.1: ROI, Expanding, 25% mean and 12.5% standard deviation

Basis 1 is where the [Tax Loss Value Proportion] figures are based on the difference in tax charges over the [New Entrant Investment Term].

Basis 2 is where the [Tax Loss Value Proportion] figures also allow for the value placed on tax losses at the end of the [New Entrant Investment Term] based on the tax loss algorithm figures for a contracting fund.

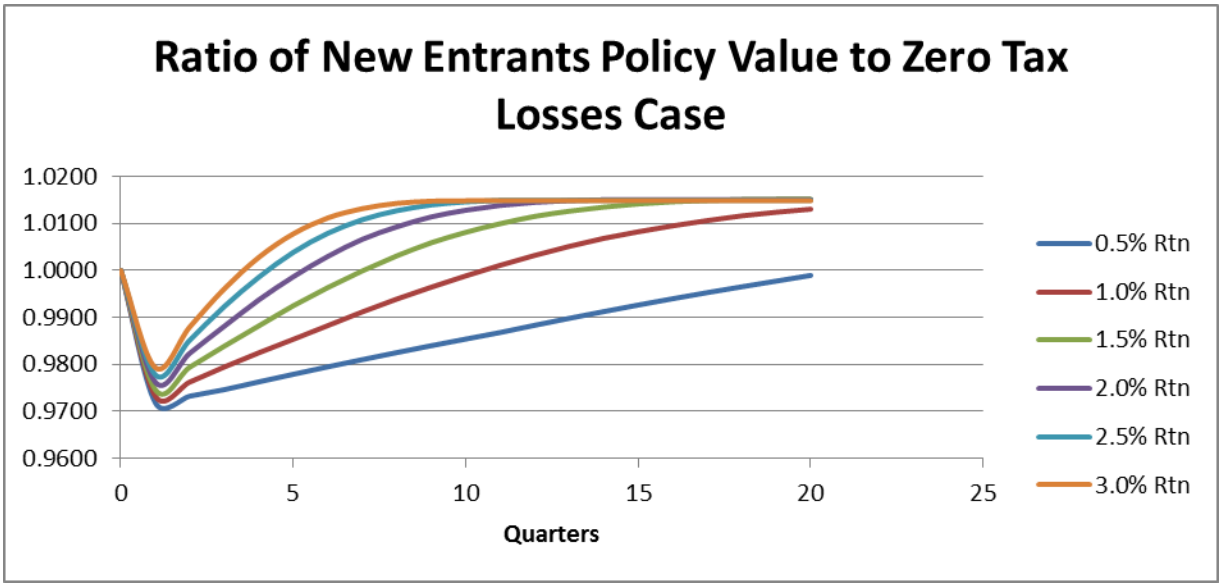
Utilising the Basis 2 approach we can graph the results for various investment return rates. The results are:



Graph 6.11.2: ROI, Expanding, 40% Tax Losses, 25% mean and 12.5% standard deviation

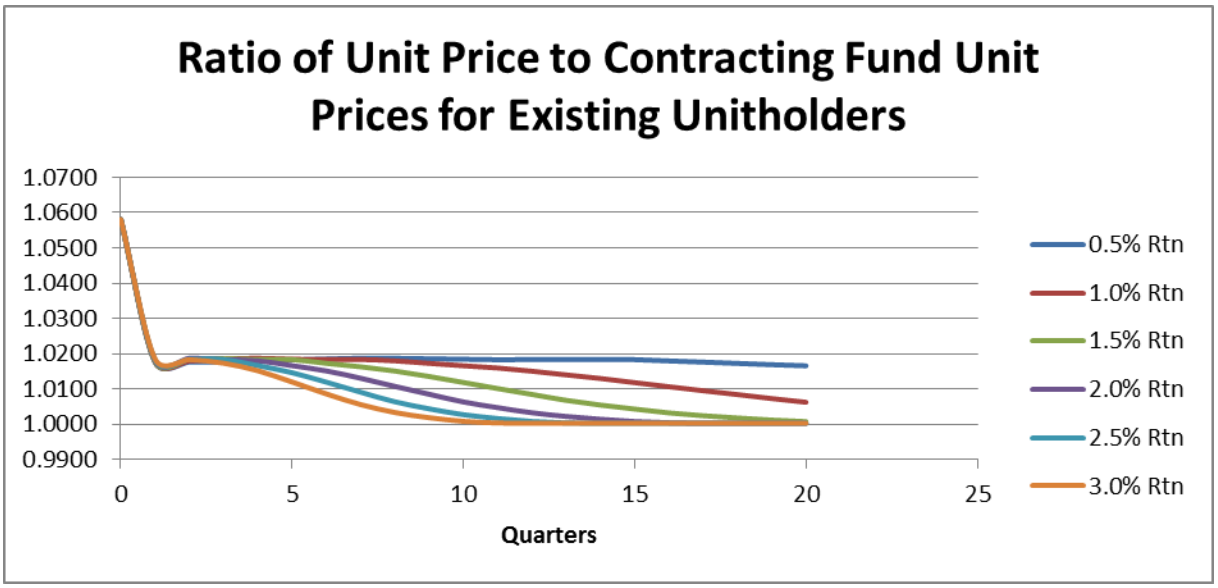
The results are unsatisfactory for lower rates of investment return. It would be better to have somewhat higher values even if that means that the ratios for higher rates of investment return

are a bit higher than 1 at later durations. We could use a lower investment return distribution with a lower mean and standard deviation as shown below.



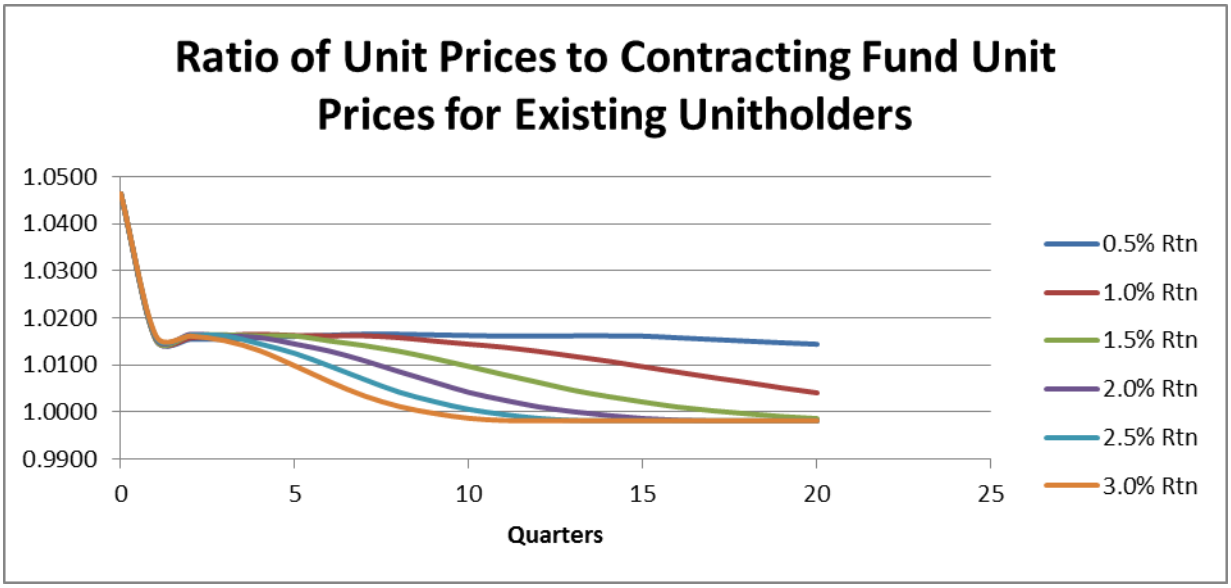
Graph 6.11.3: ROI, Expanding, 12.5% mean and 6.25% standard deviation

This gives somewhat better results for lower rates of investment return.
We can also graph the unit prices compared to the unit prices based on the tax loss value algorithm for a contracting fund for existing unit-holders.
Note: The comparison is on this basis (rather than against the base case) for consistency because on Basis 2, there is a value placed on tax losses from duration 2 onwards based on the tax loss value algorithm for a contracting fund.



Graph 6.11.4: ROI, Expanding, 25% mean and 12.5% standard deviation

The existing unit-holders benefit and especially for lower rates of investment return. We could use an investment return distribution with a lower mean and standard deviation as shown below.



Graph 6.11.5: ROI, Expanding, 12.5% mean and 6.25% standard deviation

This reduces the extent to which the existing unit-holders benefit and especially for lower rates of investment return. As explained in Section 6.2, the existing unit-holders benefit for very low rates of investment return purely because the fund size is larger (as a consequence of the new entrants) and the [Tax Loss %] (of the resultant fund value) reduces accordingly.

UK Funds –Contracting Position

7.1. Differences between UK and ROI I-E Tax Regimes

There are a number of fundamental differences between the UK and ROI I-E tax regimes that impact on the valuation of tax losses.

The first fundamental difference is that in Ireland realised tax losses can be offset against both investment income and capital gains (of all asset types) whereas in the UK tax losses can only be offset against capital gains on CGT assets (i.e. not against income and not against gains from loan relationship assets). For example fixed interest securities would be loan relationship assets rather than CGT assets.

The second fundamental difference is that in Ireland there is no RPI indexation relief in the computation of realised capital gains whereas such relief applies in the UK on CGT assets.

The consequences of these differences is that in Ireland tax losses carried forward can be offset against all types of investment return whereas in the UK tax losses carried forward can only be offset against taxable gains (being taxable gains net of indexation in respect of CGT assets).

The effect is that, for otherwise identical funds, the [Tax Loss Value Proportion] figures for all levels of [Tax Losses as a % of Fund Value] would be lower for a UK life fund than for a ROI life fund. This is because for Irish net funds the [Tax Loss Value Proportion] figures would be derived based on a total investment return distribution whereas for UK net funds the [Tax Loss Value Proportion] figures would be derived based on a taxable gain probability distribution (which is based only on CGT assets and real returns i.e. gains net of RPI indexation relief). For any given investment portfolio, the total investment return probability distribution (for ROI funds) would have a much higher mean than the taxable gain probability distribution (for UK funds) resulting in a greater capacity for offset of existing tax losses for ROI funds.

Hence the value placed on tax losses would be lower for a UK life fund than for an otherwise identical ROI life fund.

7.2. Consequences of Placing No Value on Tax Losses – UK Contracting Fund

Consider the example of a fund in a contracting position with 40% tax losses.
Suppose no value was placed on tax losses and that the withdrawals experience was as set out below.

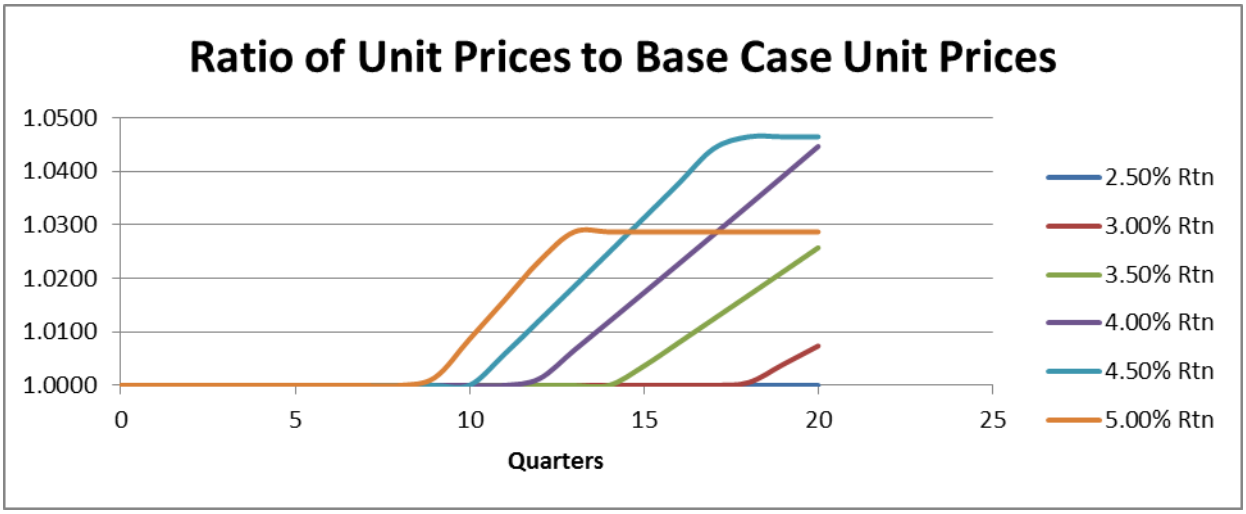
Tax Losses as % of Fund Assets					40%
Tax Rate					20%

Withdrawal Rates (per 1 in force at outset)	Year 1	Year 2	Year 3	Year 4	Year 5
	20%	20%	20%	20%	15%

Additional assumptions are:

Annualised income rate		3.00%
Annualised CPI rate		2.00%

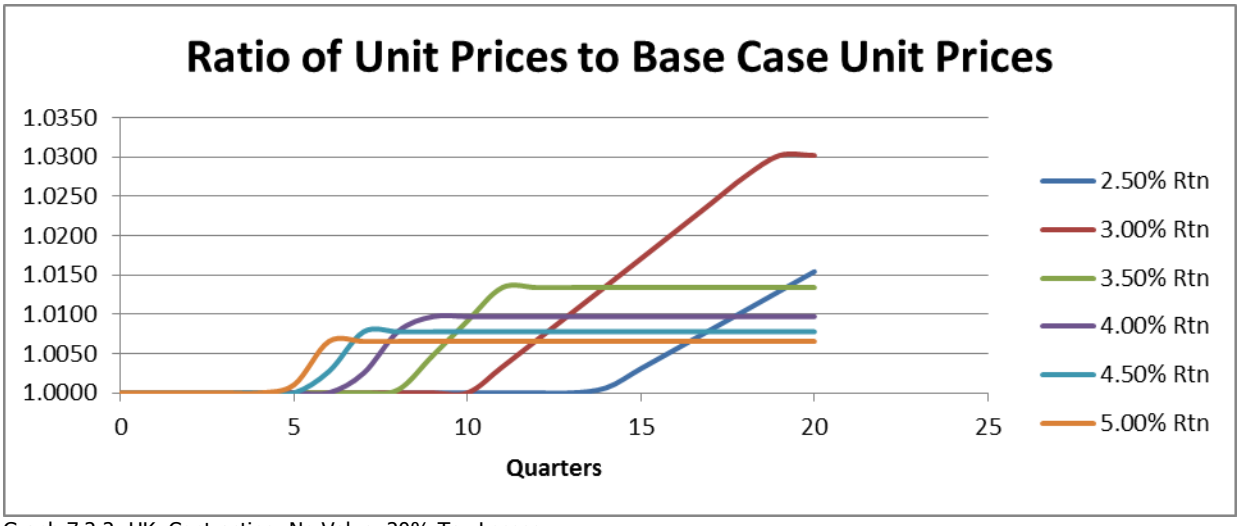
We can graph the ratio of the resultant unit prices to what the unit prices would be for the base case (where no exits take place and no value is placed on tax losses) for various quarterly investment return rates.
Note: The annualised income rate and annualised CPI rate are assumed to be constant for the various total investment return rates.



Graph 7.2.1: UK Contracting, No Value, 40% Tax Losses

The main features of graph 7.2.1 are:

- The ratios will by definition be 1 at short durations for all investment return rates.
- It is clear that the unit prices diverge from the base case unit prices only for very high rates of investment return rates (Note: the rates shown are quarterly).
- For the later durations the ratios spike above 1 and initially increasingly so for higher investment return rates.
- However for high investment return rates, the graphs level off and the higher the investment return rate, the earlier that this happens. This can be seen from the 4.5% and 5% investment return graphs. The reason for this is that the higher the investment return rate the earlier that unit-holders benefit from zero tax being charged due to the tax losses and the effect of withdrawals on later ratios is thus reduced. This feature is more evident is graph 7.2.2 (20% tax loss scenario).

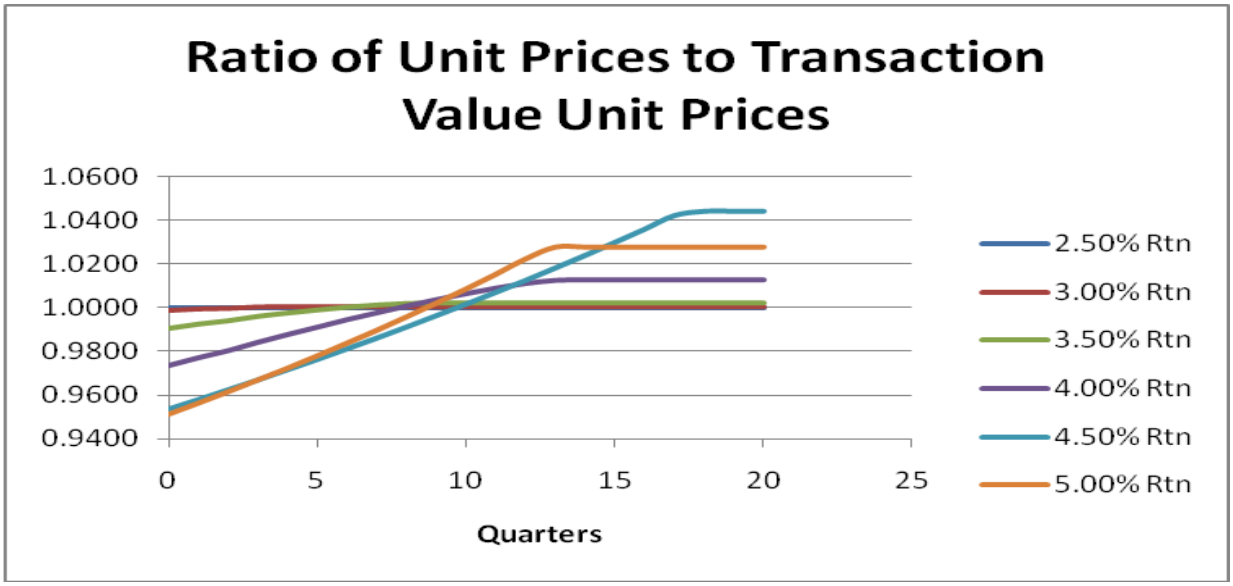


Graph 7.2.2: UK, Contracting, No Value, 20% Tax Losses

Whilst it is clear from graph 7.2.1 that placing no value on tax losses gives a clear benefit to (longer duration) continuing unit-holders, the consequences of this for earlier exits is unclear. In section 7.4, a methodology is set out to compute unit prices on a perfect foresight basis.

It is clear even solely from graph 7.2.1 that for UK funds in a contracting position that whilst placing a zero value on tax losses would be appropriate in most circumstances, it would not necessarily be appropriate in all circumstances. Ratios above 1 are arising only for very high rates of investment return rates (relative to the size of tax losses) and it is only for those scenarios that a non-zero value would be appropriate.

The ratio of the unit prices (where no value is placed on tax losses) for the 40% tax loss case to the Transaction Value perfect foresight unit prices (as per section 7.4) is shown below in graph 7.2.3.



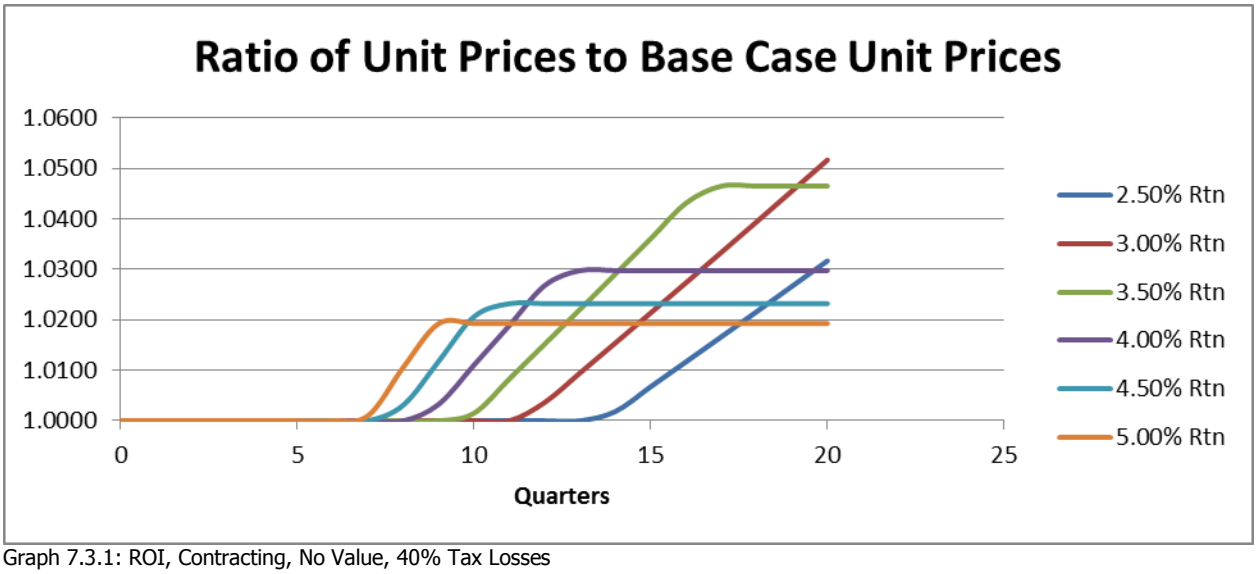
Graph 7.2.3: UK, Contracting, 40% Tax Losses

The consequences for earlier exits of placing no value on tax losses is much clearer from graph 7.2.3. It can be seen that early exit unit-holders are disadvantaged for higher investment return rates (as the ratios are less than 1 at early durations) if no value is placed on tax losses to the benefit of continuing unit-holders (as the ratios are greater than 1 at later durations) and that this is increasingly the case as the rate of investment return increases.

The conclusion is that the approach of placing no value on tax losses for contracting funds in all circumstances is inappropriate. The challenge is, in the absence of perfect foresight, to find an algorithm to place value on tax losses such that the graph of unit prices to Transaction Value perfect foresight prices flattens.

7.3. Comparison of ROI and UK Funds – Contracting Funds

The graph 7.2.1 can be contrasted with the equivalent graph 7.3.1 for Irish funds.



Graph 7.3.1: ROI, Contracting, No Value, 40% Tax Losses

The UK graph for an investment return rate should be approximately the same as the Irish graph for an investment return rate of 1.25% ((3.0%+2.0%)/4) lower (the quarterly equivalent of the combined 5% from taxable income and non-taxable capital gain assumptions). This can be seen from the graphs e.g. the blue line in graph 7.2.1 for 4.5% is similar to the green line in graph 7.2.2 for 3.5% and the purple line in graph 7.2.1 for 4.0% is similar to the dark blue line in graph 7.2.2 for 2.5%.

It is clear from the comparison of the UK and ROI graphs that whilst the issues relevant to the placing of value on tax losses in unit pricing are similar for Ireland and the UK, the consequence of the issues is greater for ROI funds than for UK funds. The UK results are similar to the Irish results of lower investment return rates (for the same portfolio of assets and the same fixed tax loss percentage) or of higher tax loss percentages (for a fixed investment return rate). For example, the shape of the graph 7.3.1 (ROI, Contracting No, Value, 40% Tax Losses) is quite similar to that of 7.2.2 (UK, Contracting, No Value, 20% Tax Losses).

7.4. Quantifying the Tax Loss Value Proportion Figures for a UK, Contracting, 'I-E' Fund

A straight-forward method, the Transaction Value Method, to derive for a fund the [Tax Loss Value Proportion] figures would be to:

- Assumptions
    - [Investment Return Rates] for the fund (and split into the three components of [Income Rate], [Taxable Capital Gains Rate] and [Non-Taxable Capital Gains Rate]
    - [Central Withdrawals Rates]
- Project the fund with no value placed on the tax losses at any pricing point using the three components of the [Investment Return Rate] and the [Central Withdrawals Rates] on two bases viz Projection 1 with the existing tax losses and Projection 2 with the existing tax losses with the difference that on exit the tax losses of those exiting are removed from the fund with no compensation

- Derive the investment return amounts and tax charges for each period for each Projection
- Derive the [Tax Losses Removed] as the total of the tax losses removed from the fund in Projection 2 (they also represent the tax losses transferred on within the fund in Projection 1)
- For each period, determine [Tax Charge (Projection 2) – Tax Charge (Projection 1)] + [Tax Rate] * {[Taxable Investment Return (Projection 1)] - [Taxable Investment Return (Projection 2)]}. Note: The second part of the term is required to adjust for the fact that the taxable investment return in the two projections differs because the fund values in the two projections differ as a result of the different tax charges. For this purpose [Taxable Investment Return] is computed without any regard to tax losses for both Projection 1 and Projection 2.
- Discount the result at the [Investment Return Rate] net of tax (i.e. net for [Income Rate] and [Taxable Capital Gains Rate] and gross for the [Non-Taxable Capital Gains Rate]). This is the [Adjusted Reduction in Tax Charges (Period)] figure.
- Total the discounted results for [Adjusted Reduction in Tax Charges (Period)] over all periods to derive [Total Adjusted Reduction in Tax Charges]. Note: If discounting was not applied, the total would be determined as [Sum of Tax Charges (Projection 1)] – [Sum of Tax Charges (Projection 2] + [Tax Rate] * {[Taxable Investment Return (Projection 1)] - [Taxable Investment Return (Projection 2)]}.
- The [Total Adjusted Reduction in Tax Charges] is expressed as a ratio of the [Tax Losses Removed]. Dividing this by the [Tax Rate] then gives the value of the [Tax Loss Value Proportion] figures.

It can be demonstrated that when this approach is followed in practice with no discounting [Tax Loss Value Proportion] figures of 0 are obtained for low investment return rates (relative to the tax loss percentage) scenarios and [Tax Loss Value Proportion] figures of 1 are obtained for high investment return rates (relative to the tax loss percentage) scenarios. It is necessary to apply discounting but the results with no discounting are a confirmation of the validity of the approach.

7.5. Transaction Value Results for Various Scenarios

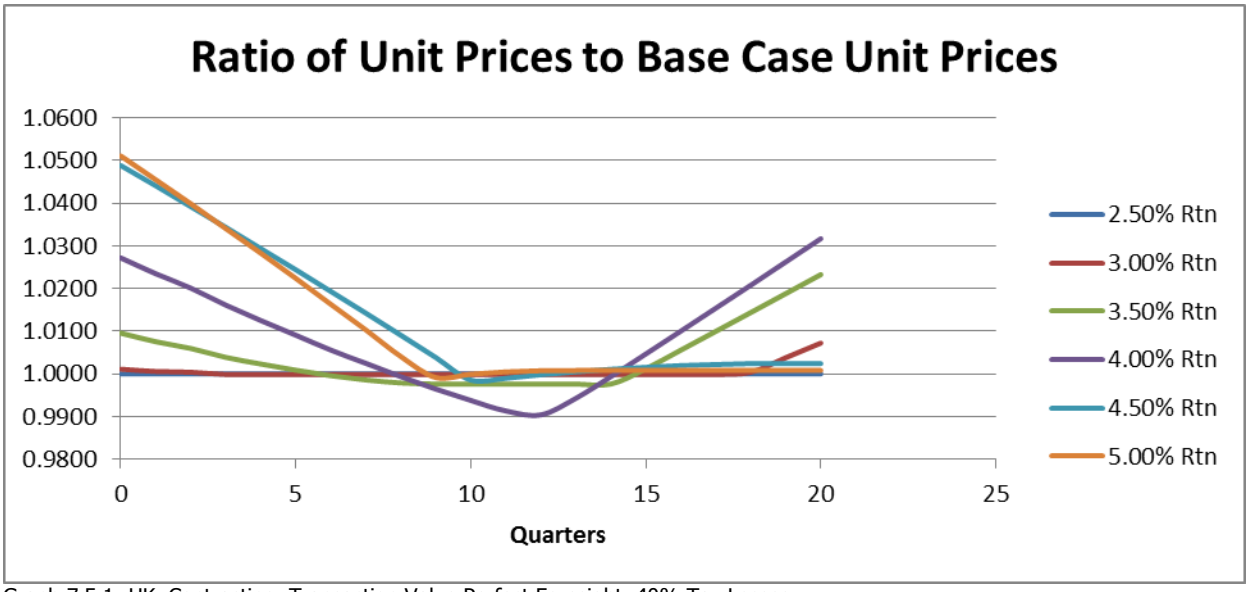
Using the method outlined in Section 7.4 and on the basis of the assumptions, we can graph the ratio of actual unit prices on the Transaction Value perfect foresight basis to base case unit prices for various investment scenarios.

Tax Losses as % of Fund Assets					40%
Tax Rate					20%
Withdrawal Rates (per 1 in force at outset)	Year 1	Year 2	Year 3	Year 4	Year 5
	20%	20%	20%	20%	15%

Additional assumptions are:

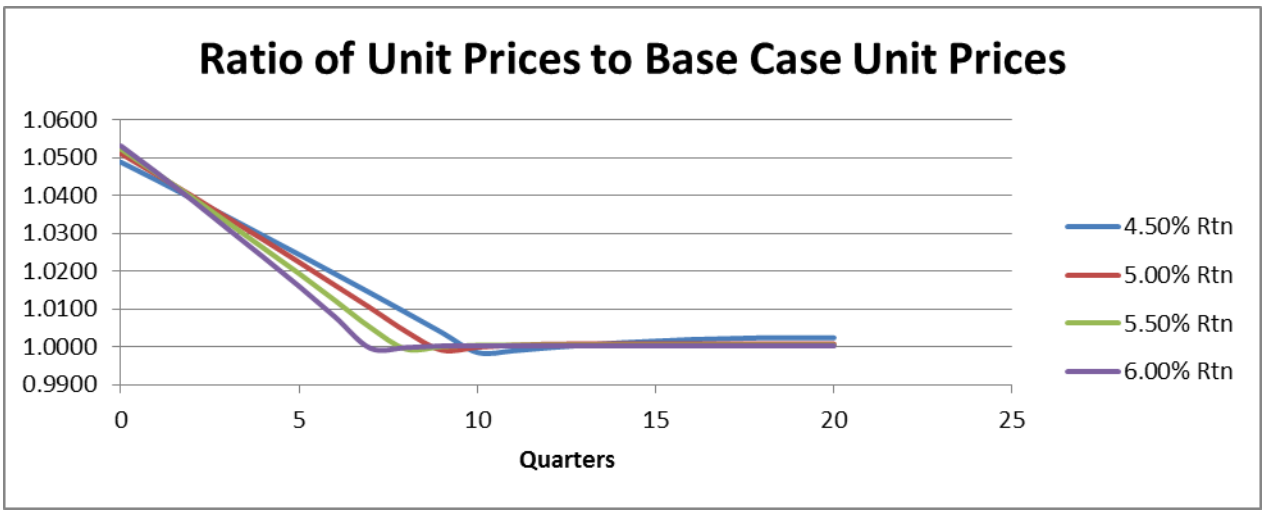
Annualised income rate		3.00%
Annualised CPI rate		2.00%

The results are:



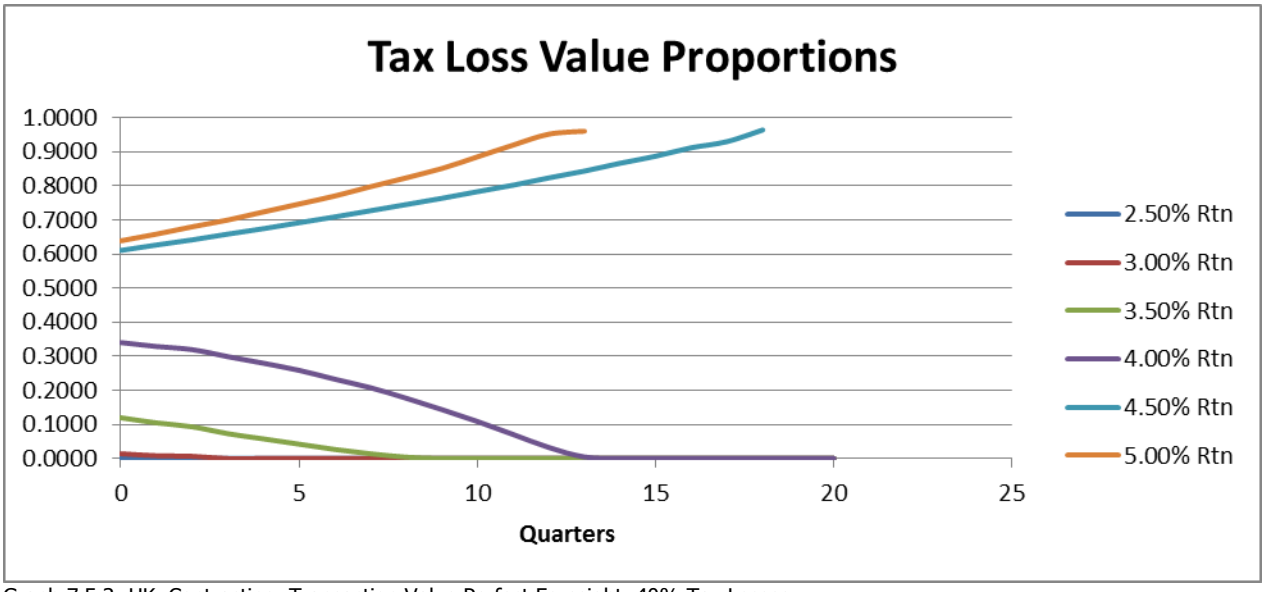
Graph 7.5.1: UK, Contracting, Transaction Value Perfect Foresight, 40% Tax Losses

The results of higher levels of investment return are very similar to the 4.5% case other that the higher the investment return the faster the ratios converge to the eventual constant value (and that ratio is closer to 1) as shown below.



Graph 7.5.2: UK, Contracting, Transaction Value Perfect Foresight, 40% Tax Losses

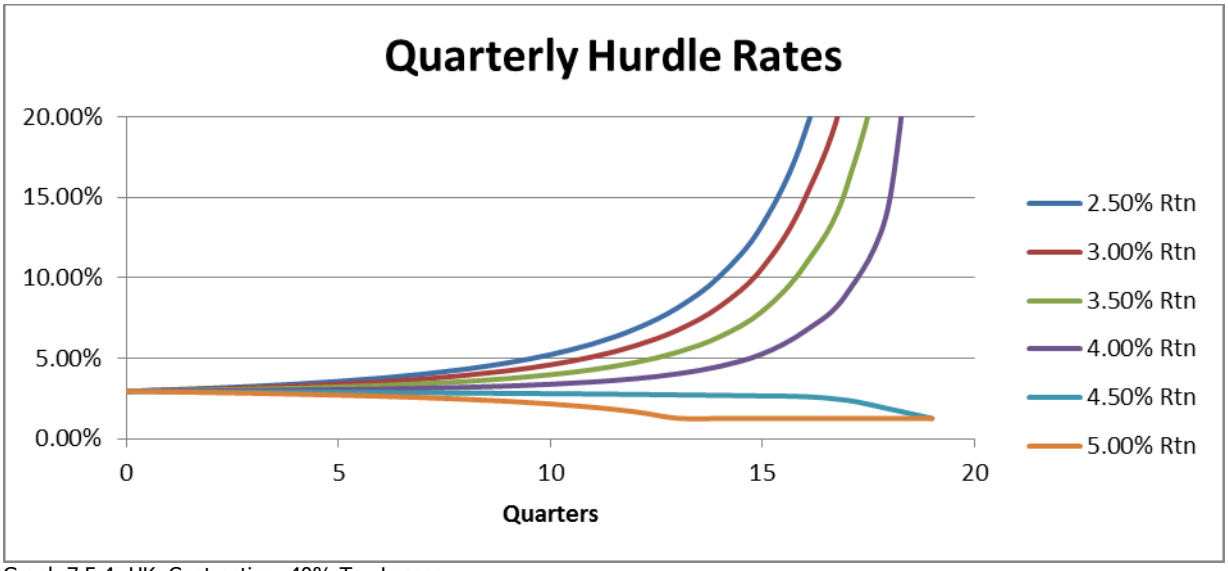
The [Tax Loss Value Proportion] figures underlying graph 7.5.1 are:



Graph 7.5.3: UK, Contracting, Transaction Value Perfect Foresight, 40% Tax Losses

The reason for the shape of the [Tax Loss Value Proportion] curves is because, for intermediate rates of investment return, the hurdle rate increases over time as the residual term to maturity reduces. The effect is magnified even more if one allows for the fact that the withdrawal rates increase over time. As the hurdle rate gets too high, the [Tax Loss Value Proportion] falls to zero.

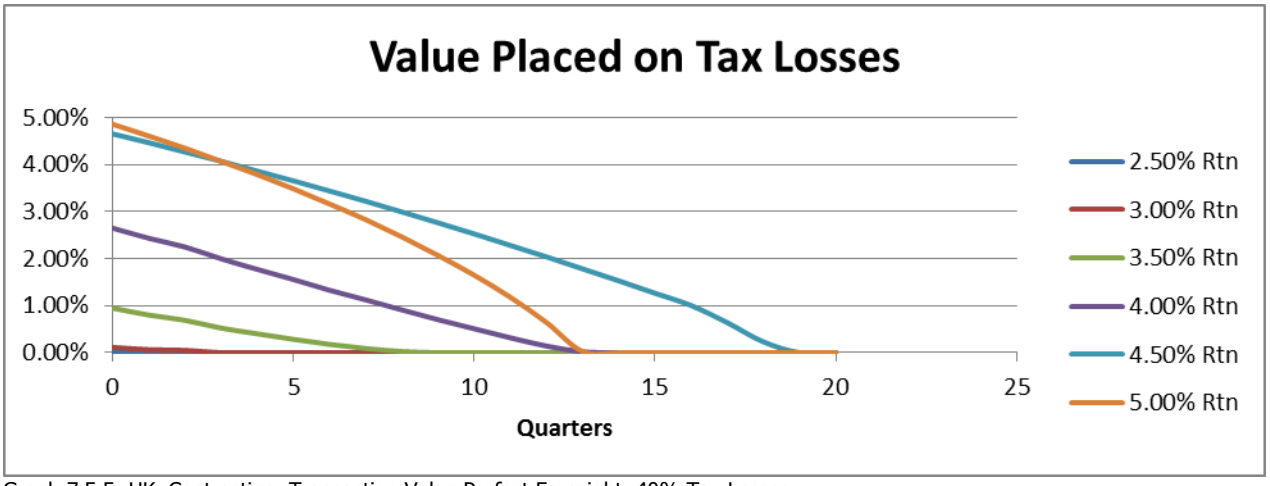
Note: The reference to a hurdle rate is to section 4.6 which discusses that there is a hurdle rate before future investment return is received tax-free by the continuing unit-holders as a result of exits.



Graph 7.5.4: UK, Contracting, 40% Tax Losses

The quarterly hurdle rate is the result of two competing forces viz the taxable capital gain rates (which is a component of the total investment return rate – the graphed item) and the withdrawal rates. The quarterly hurdle rate will rise over time unless the taxable capital gain rate overrides the effects of the withdrawals i.e. the size of the tax losses over time depends on both the taxable capital gain rates and the withdrawal rates and whether tax losses increase or reduce over time depends on the relative magnitude of the two competing forces. It can be seen from graph 7.5.4 that for 40% tax losses that the cross-over point is between 4% and 4.5% quarterly total investment return rates.

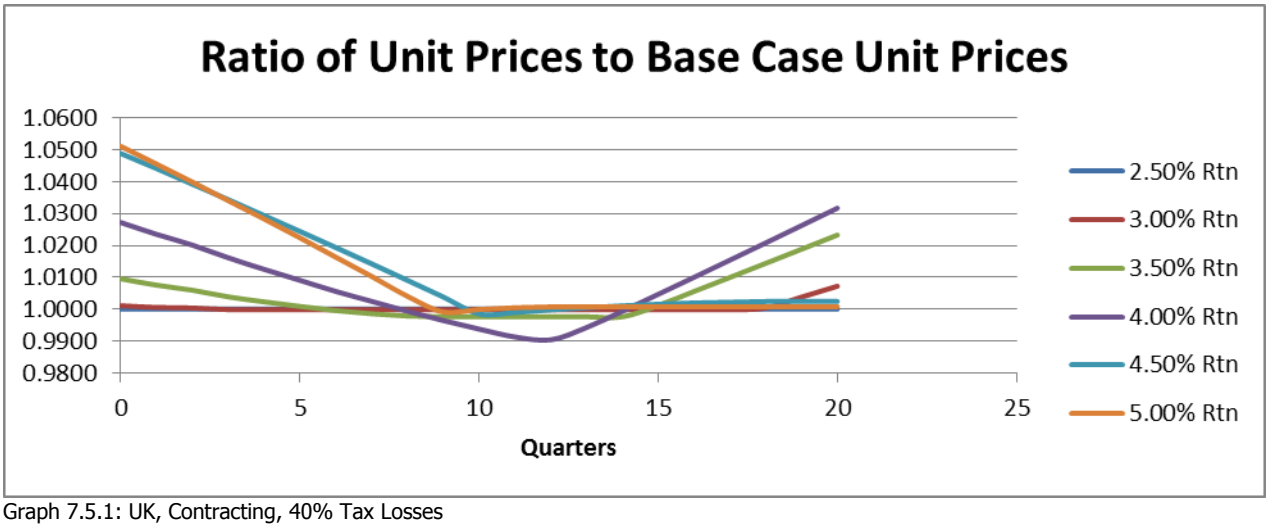
The values placed on tax losses underlying graph 7.5.1 are: -



Graph 7.5.5: UK, Contracting, Transaction Value Perfect Foresight, 40% Tax Losses,

7.6. Review of Transaction Value Results for Various Scenarios

The results were:



Graph 7.5.1: UK, Contracting, 40% Tax Losses

When considering the graphs, it is important to bear in mind that the proportion in force is much smaller at the later durations.

A prominent feature of the graphs is the upward sloping feature at the later durations for intermediate values of investment returns. This upward sloping feature is expected. The reason is that, for the intermediate investment return rates, tax on capital gains becomes payable at the later durations for the no exit base case but not on the exit basis. Hence the base case unit prices at later durations are growing at a lower net investment return rate than the actual unit prices (which would be gross of tax on capital gains).

It would appear that the graphs undershoot the target base line (of a ratio of 1) at durations 10-15 and then overshoot it at later durations. This might appear to suggest that there is an error in the process for calculating the tax loss value proportions.

The question arises as to what is the reason for the observed feature of a dip (below a ratio of 1) in the graphs around durations 10-15.

The reason is to do with the value placed on tax losses as per graph 7.5.5.
Considering the 4% total investment return case, the value placed on tax losses is zero from duration 13 onwards despite the fact that tax losses at that stage are around 21% of fund value. With no exits, tax on capital gains would have become payable from about duration 12 onwards. Thus for durations 10-12, the Transaction Value perfect foresight unit prices are lower than the base case because of the combination of three effects being

- Consideration has been paid for prior exits,
- No value is being placed on tax losses at that stage
- No additional tax-free investment return has been received by that stage.

When additional tax-free investment return starts to accrue, the graph turns upwards but (at 4%) remains below 1 until duration 15.

The dip feature might seem inconsistent with the concept of perfect foresight. However it arises because the value placed on tax losses is computed as a weighted average of what different groups of continuing unit-holders would reasonably pay for tax losses. The 10-15 duration cohorts would theoretically pay nothing to prior exits whereas the later duration cohorts would pay consideration. The 10-15 duration cohorts are disadvantaged by this weighted average process.

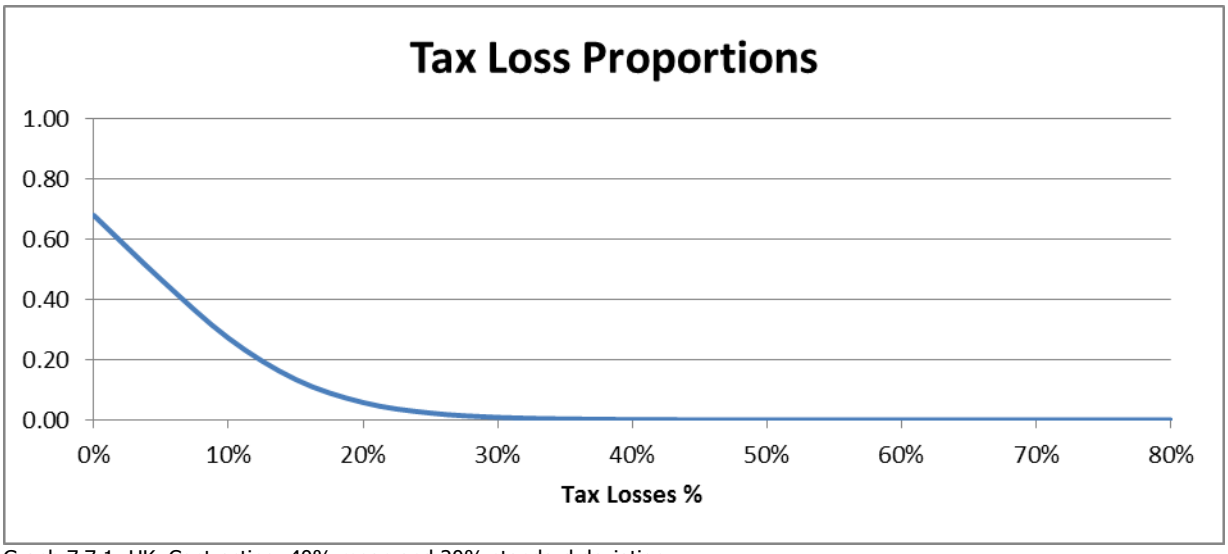
7.7. Tax Loss Value Proportion Algorithm with no Residual Term Weighting

Using the method described in section 7.4 and the assumptions of section 7.5, we can derive tax loss value proportions for various total investment return rates. Using a probability investment return distribution, we can derive a schedule of tax loss value proportions corresponding to tax loss percentages.

We can then graph the results for various scenarios.

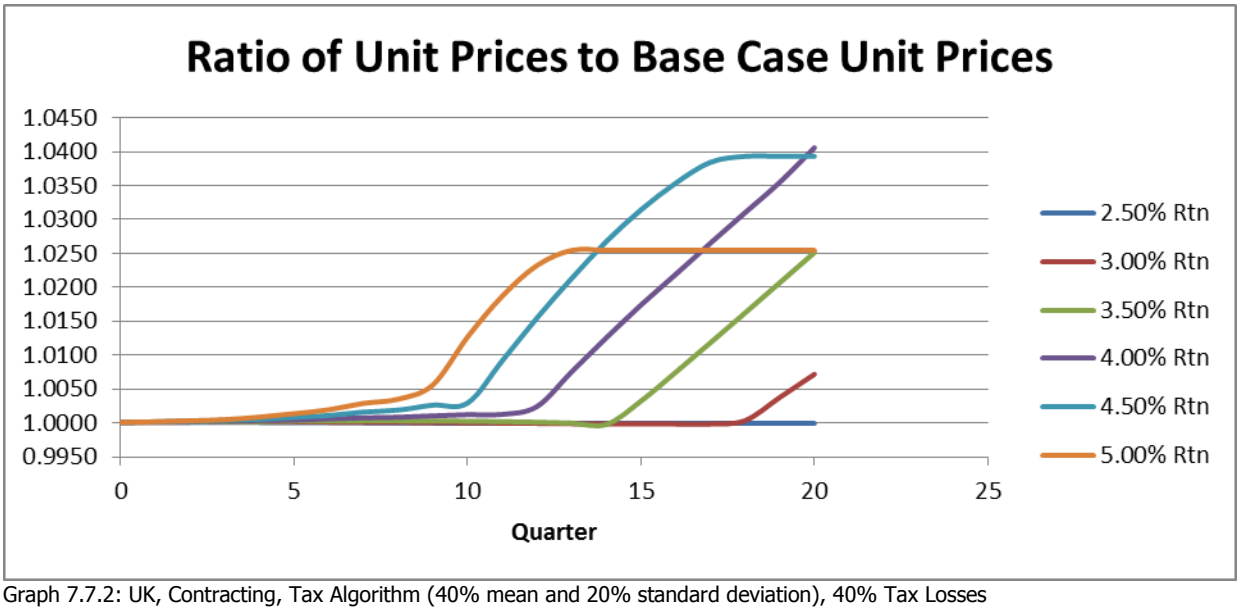
Assuming a normal distribution for the 5-year total investment return with a 40% mean and 20% standard deviation and assuming that the total investment return is uniform over the five-year period, the results are as follows: -

Firstly the [Tax Loss Value Proportion] figures are:



Graph 7.7.1: UK, Contracting, 40% mean and 20% standard deviation

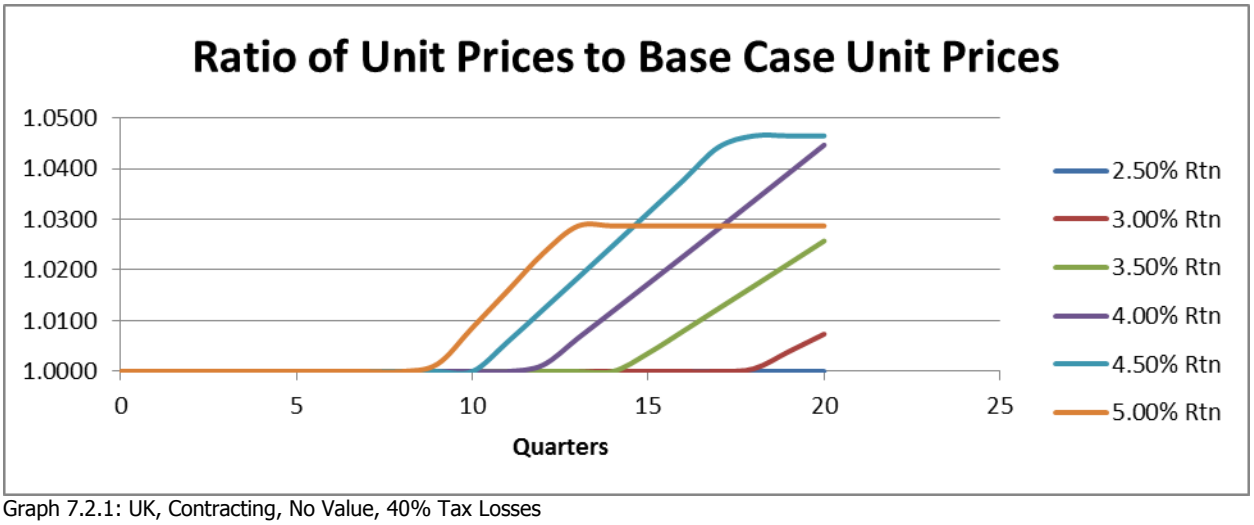
The ratios of tax algorithm unit prices to the base case unit prices are:



Graph 7.7.2: UK, Contracting, Tax Algorithm (40% mean and 20% standard deviation), 40% Tax Losses

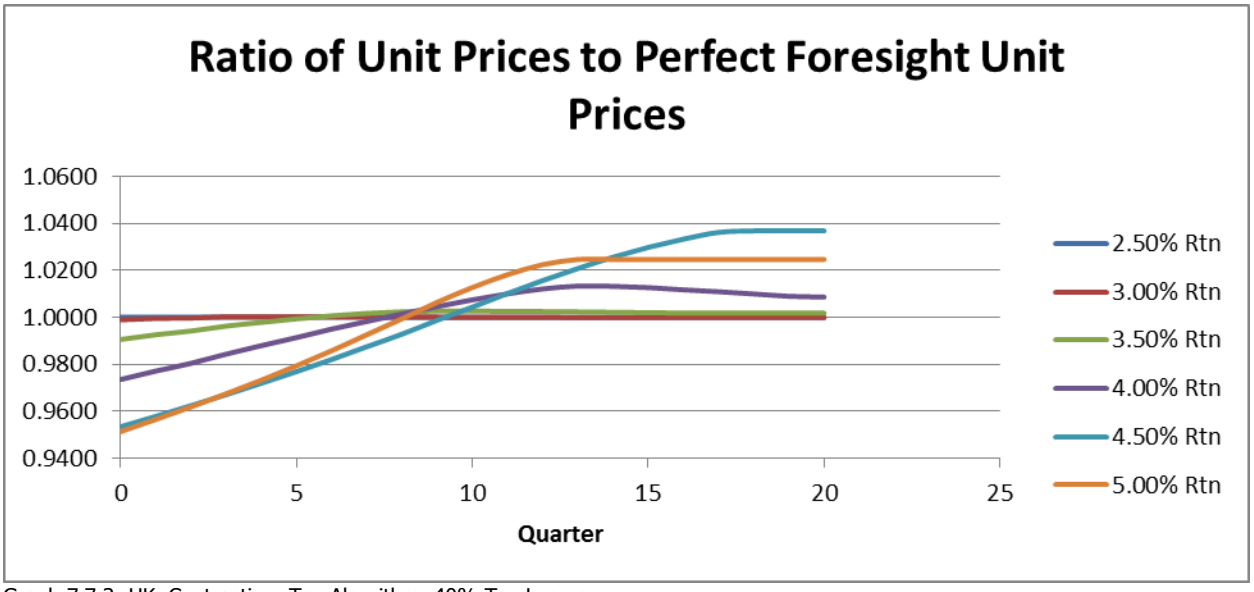
There are some poor features in the graph 7.7.2. The lack of relative consistency in the various graphs is disappointing e.g. the 4.5% investment return rate compared to the 5% investment return rate.

The graph 7.7.2 is almost identical to that of graph 7.2.1 (the no value placed on tax losses approach) which is expected as the tax algorithm is placing very little value on tax losses for the 40% mean and 20% standard deviation normal distribution for total investment return.



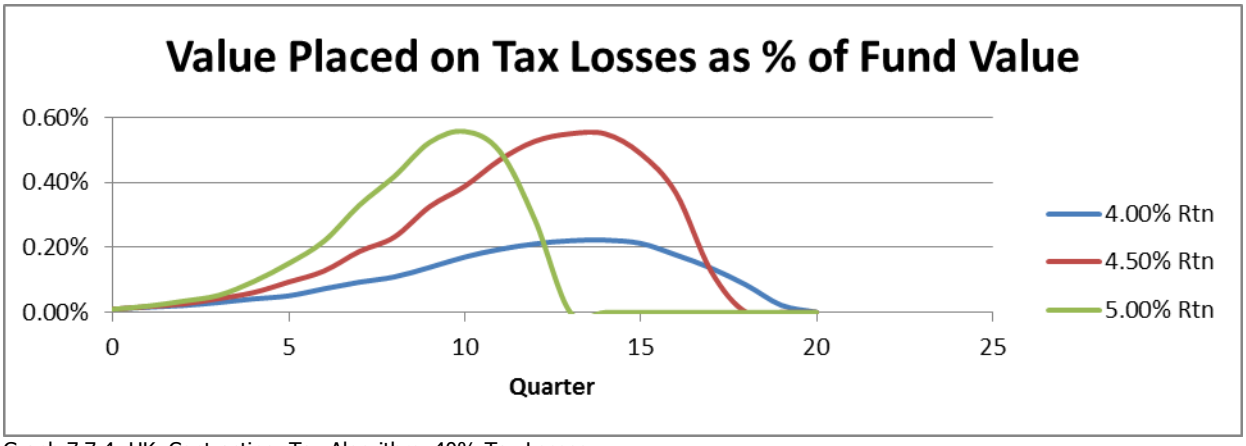
Graph 7.2.1: UK, Contracting, No Value, 40% Tax Losses

The results can be analysed in the context of the ratios of the actual prices (on the basis of the tax loss value algorithm) to the transaction value perfect foresight unit prices.



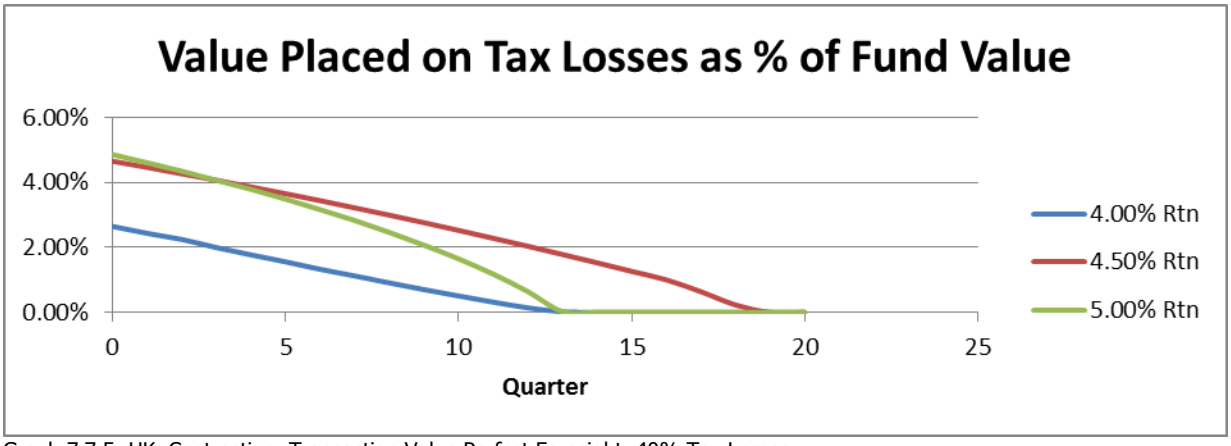
Graph 7.7.3: UK, Contracting, Tax Algorithm, 40% Tax Losses

Graph 7.7.4 is the value placed on tax losses using the algorithm.



Graph 7.7.4: UK, Contracting, Tax Algorithm, 40% Tax Losses

Graph 7.7.5 is the value placed on tax losses in the Transaction Value perfect foresight scenario.

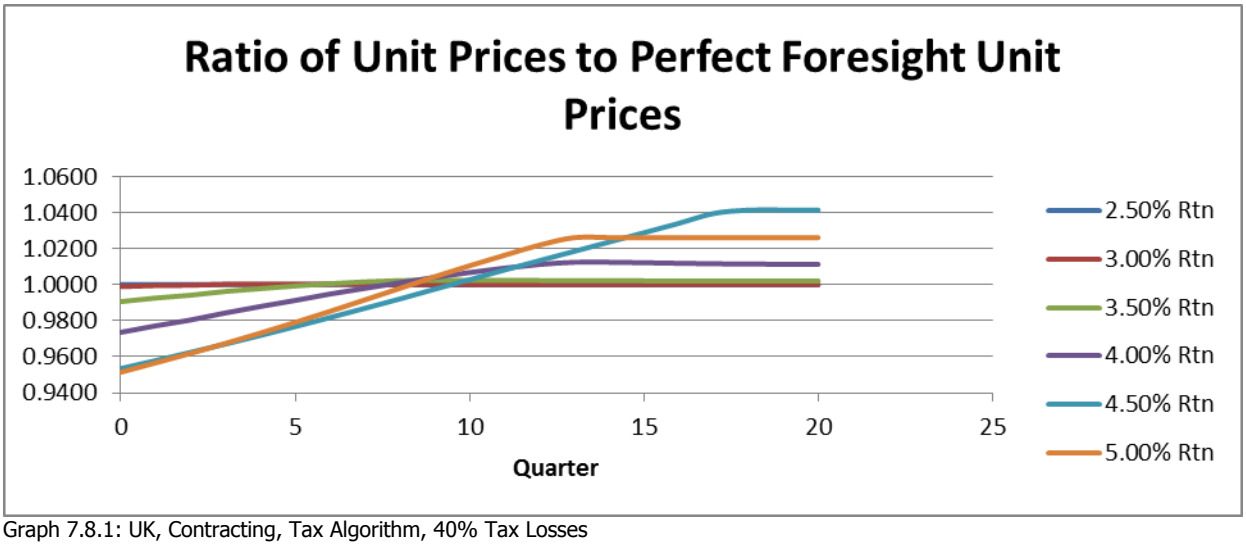


Graph 7.7.5: UK, Contracting, Transaction Value Perfect Foresight, 40% Tax Losses

7.8. Tax Loss Value Proportion Algorithm with Residual Term Weighting

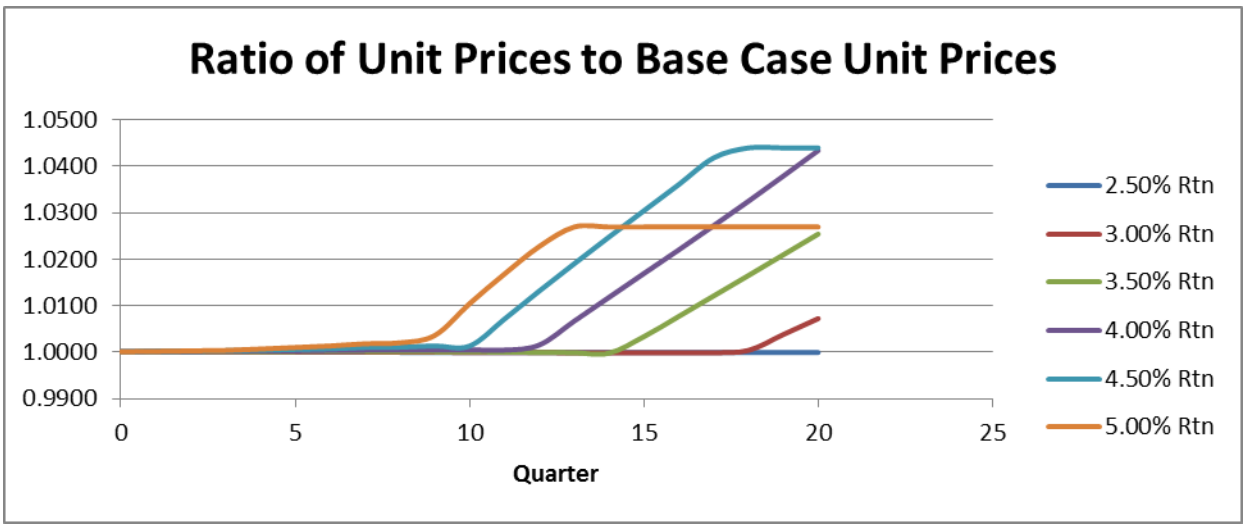
A possible variation for the tax loss value algorithm is to postulate a fixed term for the fund and consequently to apply a weighting factor of [Residual Term] / [Residual Term at Basis Outset] (e.g. [Residual Term] /20) to the [Tax Loss Value Proportion]. Thus the value placed on tax losses would tend towards zero at the end of the term irrespective of the then tax loss percentage.

Utilising the assumptions of section 7.7 and applying a [Residual Term Weighting Factor], the results are as follows:-



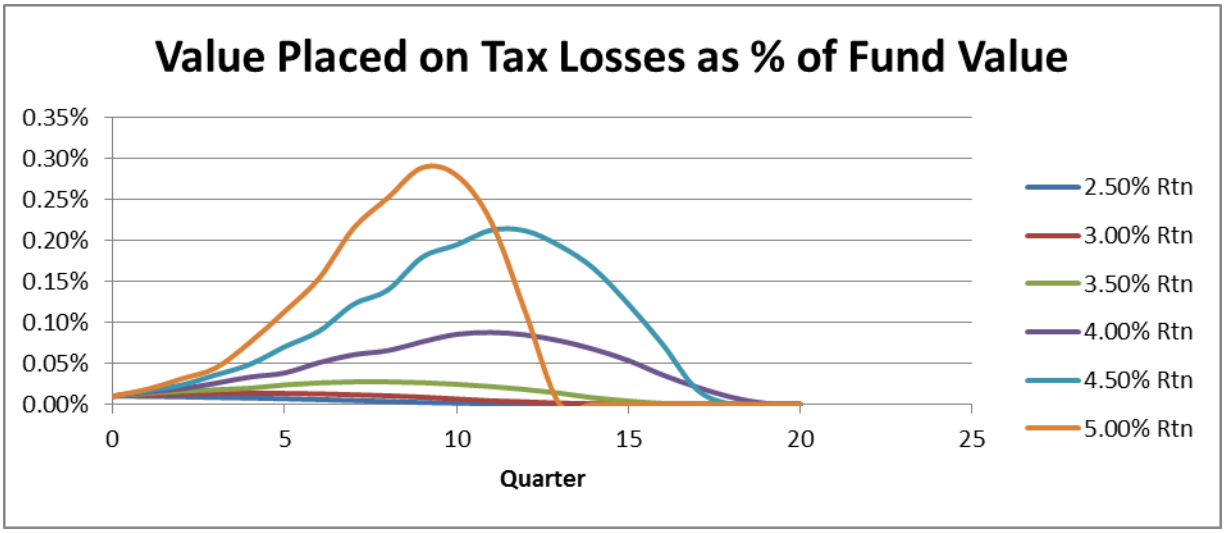
Graph 7.8.1: UK, Contracting, Tax Algorithm, 40% Tax Losses

For high values of investment return at the high tail of the investment return distribution, the unit prices would be expected to be much lower than the perfect foresight unit prices at the early durations. This is understandable as at the outset we don't know whether the outcome is going to be a scenario 1 type outcome or a scenario 2 type outcome or some intermediate scenario 3 type outcome. For high tail outcomes, it would be unreasonable to expect the tax loss value algorithm to match the perfect foresight results.

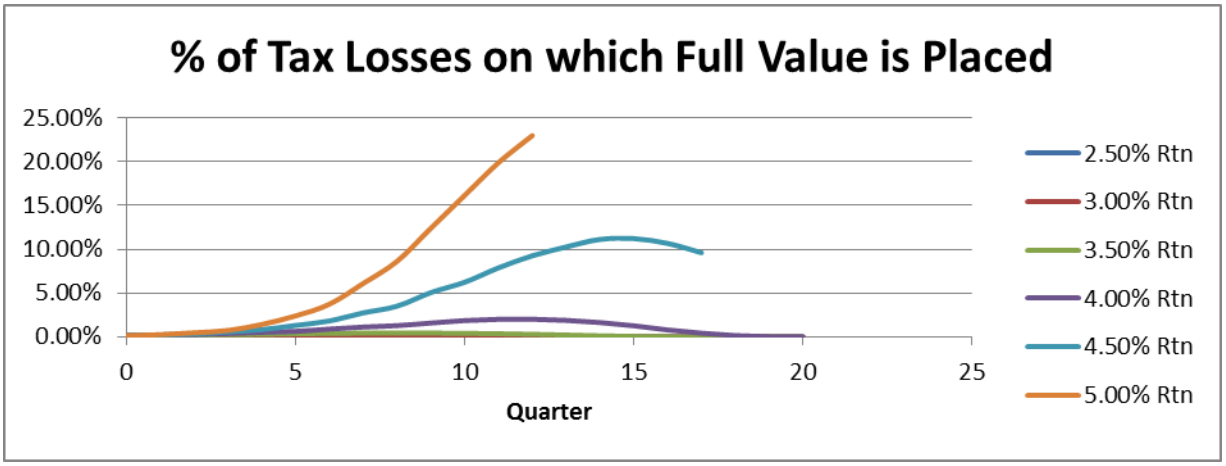


Graph 7.8.2: UK, Contracting, Tax Algorithm, 40% Tax Losses

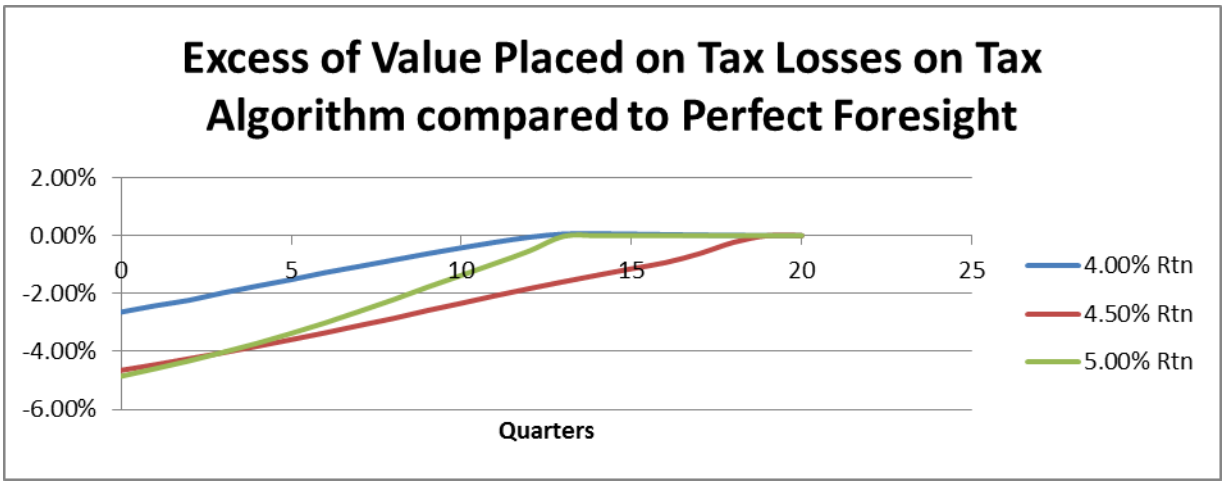
The value placed on tax losses (where the graphed investment return rates determine the amount of tax losses – the value placed thereon is determined by the algorithm) is as follows:-



Graph 7.8.3: UK, Contracting, Tax Algorithm, 40% Tax Losses



Graph 7.8.4: UK, Contracting, Tax Algorithm, 40% Tax Losses



Graph 7.8.5: UK, Contracting, Tax Algorithm, 40% Tax Losses

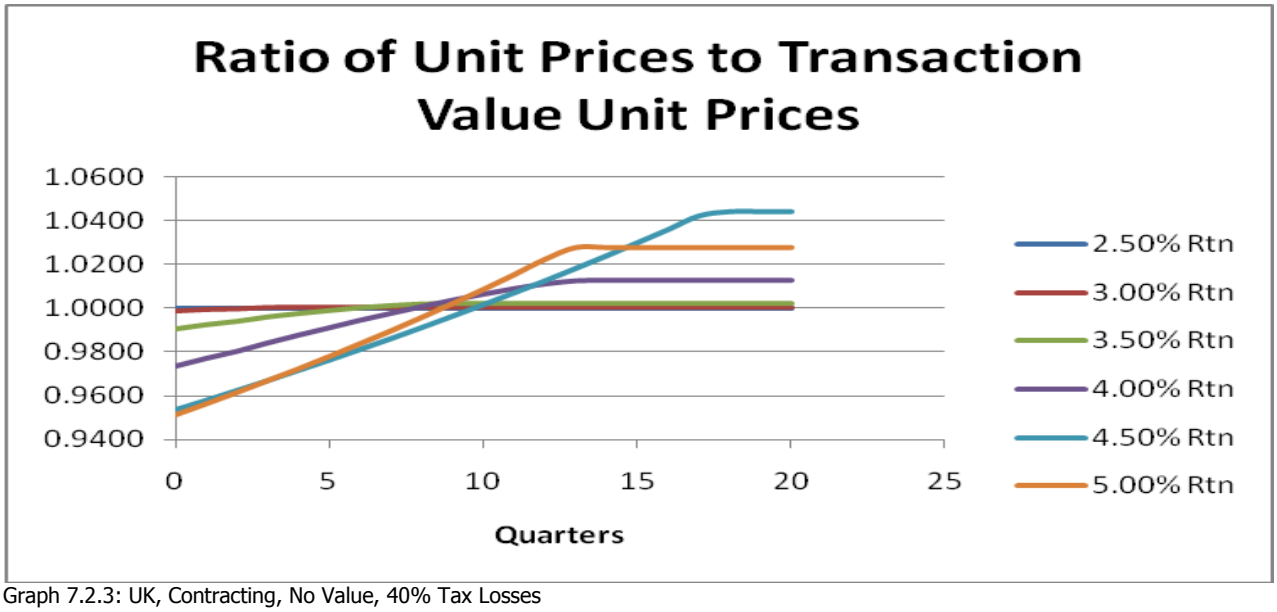
7.9. Review of Results with Residual Term Weighting

The results meet the specified criteria (as per Section 3.8) of a good tax loss value algorithm to in that:

- The unit prices (other than higher tail investment returns) converge over time towards the base case unit prices (see graph 7.8.2).
- For higher rates of investment return, the unit prices are somewhat higher at the later durations than the base case unit prices but it must be borne in mind that the proportion in force at the later durations is very small.
- The unit price discontinuity on change of basis is small (see graph 7.8.3).
- At later durations, the unit prices are close to the perfect foresight unit prices (see graph 7.8.1).

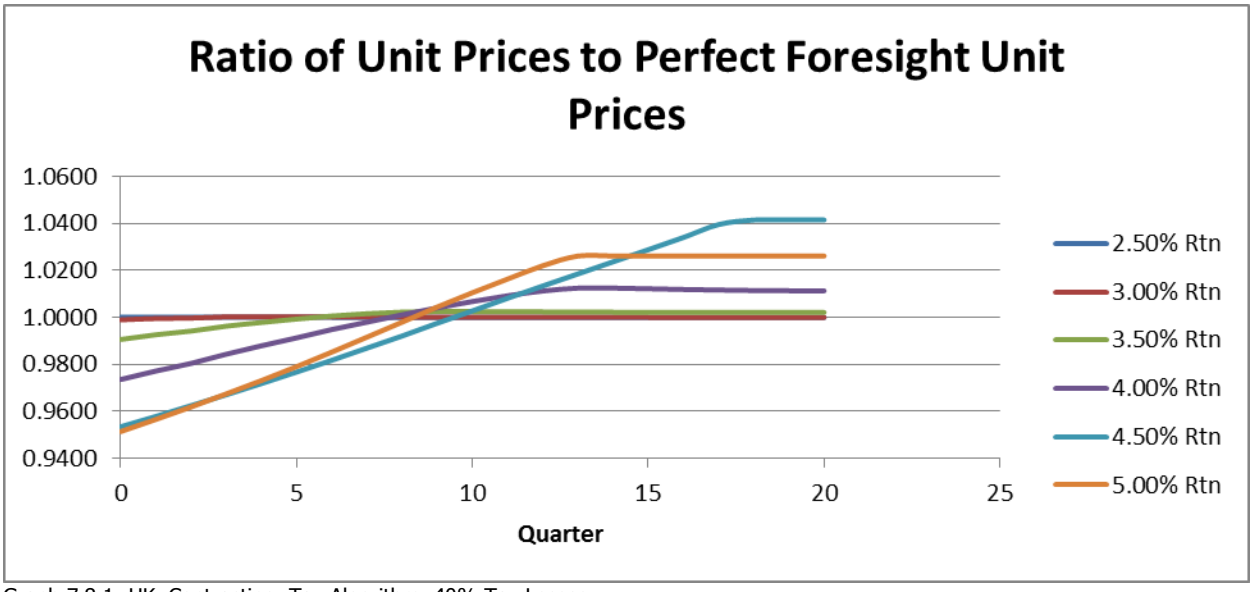
7.10. Merits of Placing No Value on Tax Losses

If no value is placed on tax losses, the results are:



Graph 7.2.3: UK, Contracting, No Value, 40% Tax Losses

If value is placed on tax losses using the tax algorithm, the results are:

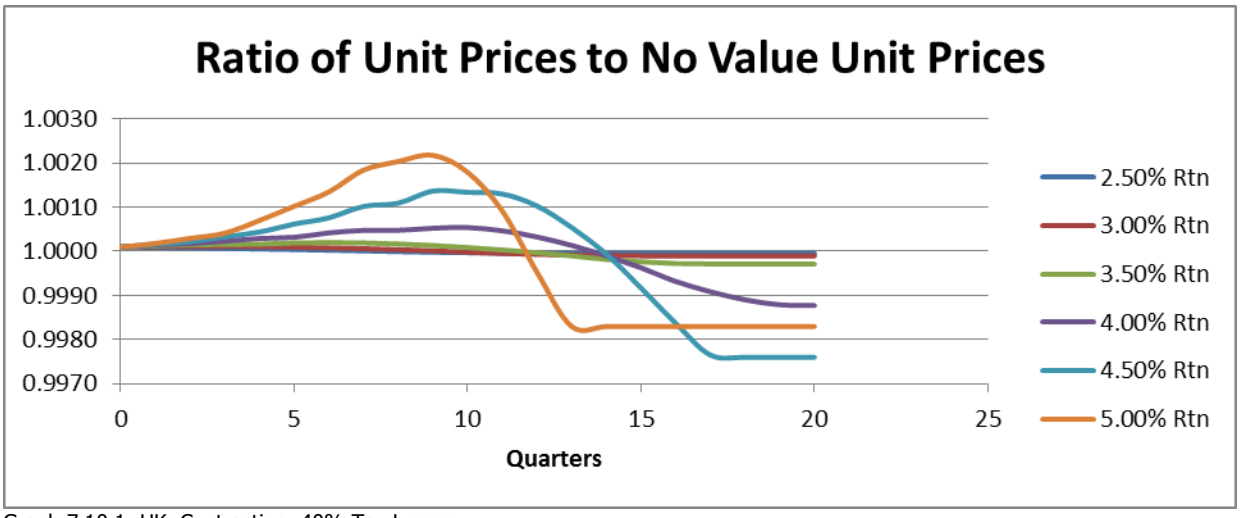


Graph 7.8.1: UK, Contracting, Tax Algorithm, 40% Tax Losses

It can be seen that the two graphs are pretty similar. This is to be expected as it can be seen from graph 7.12.1 in Section 7.12 that the value placed on tax losses by the tax algorithm is quite small.

We can see from graph 7.2.3 and graph 7.8.1 that at later durations for higher rates of total investment return that the unit prices (both on the basis of no value and the tax algorithm basis) are higher than the Transaction Value perfect foresight unit prices.

To better understand the differences between the two sets of results, we can compare the unit prices on the tax algorithm basis compared to the unit prices on the no value basis.

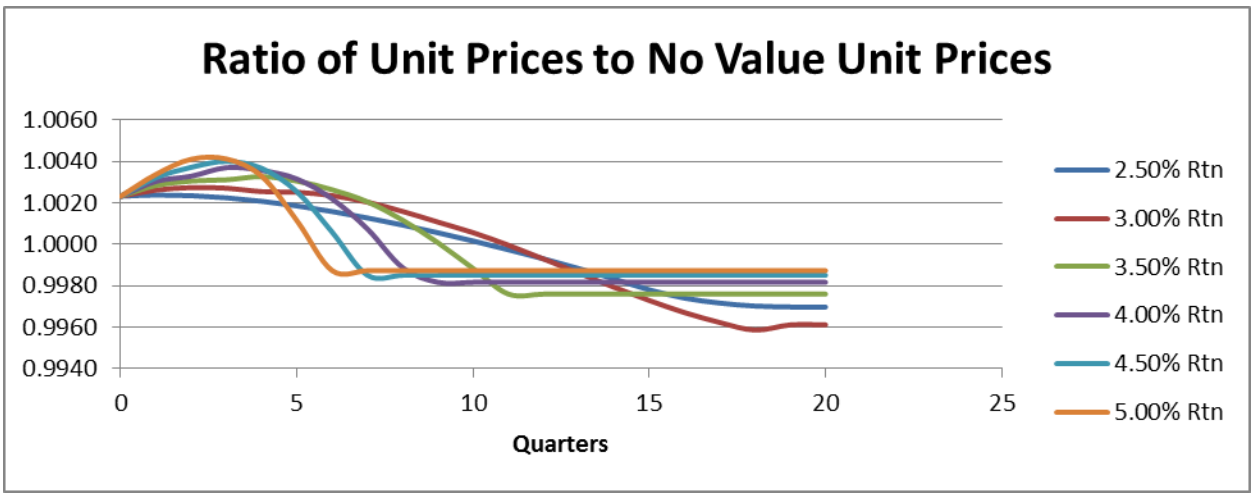


Graph 7.10.1: UK, Contracting, 40% Tax Losses

From graph 7.10.1, we can see that the use of the tax algorithm reduces the effect at later durations for those higher rates of total investment return and to that extent provides an improvement. However the effect is not significant.

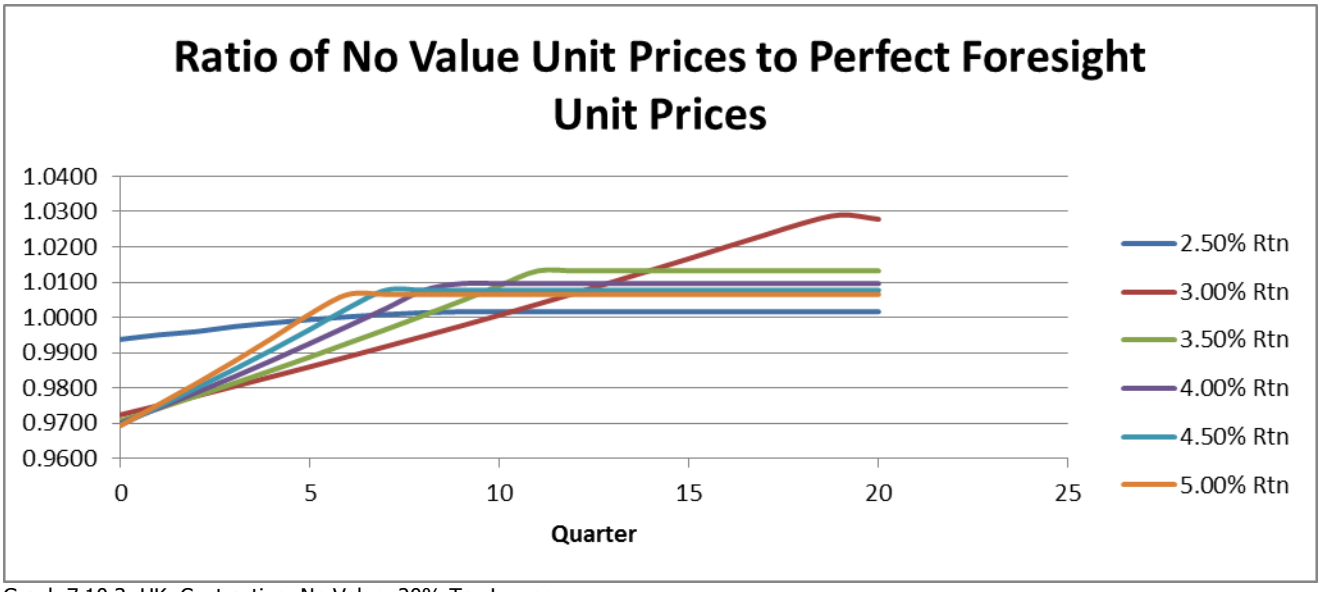
One might conclude from the above that there is no practical difference between the Zero Value Method and the tax algorithm Transaction Value Method. However that conclusion would be solely based on the 40% tax losses case. It can be seen from graph 7.12.1 in Section 7.12 that the value placed on tax losses by the tax algorithm is very small for an initial 40% tax losses case but for smaller tax loss percentages the values placed are more significant.

The effect is more significant for the 20% tax loss percentage case as is evident from graph 7.10.2 below.

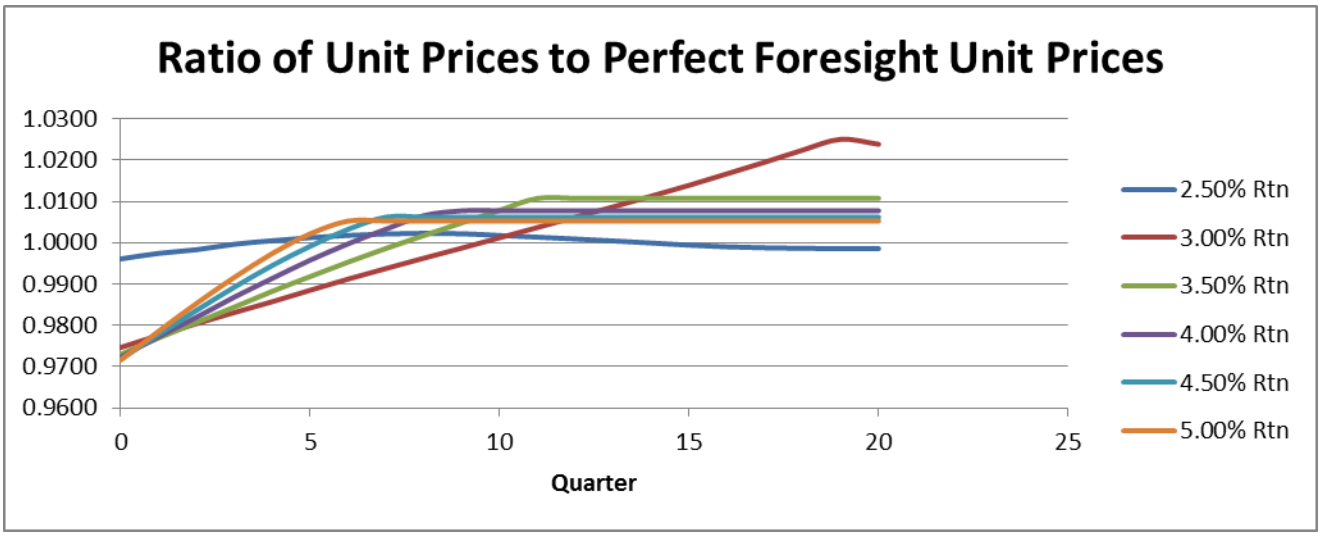


Graph 7.10.2: UK, Contracting, Tax Algorithm, 20% Tax Losses

We can see from graph 7.10.2 that there are differences between the no value unit prices and the tax algorithm unit prices and that the no value unit prices are higher at the later durations for higher investment return rates as would be expected. To fully understand the consequences of this, it is important also to look at the respective rates of the unit prices to the perfect foresight unit prices as shown in graphs 7.10.3 and 7.11.1 below.



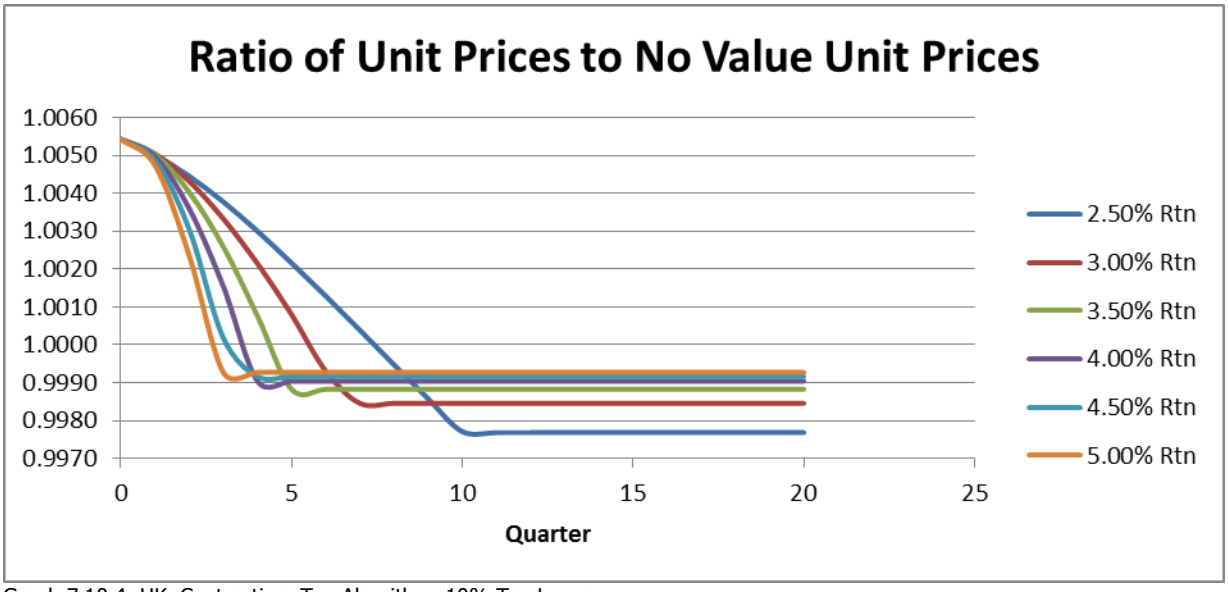
Graph 7.10.3: UK, Contracting, No Value, 20% Tax Losses



Graph 7.11.1: UK, Contracting, Tax Algorithm, 20% Tax Losses

The graphs 7.10.3 and 7.11.1 look almost identical but on much closer inspection graph 7.11.1 gives slightly better results.

We can also consider the 10% tax loss percentage.



Graph 7.10.4: UK, Contracting, Tax Algorithm, 10% Tax Losses

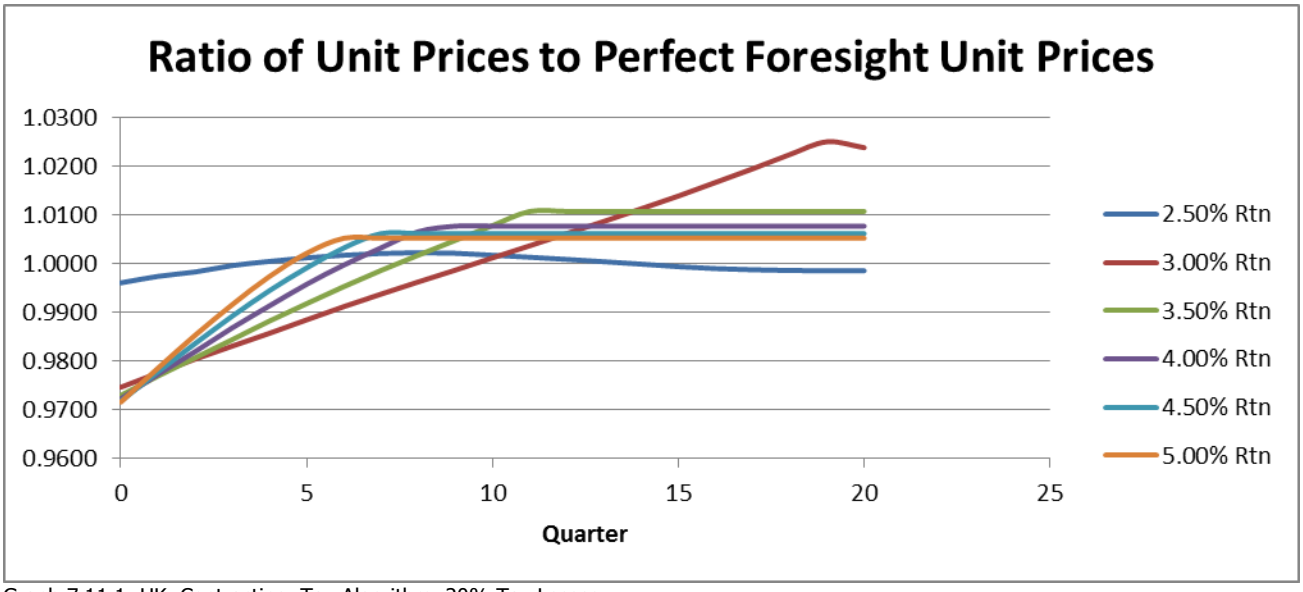
It is significant at the early durations for the 10% tax loss percentage.

For the 40% tax loss percentage, there are maximum differences in price of about 0.2%.
For the 20% tax loss percentage, there are maximum differences in price of about 0.4%.
For the 10% tax loss percentage, there are maximum differences in price of about 0.55% at early durations but quickly reducing to much less significant differences.

The conclusion is that there is merit in placing value on tax losses and particularly so for lower tax loss percentages such as the 10% case or the 20% case. See also the graphs in section 7.12.

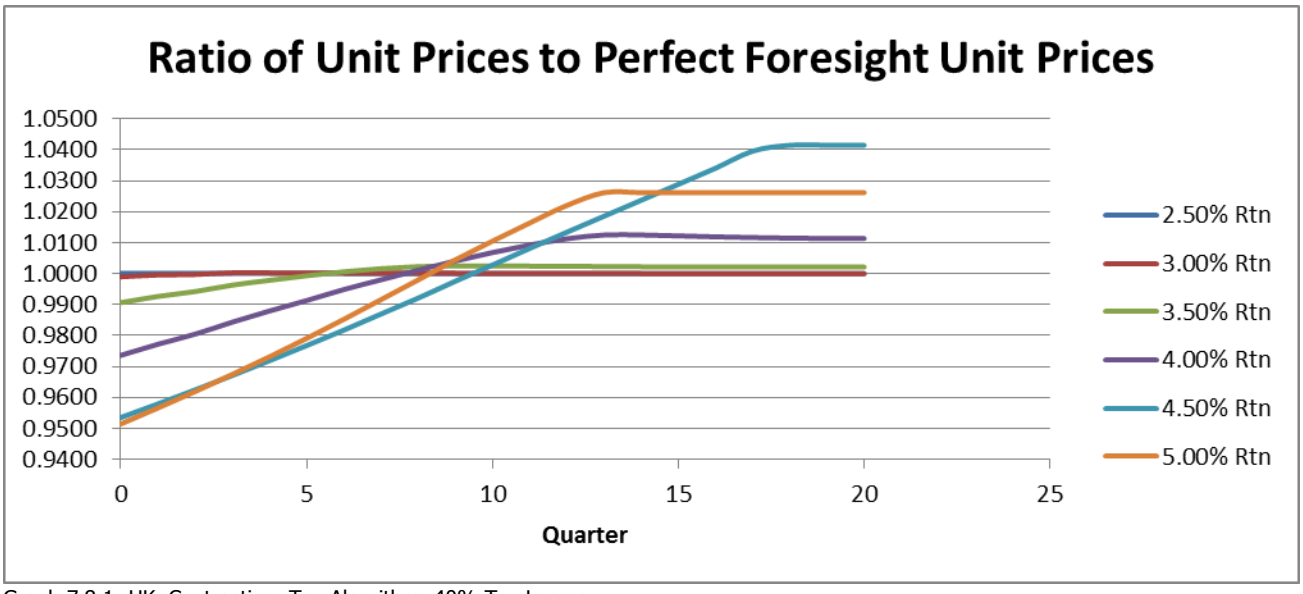
7.11. Sensitivity of Tax Loss Percentage

Suppose the tax loss percentage at the outset were 20%.



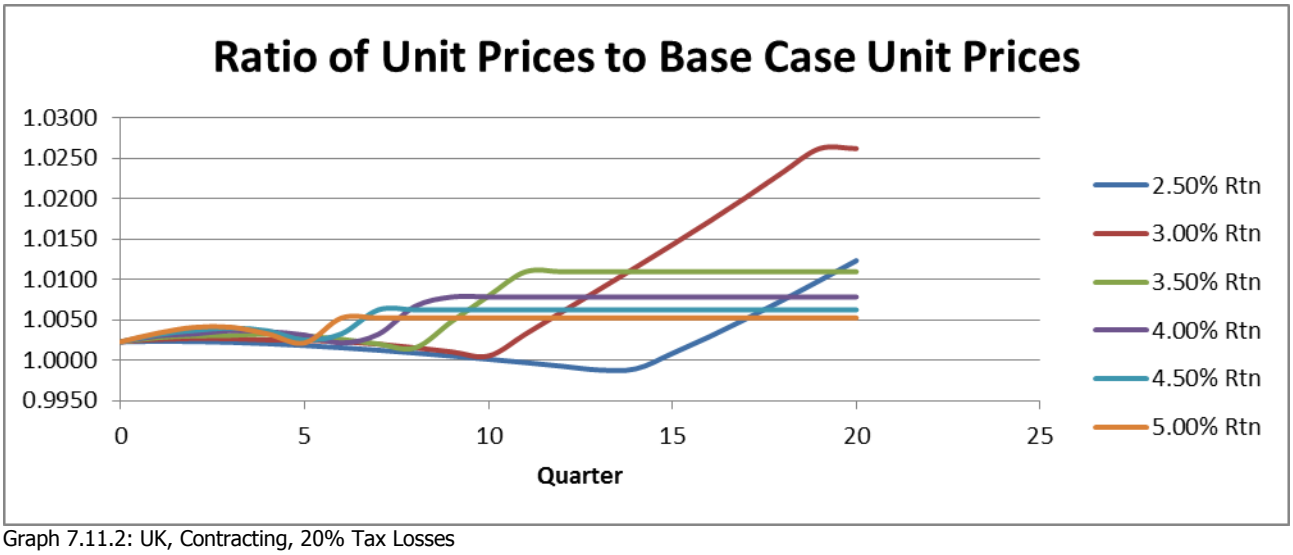
Graph 7.11.1: UK, Contracting, Tax Algorithm, 20% Tax Losses

Graph 7.11.1 is similar to the shape of graph 7.8.1 for 40% tax losses.



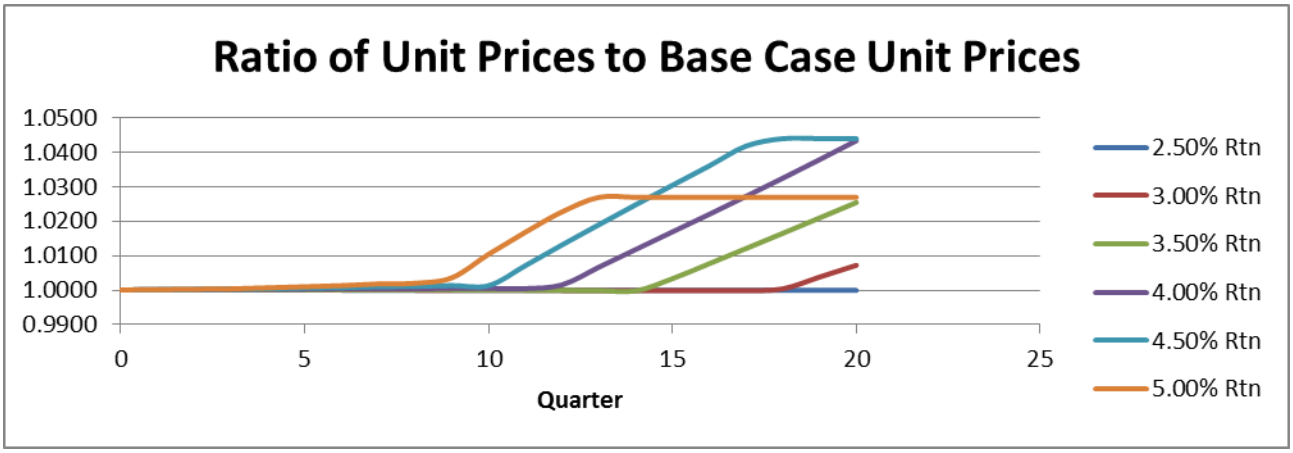
Graph 7.8.1: UK, Contracting, Tax Algorithm, 40% Tax Losses

The difference is that the ratio variations are smaller for the 20% case and the greatest difference arises for 3% return rather than 4.5% return.



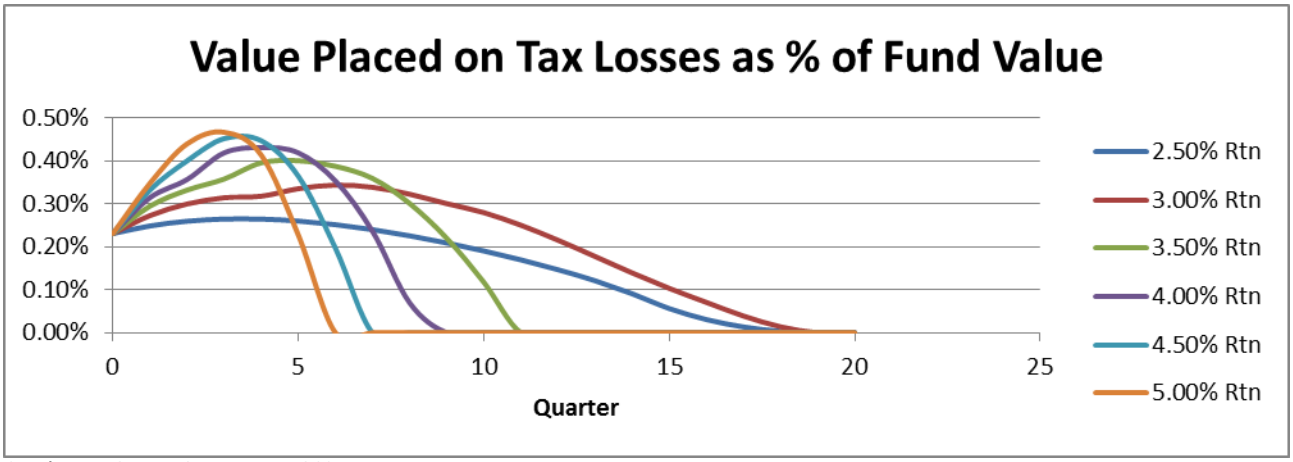
Graph 7.11.2: UK, Contracting, 20% Tax Losses

Graph 7.11.2 is similar to the shape of graph 7.8.2 for 40% tax losses.

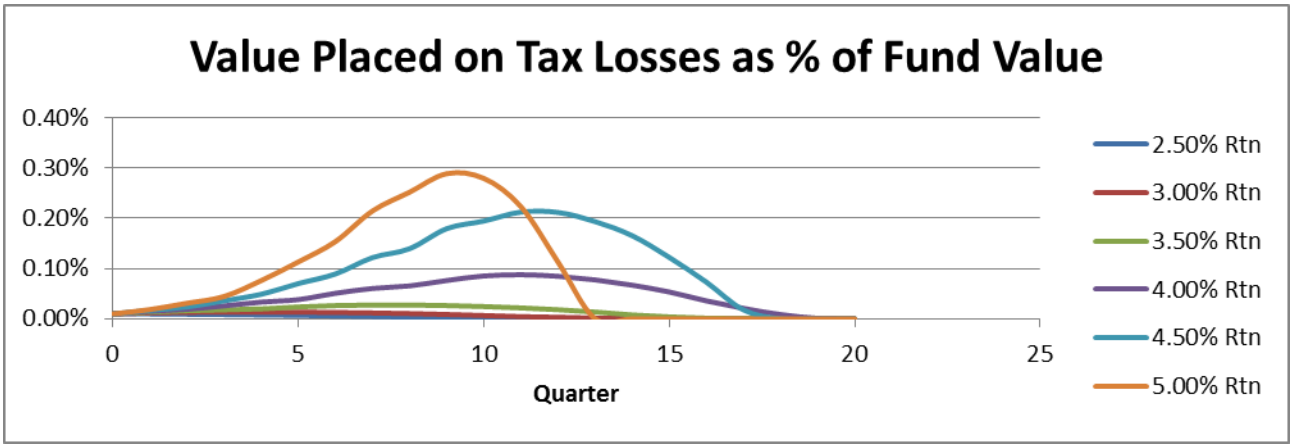


Graph 7.8.2: UK, Contracting, 40% Tax Losses

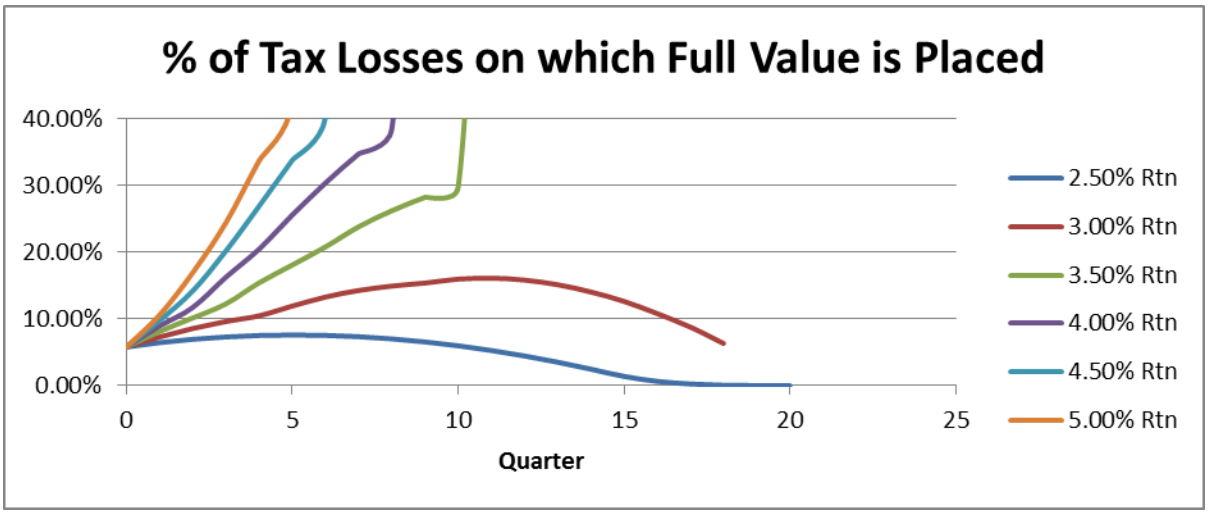
The difference is that ratio variations are smaller for the 20% case and the greatest difference arises for 3% return rather than 4.5% return.



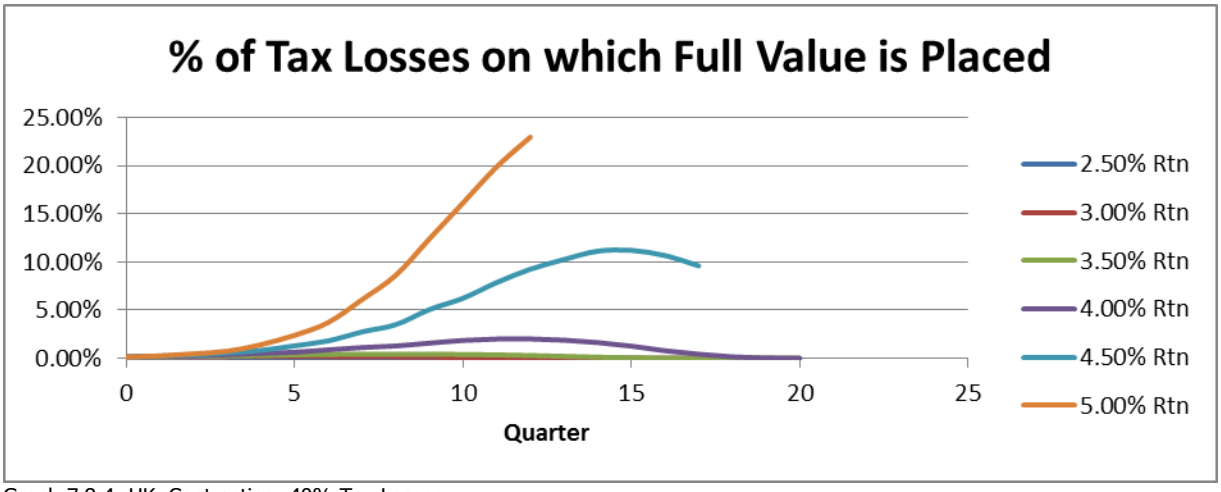
Graph 7.11.3: UK, Contracting, 20% Tax Losses



Graph 7.8.3: UK, Contracting, 40% Tax Losses



Graph 7.11.4: UK, Contracting, 20% Tax Losses



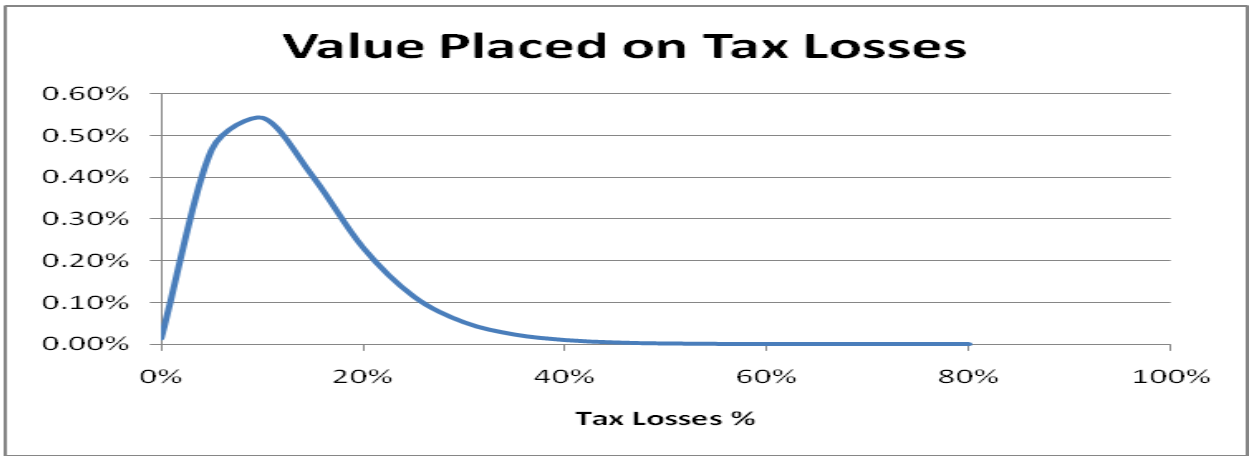
Graph 7.8.4: UK, Contracting, 40% Tax Losses

It can be seen from graphs 7.11.3, 7.11.4 compared to graphs 7.8.3 and 7.8.4 that a greater value is placed on tax losses (and a higher proportion of tax losses have full value placed on them) for the 20% tax loss percentage than for the 40% tax loss percentage.

7.12. Value Placed on Tax Losses

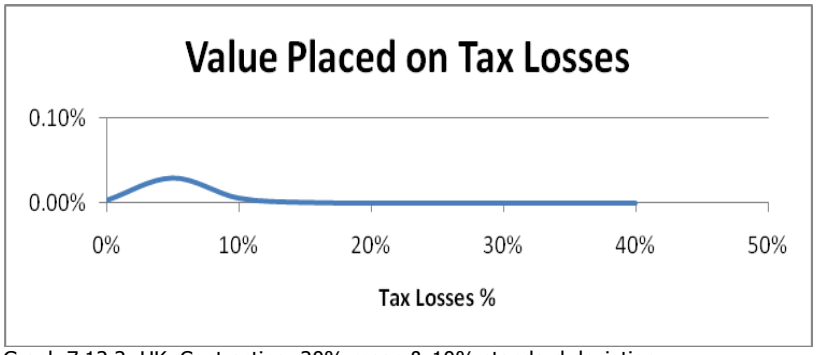
Using the method described in section 7.4 and the assumptions of section 7.5, we can derive tax loss value proportions for various total investment return rates. Using a probability investment return distribution, we can derive a schedule of tax loss value proportions corresponding to tax loss percentages and the value placed on tax losses.

Assuming a normal distribution for the 5-year total investment return with a 40% mean and 20% standard deviation and assuming that the total investment return is uniform over the five-year period, the results are as follows: -

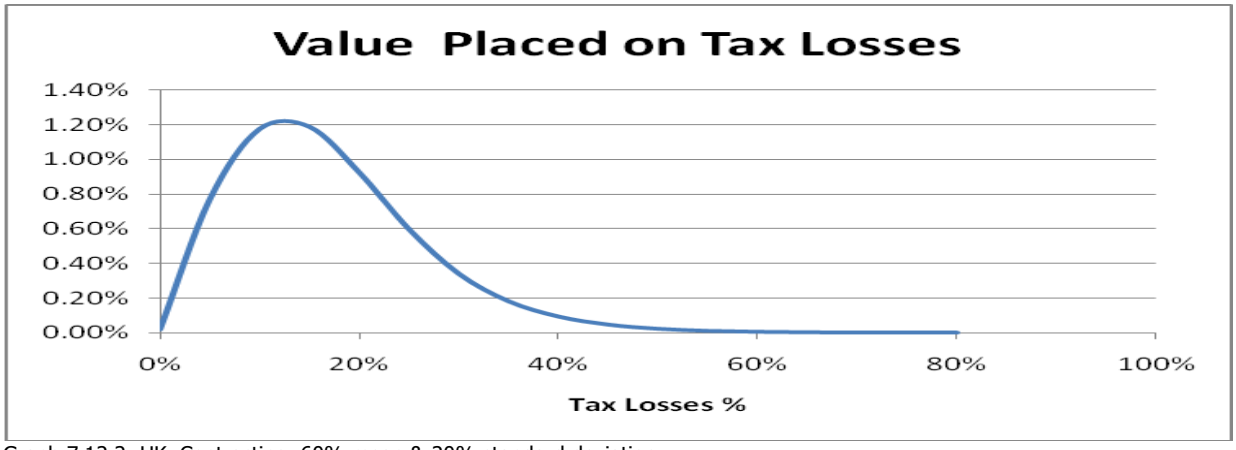


Graph 7.12.1: UK, Contracting, 40% mean & 20% standard deviation

We can also consider other investment return distributions.



Graph 7.12.2: UK, Contracting, 20% mean & 10% standard deviation



Graph 7.12.2: UK, Contracting, 60% mean & 20% standard deviation

UK Funds –Expanding Position

8.1. Generalised Unit Pricing Basis

In general the unit prices are used both for unit transactions between incoming unit-holders and continuing unit-holders and for unit transactions between exiting unit-holders and continuing unit-holders.

For the purpose of our discussion, let us label the most appropriate price for unit transactions between incoming unit-holders and continuing unit-holders as "CRP" and the most appropriate price for unit transactions between exiting unit-holders and continuing unit-holders as "CLP".

The difficulty is that it may be necessary to operate within the straight-jacket of a single pricing basis to be applied equally to both inflows and outflows. The fairest approach in those circumstances to striking a single unit price would appear to be to use a single price which is a weighted average of the "CRP" and "CLP" prices.

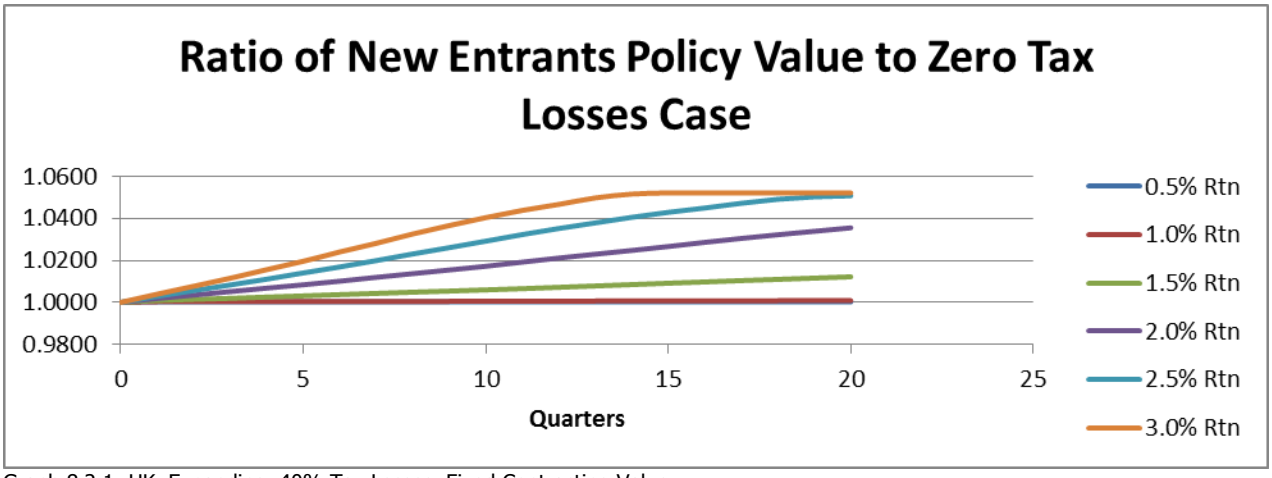
Thus suppose that incoming unit-holders were fraction n of the existing fund and exiting unit-holders were fraction w of the existing fund. The most appropriate single unit price would then be (w* CLP + n * CRP)/ (w + n).

If one accepts that proposition, the approach to valuing tax losses in unit pricing for an expanding fund is relevant even for life companies whose unit funds are in a contracting position. This is because on a generalised unit pricing basis the unit price should be a weighted average of the contracting basis and expanding basis unit prices. It is thus necessary to separately calculate cancellation and creation unit prices and separate [Tax Loss Proportion] figures are required for the cancellation and creation unit prices.

8.2. Consequences of Placing No Value on Tax Losses

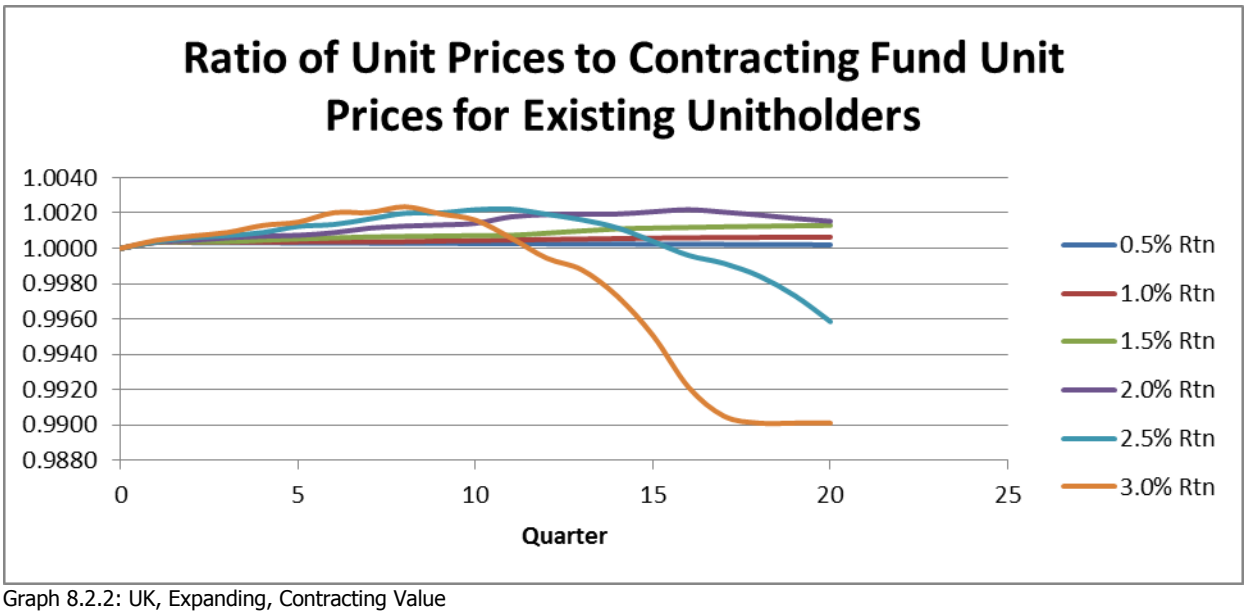
Suppose the fund is in a contracting position with 40% tax losses and value is being placed on tax losses based on the tax loss value algorithm developed for contracting funds.

Suppose the unit pricing basis is left unchanged for a [New Entrant % Inflow] of 25%.
The results would be:



Graph 8.2.1: UK, Expanding, 40% Tax Losses, Fixed Contracting Value

New entrants would clearly benefit (as can be seen from graph 8.2.1) at the expense of existing unit-holders (as can be seen from graph 8.2.2) because they will receive some future investment return tax-free whereas the existing unit-holders will receive less future investment return tax-free than they otherwise would have. The effect is greater for higher investment return rates. For example, at 3% investment return, the tax losses were fully extinguished and so the 40% tax losses generated a tax saving of 8% spread over 125% (existing unit-holders plus the 25% new entrants) unit-holders and the discounted effect is approx 5.2% at later durations.

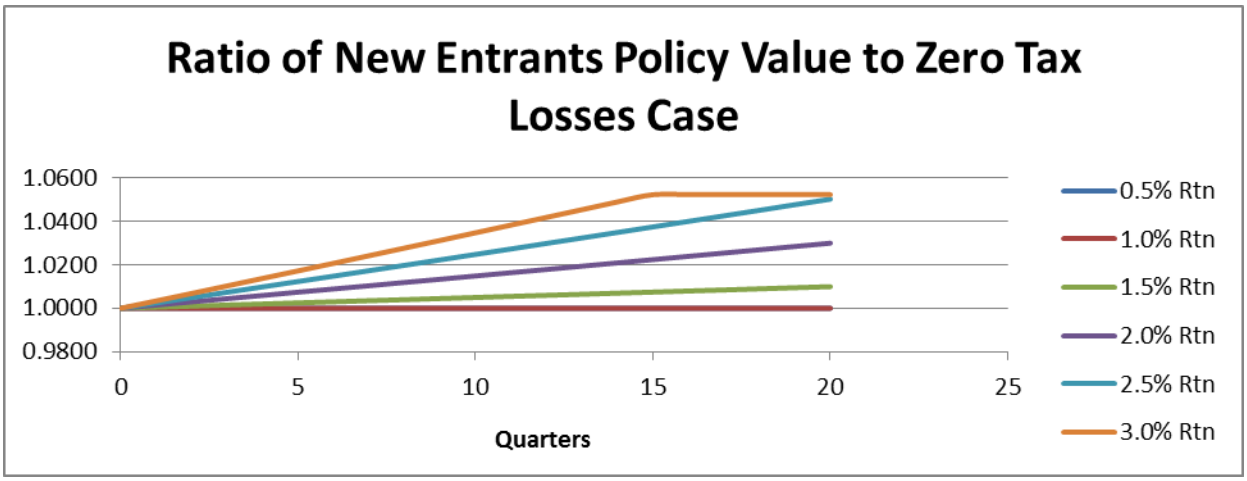


Graph 8.2.2: UK, Expanding, Contracting Value

There is an unusual feature for existing unit-holders in that for low rates of investment return the ratios are greater than 1. This might seem odd but it is due to the feature that for a contracting fund (with 40% tax losses) that the value placed on tax losses increases as the tax loss percentage reduces. The effect of the [New Entrant % Inflow] of 25% reduces the [Tax Loss %] but the resultant increase in the proportion of tax losses on which full value is placed is

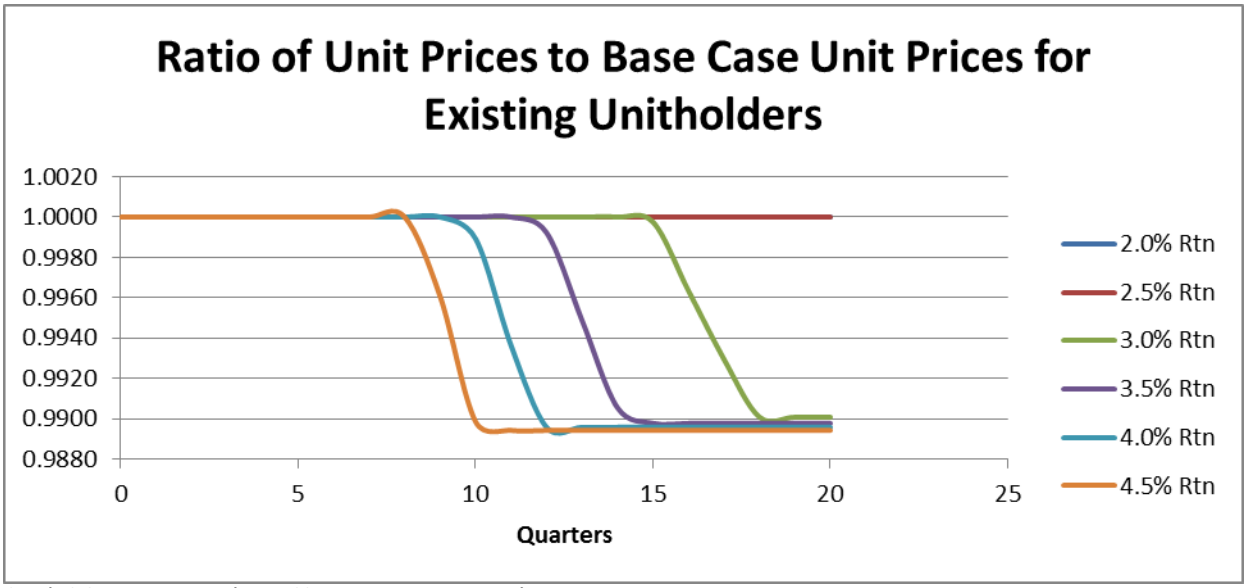
more than 25% resulting in an overall increase in the value placed on tax losses as a percentage of the fund even though tax losses as a percentage of the fund reduces.

Note: The same pattern of a benefit to new entrants is observed if no value (as distinct from contracting value) is being placed on tax losses as can be seen from graph 8.2.3.



Graph 8.2.3: UK, Expanding, 40% Tax Losses, Zero Value

As regards the position of existing unit-holders, it can be seen from graph 8.2.4 that there is no effect for lower rates of investment return (for 40% tax losses) but at higher rates an effect arises. This corresponds to the 40% tax losses scenario but for lower rate of tax losses, the effect on existing unit-holders would arise for lower rates of investment return.



Graph 8.2.4: UK, Expanding, 40% Tax Losses, Zero Value

It is clear from the results that it is necessary to place a value on tax losses for the purposes of the tax loss transfer transaction arising from the [New Entrant % Inflow] of 25%.

A tax loss value algorithm for expanding funds is clearly required.

A tax algorithm is developed in this chapter and example results given in section 8.11. A comparison of graphs 8.2.1 and 8.11.2 would show that the new entrant policy values are approx 2% lower (for all durations after 0 and all investment return rates) on the tax loss value algorithm basis.

A comparison of graphs 8.2.2 and 8.11.4 would show that the existing unit-holder unit prices are approx 0.48% higher (for all durations after 0 and all investment return rates) on the tax loss algorithm basis.

The order of magnitude of the differences for both new entrants and existing unit-holders would suggest that the use of the tax loss value algorithm is appropriate.

8.3. Philosophies for Placing Value on Tax Losses

It was easier to formulate a pricing basis philosophy for funds in a contracting position. It was based on a determination of the value obtained by continuing unit-holders from the tax losses left behind by exiting unit-holders.

The position is more complicated for funds in an expanding fund position. This is because there are a number of possible approaches.

- Approach 1: The incoming unit-holders pay for the value they accrue from the transfer to them of a share of the tax existing tax losses in the fund
- Approach 2: The incoming unit-holders compensate the existing unit-holders for the reduction in tax-free investment return they receive as a consequence of the tax losses transferred to the incoming unit-holders

In some circumstances, the two approaches would give similar results. However in other circumstances they could give very different results.

Suppose there were 25% new unit-holders.
Suppose a fund had 20% tax losses. The tax losses would become 16% (20%/1.25) per unit-holder. Suppose with perfect foresight we knew that future taxable capital gains would be 20% per unit-holder (with 0.75% investment income and 0.5% non-taxable capital gains e.g. RPI indexation relief). This would mean that all tax losses would be relieved. All unit-holders would receive capital gains 16% tax-free and 4% taxable compared to 20% tax-free previously for existing unit-holders and 20% taxable for incoming unit-holders if there were no tax losses.
Utilising Approach 1, the tax losses would be valued at 3.416% (20% tax losses at 20% tax with discounting at 17.1%). The unit price then increases by 21.1% viz 20% plus 0.8* 0.75 + 0.5% (i.e. whilst the taxable capital gains is 16% tax-free and 4% taxable, this is counterbalanced by the effect of the basis on which the new entrants were allocated units such

that the overall effect is a gross 20% for taxable capital gains). It can be shown that the incoming unit-holders have the same policy values as if there were no tax losses. It is clear that the existing unit-holders receive the same level of tax-free investment return as if there were no new unit-holders. Hence in this scenario, the 3.416% figure is clearly the same answer as Approach 2 would have given because with that figure the existing unit-holders receive the same level of tax-free investment return as if there were no new unit-holders.

If however the fund had 80% tax losses, the tax losses would become 64% per unit-holder.
The existing unit-holders would receive 20% tax-free taxable capital gains as before and so Approach 2 would suggest that no compensation is required from the incoming unit-holders. However the incoming unit-holders receive 20% tax-free taxable capital gains and so Approach 1 would require that the incoming unit-holders pay consideration in respect of this.

The authors recommend that Approach 1 is used.
The rationale is that:

- Approach 1 is designed to ensure that new entrants receive the same after-tax investment returns as if they invested into an otherwise identical fund with no tax losses. It might be that existing unit-holders benefit from this approach but that is because circumstances arose where the tax losses of the existing unit-holders could be reasonably sold to new unit-holders at a fair price i.e. the benefit is arising from the realisation of a contingent asset.
- With Approach 2, the method might result in a zero valued being placed on tax losses notwithstanding that the new entrants would get a clear and significant benefit from receiving a share of the tax losses.

In practice, new entrants will enter over a period of time. This presents computational difficulties in that ideally the calculation of the value to be placed on tax losses at a particular unit pricing point should include assumptions about the proportion of new entrants at each pricing point up to and including the [New Entrant Investment Term] and the value to be placed on tax losses for each of those pricing points. The authors have not sought to generalise the calculation formula to that extent. The authors have made an implicit assumption without mathematical evidence that the results of assuming say a 2.08% non-compound new entrant rate for a period of 12 months is approximately the same as new entrants of 25% at the outset. This explains why the [New Entrant % Inflow] figures in the examples are so high.

However, it is clear from Graph 8.6.6 in Section 8.6 that Approach 2 on best estimate assumptions would be disadvantageous to new entrants leaving before the expiry of the [New Entrant Investment Term] with no benefit to those remaining until then and afterwards i.e. new entrants would be better off in an otherwise identical fund with no tax losses. Thus some conservatism in the assumptions in favour of new entrants is required in the calculation basis.
This conservatism is reasonable as the new entrants are paying an immediate price for a contingent benefit.

8.4. Parameters for [Tax Loss Value Proportion]

The appropriate value to place on tax losses for the tax loss transfer transaction between new unit-holders and existing unit-holders for a fund is dependent on a number of parameters including:

- The [Tax Loss %]
- The [New Entrant % Inflow]
- The [New Entrant Investment Term]
- The [Investment Return Rate]
- Whether or not to include an adjustment for the value placed on tax losses at the end of the [New Entrant Investment Term] (e.g. perhaps based on the tax loss algorithm figures for a contracting fund.

Using Approach 1, the principle underlying the calculation of the value to be placed on tax losses for the tax loss transfer transaction is that the value of new entrants' policies at the end of the [New Entrant Investment Term] having invested into the fund should be identical to what the value would have been if the new entrants had invested in an otherwise identical fund with no tax losses.

8.5. Quantifying the [Tax Loss Value Proportion]

A straight-forward way to derive the [Tax Loss Value Proportion] figures for a specific [Tax Loss %] using Approach 1 would be to:

- Assumptions
    a. [New Entrant % Inflow]
    b. [New Entrant Investment Term]
    c. [Investment Return Rates] for the fund (and split into the three components of [Income Rate], [Taxable Capital Gains Rate] and [Non-Taxable Capital Gains Rate]
- Project the fund using the three components of the [Investment Return Rate] and the [New Entrant % Inflow] on two bases viz Projection 1 with the tax losses and Projection 2 without the tax losses
- Derive the investment return amounts and tax charges for each period for each projection
- For each period, determine [Tax Charge (Projection 2) – Tax Charge (Projection 1)] + [Tax Rate] * {[Taxable Investment Return (Projection 1)] - [Taxable Investment Return (Projection 2)]}. Note: The second part of the term is required to adjust for the fact that the investment return in the two projections differs because the fund values differ as a result of the different tax charges. For this purpose [Taxable Investment Return] is computed without any regard to tax losses for both Projection 1 and Projection 2.
- Discount the result at the [Investment Return Rate] net of tax (i.e. net for [Income Rate] and [Taxable Capital Gains Rate] and gross for the [Non-Taxable Capital Gains Rate]). This gives the [Adjusted Reduction in Tax Charges (Period)] figure.

- Total the discounted results for [Adjusted Reduction in Tax Charges (Period)] over all periods up to and including the [Investment Term] to derive [Total Adjusted Reduction in Tax Charges]. Note: If discounting was not applied, the total would be determined as [Sum of Tax Charges (Projection 1)] – [Sum of Tax Charges (Projection 2] + [Tax Rate] * {[Taxable Investment Return (Projection 1)] - [Taxable Investment Return (Projection 2)]}.
- The [Total Adjusted Reduction in Tax Charges] figure is expressed as a ratio of the [Tax Losses]. Dividing this by the [Tax Rate] then gives the value of the [Tax Loss Value Proportion] figures.

It can be demonstrated that when this approach is followed in practice with no discounting [Tax Loss Value Proportion] figures of 0 are obtained for the zero tax loss value scenario and [Tax Loss Value Proportion] figures of 1 are obtained for the full value scenario.

It is necessary to apply discounting but the results with no discounting are a confirmation of the validity of the approach.

A variation on the calculation method would be to calculate the [Total Adjusted Reduction in Tax Charges] figure as follows:

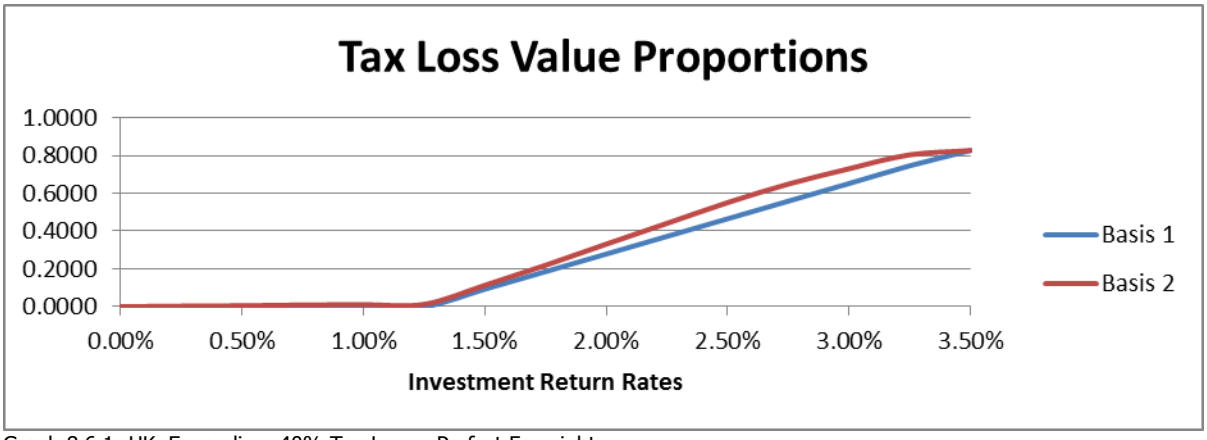
- Exclude the [Tax Rate] * {[Investment Return (Projection 1)] - [Investment Return (Projection 2)]} factor.
- Accumulate the {[Tax Charge (Projection 2) – Tax Charge (Projection 1)]} factor to the end of the [Investment Term] at the gross investment return rate and discount back to the start at the net investment return rate. This is the [Adjusted Reduction in Tax Charges (Period)] figure.
- Sum the [Adjusted Reduction in Tax Charges (Period)] figures over all time periods up to the [Investment Term] to drive the [Total Adjusted Reduction in Tax Charges] figure.

8.6. Example Results – Perfect Foresight

Our central assumptions are:

Annualised income rate		3.00%
Annualised CPI rate		2.00%

For a [Tax Loss %] of 40%, a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 3-years, the results are:



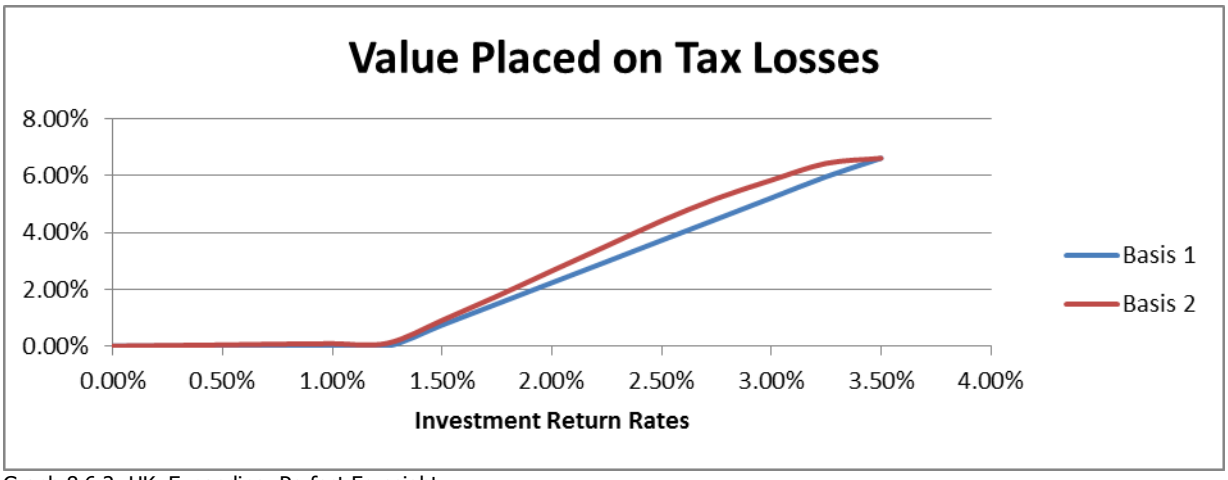
Graph 8.6.1: UK, Expanding, 40% Tax Loses, Perfect Foresight

Notes:

- Basis 1 is where the [Tax Loss Value Proportion] figures are based on the difference in tax charges over the [New Entrant Investment Term].
- Basis 2 is where the [Tax Loss Value Proportion] figures also allow for the value placed on tax losses at the end of the [New Entrant Investment Term] based on the tax loss algorithm figures for a contracting fund.

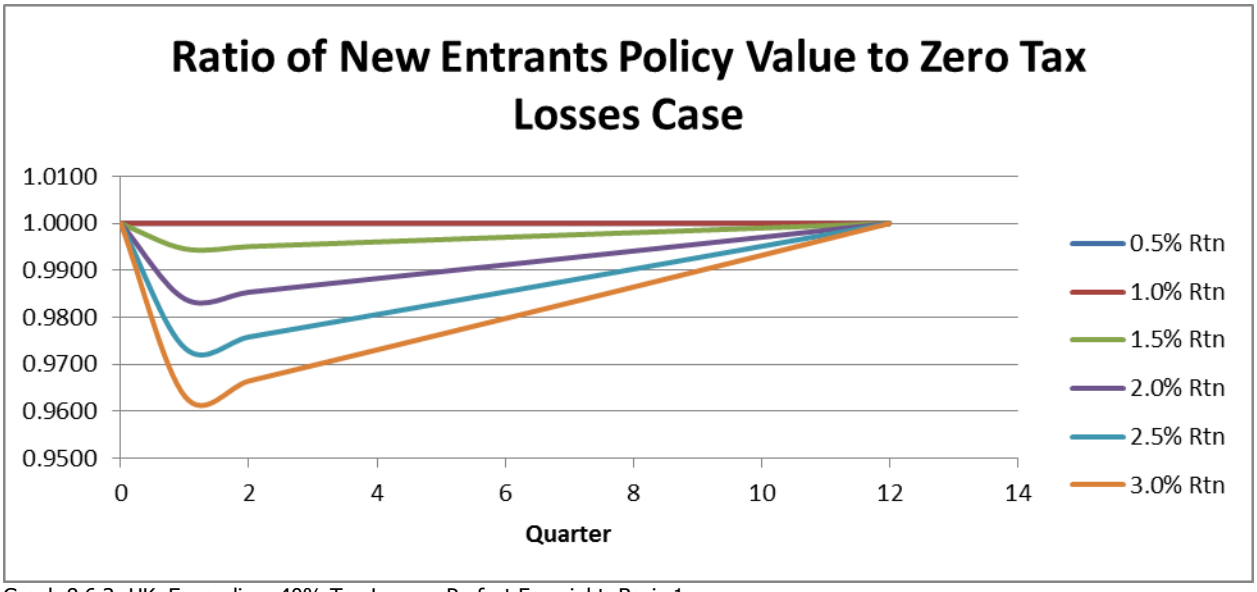
Graph 8.6.1 is zero for Basis 1 for total investment return rates less than 1.25% quarterly. The results on Basis 2 are only marginally higher for the various investment return rates.

The value placed on the 40% tax losses is as follows:-



Graph 8.6.2: UK, Expanding, Perfect Foresight

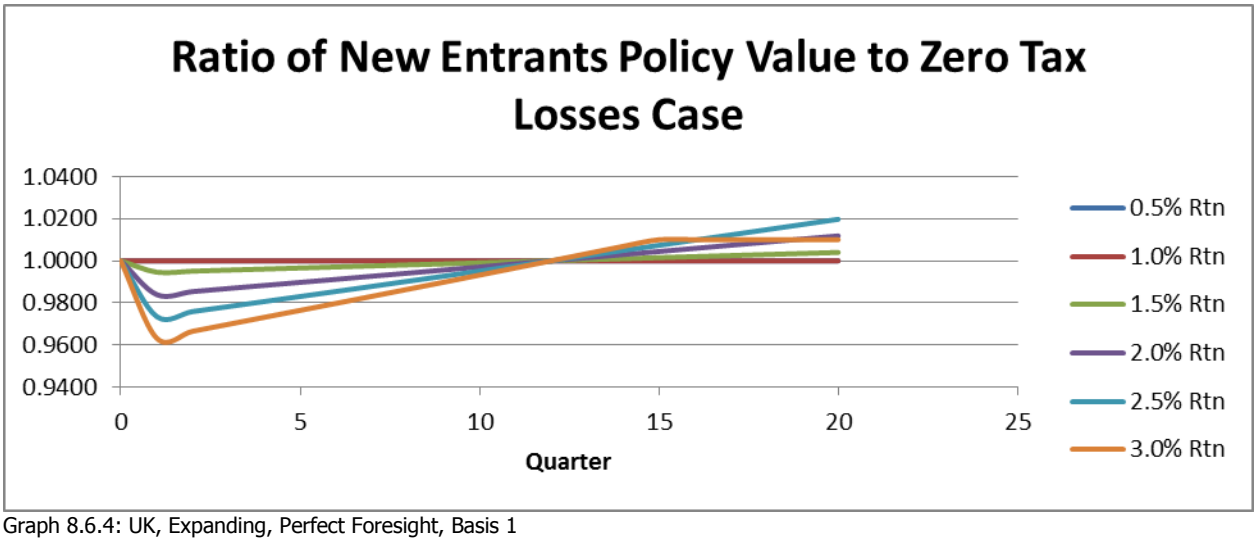
The resultant new entrants policy value can be graphed against the policy value in the zero tax losses case as shown below.



Graph 8.6.3: UK, Expanding, 40% Tax Losses, Perfect Foresight, Basis 1

The ratios converge to 1 (as expected per the logic underlying the quantification of the [Tax Loss Value Proportion]) at duration 12 which is the [New Entrant Investment Term]. The lower values prior to that duration reflect the fact that the new entrants have paid for a share of tax losses and the resultant value to them from the tax losses accrues gradually over a period of time (and is not being anticipated in this example).

Extending the graph to later durations gives:

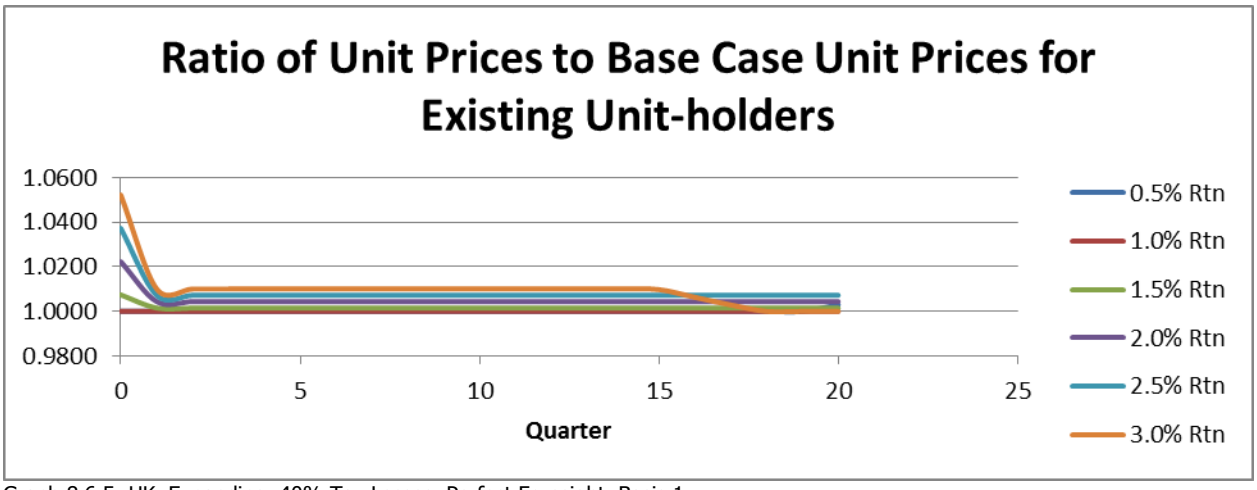


Graph 8.6.4: UK, Expanding, Perfect Foresight, Basis 1

The upward sloping feature observed in graph 8.6.3 is continued in graph 8.6.4 beyond duration 12 for lower investment return rates. This is because the benefit of the tax losses extends beyond duration 12 for lower investment return rates and so the [Tax Loss Value Proportion] for the tax loss transfer transaction is understated where the actual [New Entrant

Investment Term] exceeds 12 quarters (and hence new entrants entered at understated unit prices).

We can also graph the unit prices compared to the base case (no new entrants, no value placed on tax losses) of existing unit-holders.



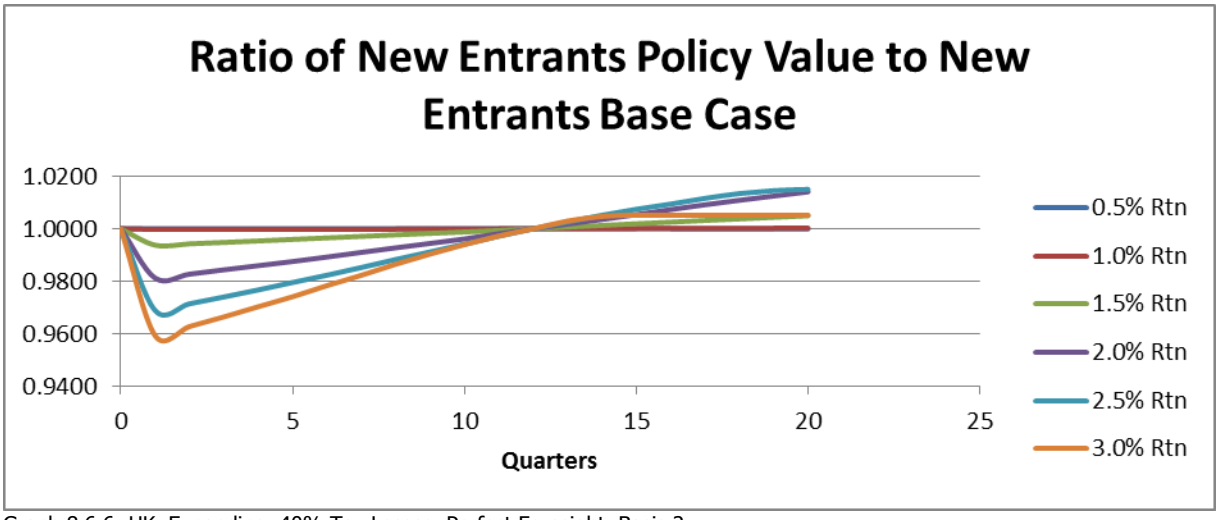
Graph 8.6.5: UK, Expanding, 40% Tax Losses, Perfect Foresight, Basis 1

It can be seen that the graphs converge to 1.

The graph 8.6.4 of new entrants policy value against the policy value in the zero tax losses case is improved if both:

- Allowance is made for the [Value Placed on Tax Losses] (in a contracting fund position) at the expiry of the [New Entrant Investment Term] in computing the [Tax Loss Value Proportion] for the tax loss transfer transaction
- A value is placed on the tax losses in unit pricing using the [Tax Loss Value Proportion] figures computed using the tax loss value algorithm previously developed for a contracting fund.

This can be seen in graph 8.6.6 below.



Graph 8.6.6: UK, Expanding, 40% Tax Losses, Perfect Foresight, Basis 2

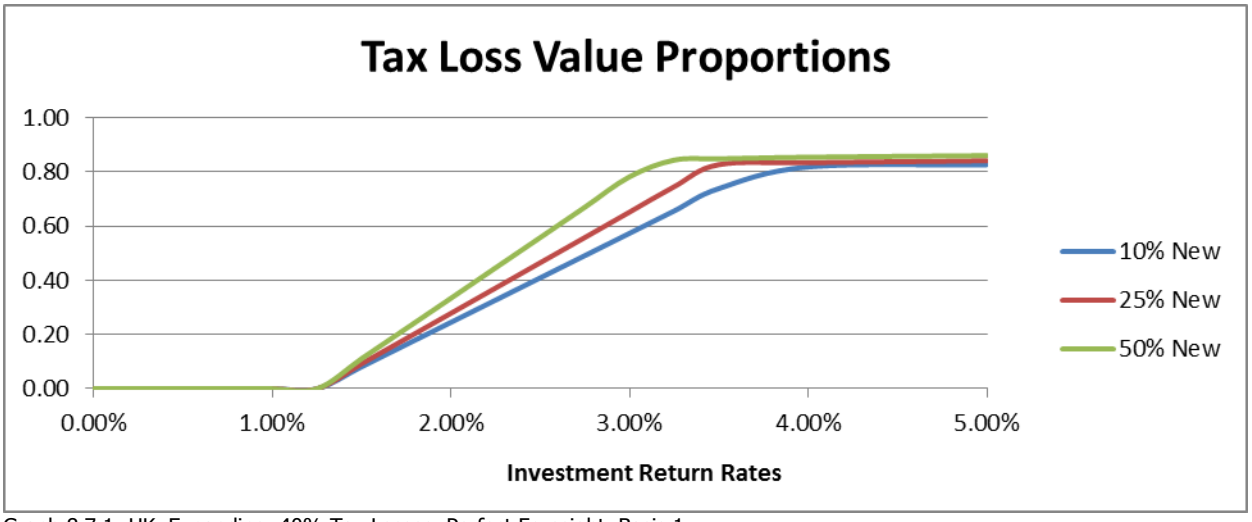
The improvements are:

- The dips below 1 for the higher investment return rates at the shorter durations are smaller (but a bit greater for the lower investment return rates).
- The graphs for the intermediate investment return rates flatter more at later durations
- The graphs for the high investment return rates converge much faster towards 1 (at 3.5% it would converge to 1).

Because the value placed on tax losses in a contracting position will generally be less than that in an expanding position, the dip in the graphs at short durations is inevitable.

8.7. Varying the [New Entrant % Inflow] figures

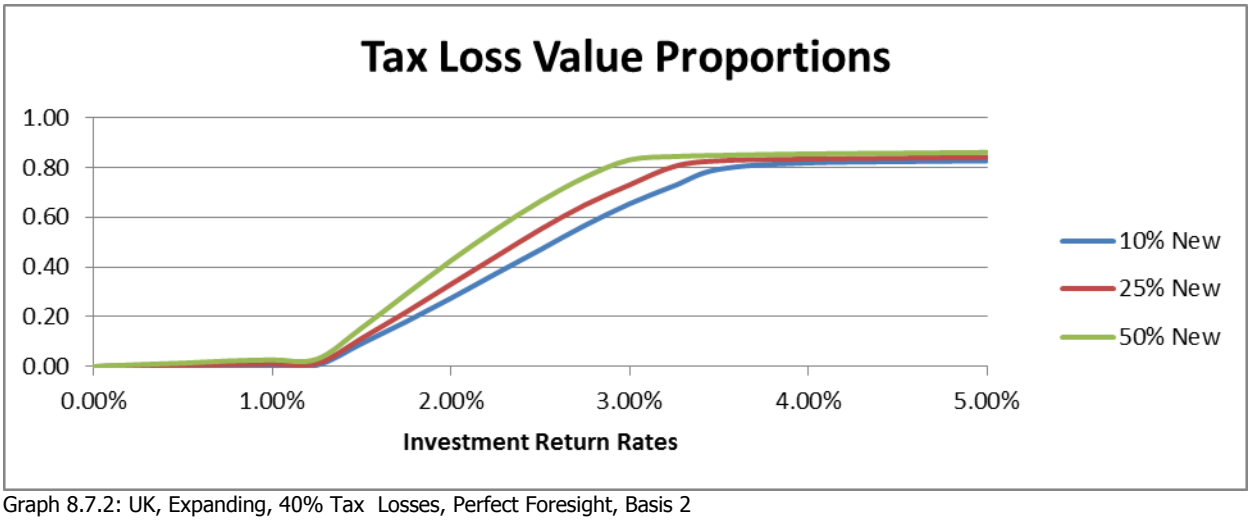
For a [Tax Loss %] of 40% and a [New Entrant Investment Term] of 3-years, the results for various values of [New Entrant % Inflow] are:



Graph 8.7.1: UK, Expanding, 40% Tax Losses, Perfect Foresight, Basis 1

It can be seen that the [Tax Loss Value Proportion] figures are higher for higher [New Entrant % Inflow] figures. This reflects the fact that the (share of) tax losses per incoming unit-holder are lower for higher [New Entrant % Inflow] figures and so the proportion of tax losses relieved at a particular investment return rate is greater resulting in a greater saving in tax charges and so higher [Tax Loss Value Proportion] figures.

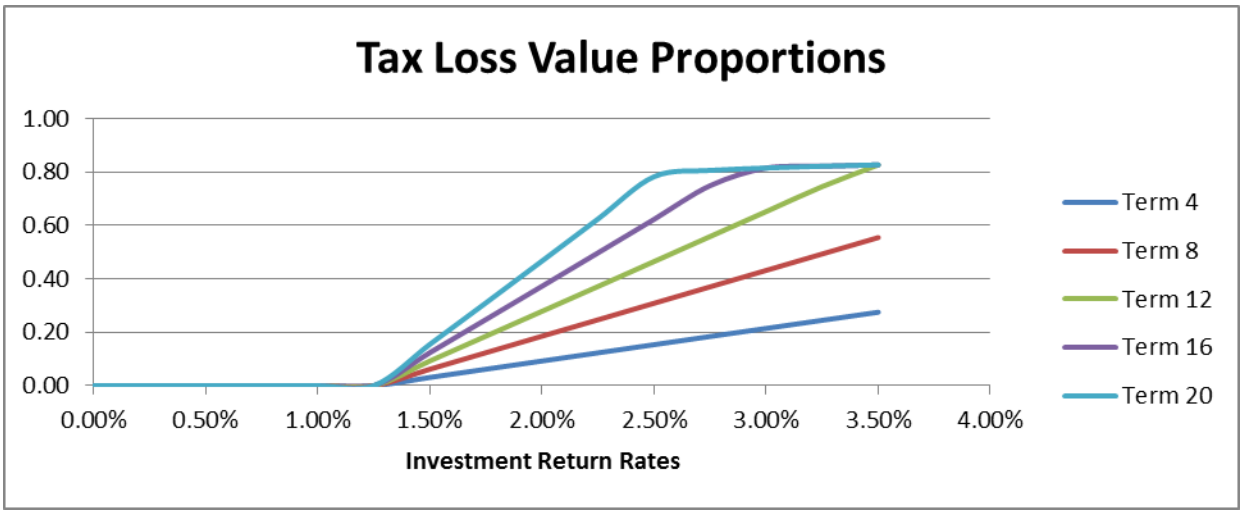
The graphs on Basis 2 shown below are similar.



Graph 8.7.2: UK, Expanding, 40% Tax Losses, Perfect Foresight, Basis 2

8.8. Varying the [New Entrant Investment Term] figures

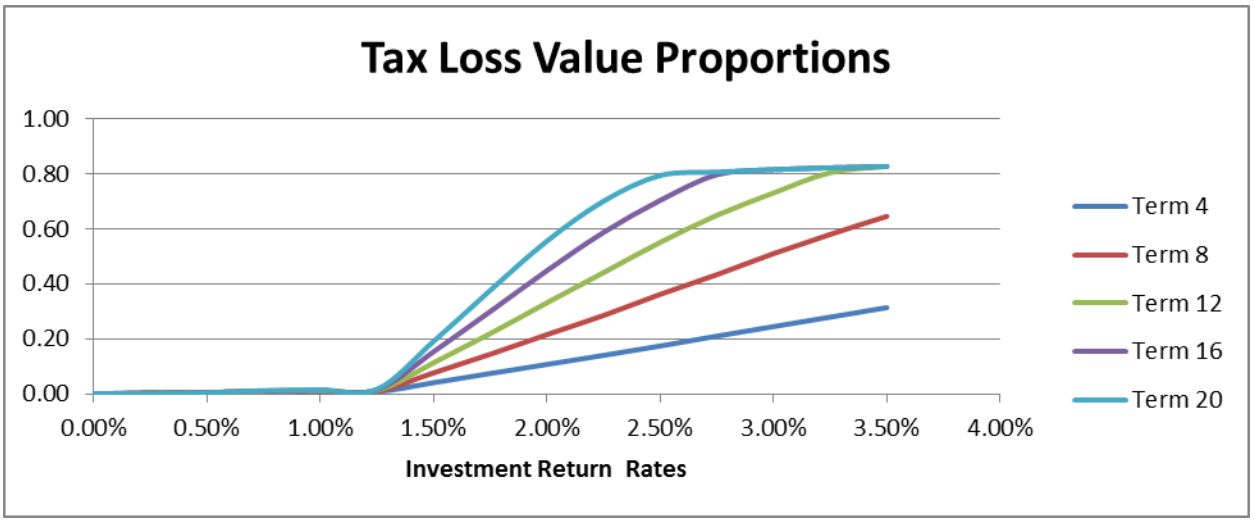
For a [Tax Loss %] of 40% and a [New Entrant % Inflow] of 25%, the results for various values of [New Entrant Investment Term] are:



Graph 8.8.1: UK, Expanding, 40% Tax Losses, Perfect Foresight, Basis 1

We can see from graph 8.8.1 that on Basis 1 as expected, the shorter the [New Entrant Investment Term] in quarters, the lower the [Tax Loss Value Proportion] figures.

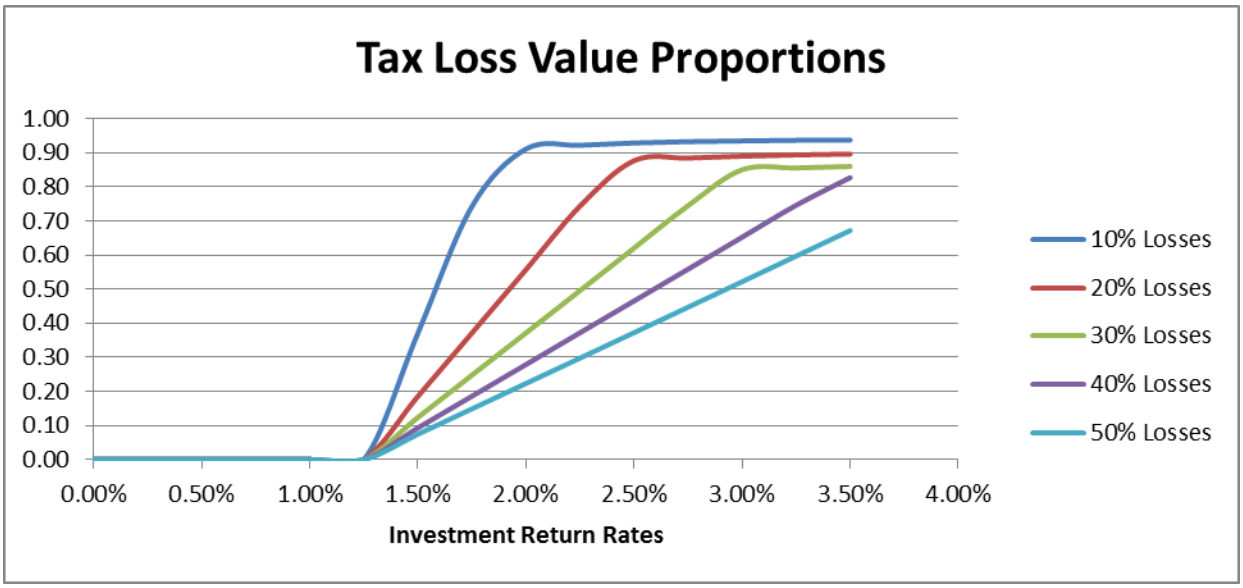
Similarly from graph 8.8.2 on Basis 2 as expected, the shorter the [New Entrant Investment Term] in quarters, the lower the [Tax Loss Value Proportion] figures. However a further noticeable feature from graph 8.8.2 is that the values for the respective [New Entrant Investment Terms] are closer than in graph 8.8.1.



Graph 8.8.2: UK, Expanding, 40% Tax Losses, Perfect Foresight, Basis 2

8.9. Varying the [Tax Loss %] figures

For a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 12 quarters, the results for various values of [Tax Loss %] are:



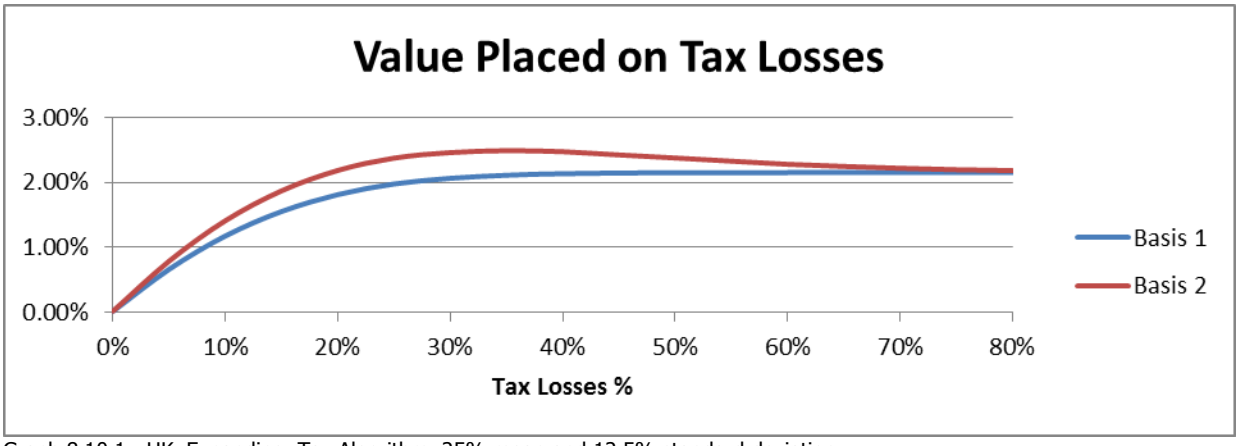
Graph 8.9.1: UK, Expanding, Perfect Foresight, Basis 1

As expected the lower the [Tax Loss %] figures, the higher the [Tax Loss Value Proportion] figures. This is because the proportion of tax losses relieved at a particular investment return rate is greater for lower [Tax Loss %] figures.

8.10. Value Placed on Tax Losses

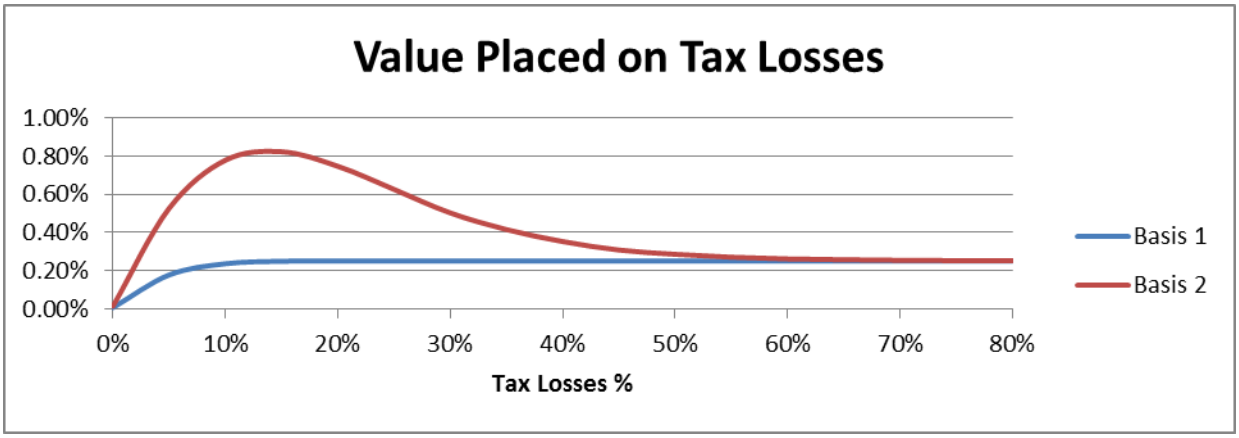
Using the method described in section 8.5 (with central assumptions of a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 12 quarters), we can derive tax loss value proportions for various investment return rates. Using an investment return distribution, we can derive a schedule of [Tax Loss Value Proportion] figures corresponding to [Tax Loss %] figures and then the value placed on tax losses.

Assuming a normal distribution for the 3-year investment return with a 25% mean and 12.5% standard deviation and assuming that investment return is uniform over the three-year period, the results are as follows: -

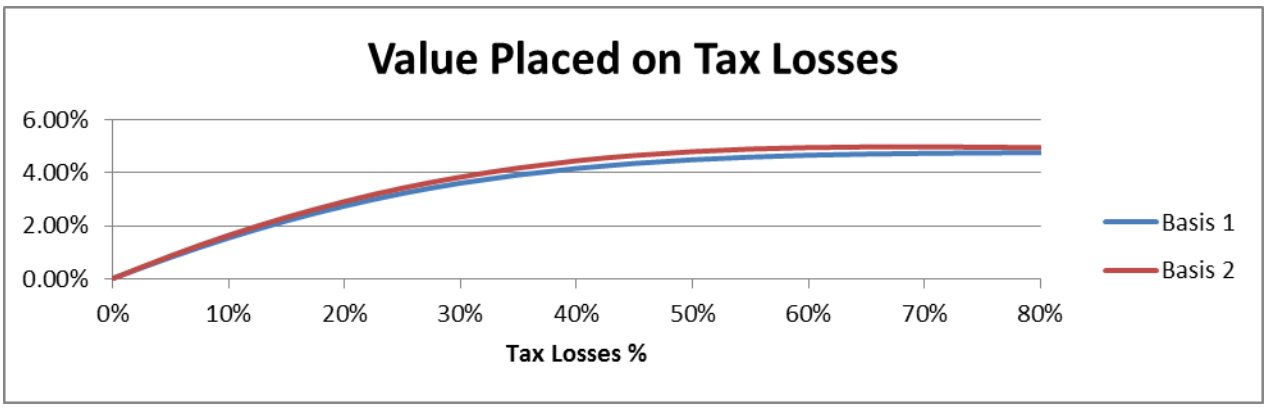


Graph 8.10.1: UK, Expanding, Tax Algorithm, 25% mean and 12.5% standard deviation

We can also consider other investment return distributions.



Graph 8.10.2: UK, Expanding, Tax Algorithm, 12.5% mean and 6.25% standard deviation



Graph 8.10.3: UK, Expanding, Tax Algorithm, 40% mean and 20% standard deviation

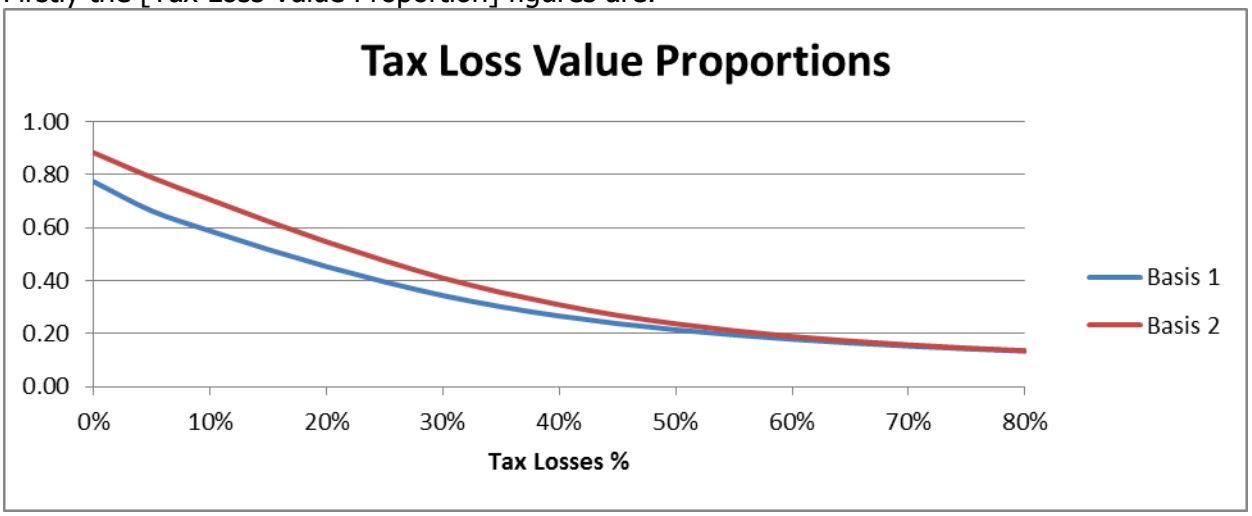
8.11. Tax Loss Value Algorithm

Using the method described in section 8.5 (with central assumptions of a [New Entrant % Inflow] of 25% and a [New Entrant Investment Term] of 12 quarters), we can derive tax loss value proportions for various investment return rates. Using an investment return distribution, we can derive a schedule of [Tax Loss Value Proportion] figures corresponding to [Tax Loss %] figures.

We can then graph the results for various scenarios.

Assuming a normal distribution for the 3-year investment return with a 25% mean and 12.5% standard deviation and assuming that investment return is uniform over the three-year period, the results are as follows: -

Firstly the [Tax Loss Value Proportion] figures are:

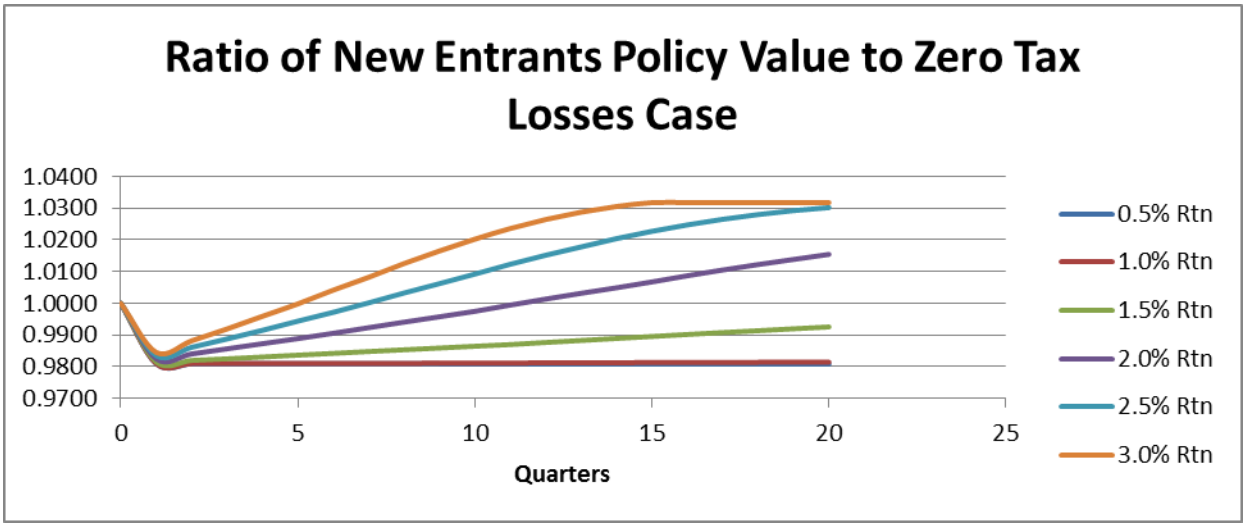


Graph 8.11.1: UK, Expanding, Tax Algorithm, 25% mean and 12.5% standard deviation

Notes

- Basis 1 is where the [Tax Loss Value Proportion] figures are based on the difference in tax charges over the [New Entrant Investment Term].
- Basis 2 is where the [Tax Loss Value Proportion] figures also allow for the value placed on tax losses at the end of the [New Entrant Investment Term] based on the tax loss algorithm figures for a contracting fund.

Utilising the Basis 2 approach we can graph the results for various investment return rates (i.e. the value placed on tax losses was based on the investment return distribution and we are looking at the outcomes for various subsequent investment return rates).
The results are:

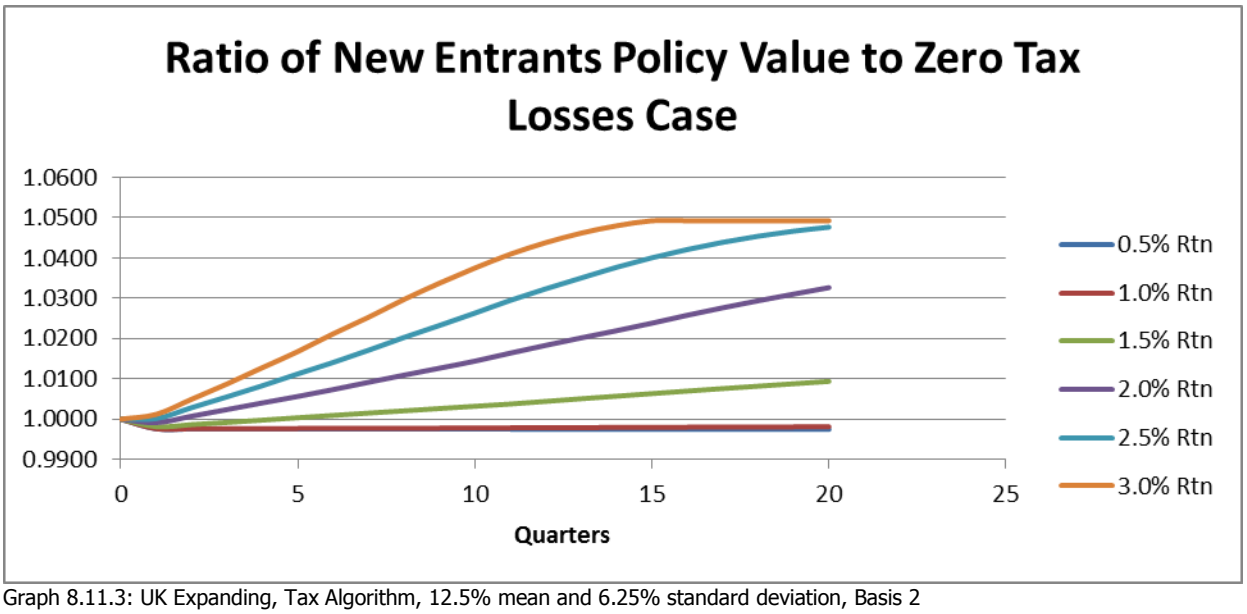


Graph 8.11.2: UK, Expanding, Tax Algorithm, 40% Tax Losses, 25% mean and 12.5% standard deviation, Basis 2

The algorithm is placing a value at the outset of approx 2.5% on the tax losses. For lower rates of investment return e.g. 1%, with perfect foresight, a zero value would be appropriate as no value accrues from the tax losses and hence the reversal of the 2.5% over the 125% resultant in-force results in a diminution of 2% for the new entrants as observed above.

For a total investment return of 3%, with perfect foresight, a 5.8% value at the outset would be appropriate meaning that the initial value is understated by approx 3.3% and hence the new entrants' policy value at late durations is approx 3.3% higher compared to the no tax losses scenario.

Using an investment return distribution with a 12.5% mean and 6.25% standard deviation, the results are:

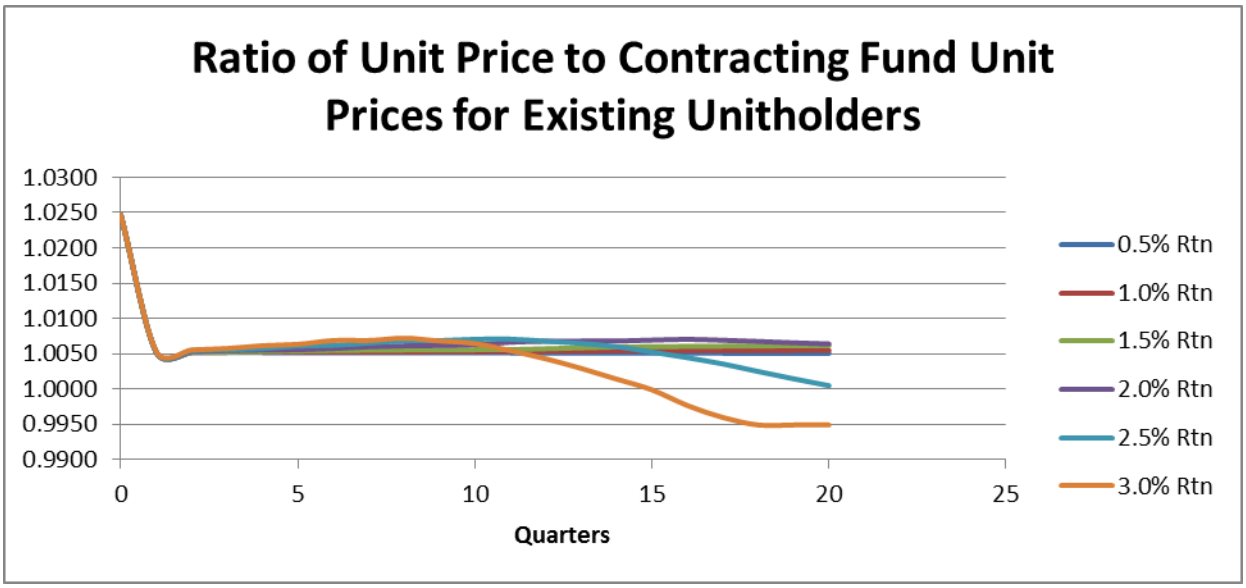


Graph 8.11.3: UK Expanding, Tax Algorithm, 12.5% mean and 6.25% standard deviation, Basis 2

As expected, this gives somewhat better results for lower rates of investment return but somewhat worse results for higher rates of investment return.

We can also graph the unit prices compared to the unit prices based on the tax loss value algorithm for a contracting fund for existing unit-holders.

Note: The comparison is on this basis (rather than against the base case) for consistency because on Basis 2, there is a value placed on tax losses from duration 2 onwards based on the tax loss value algorithm for a contracting fund.

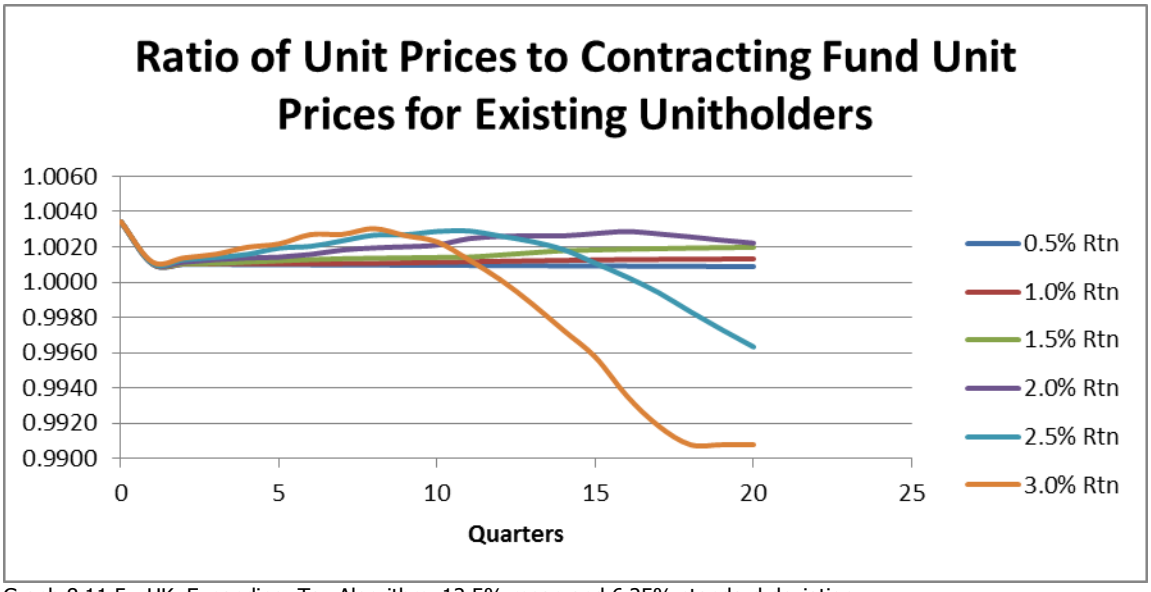


Graph 8.11.4: UK, Expanding, Tax Algorithm, 25% mean and 12.5% standard deviation

The tax algorithm overstates the value at the outset of tax losses compared to the perfect foresight case for low investment return rate scenarios. For example, at 1% investment return, new entrants are disadvantaged (as can be seen from graph 8.11.2) to the benefit of existing unit-holders (as can be seen from graph 8.11.4).

The tax algorithm understates the value at the outset of tax losses compared to the perfect foresight case for high investment return rate scenarios. For example, at 3% investment return, new entrants would clearly benefit (as can be seen from graph 8.11.2) at the expense of existing unit-holders (as can be seen from graph 8.11.4) because they will receive more future investment return tax-free than envisaged whereas the existing unit-holders will receive less future investment return tax-free than they otherwise would have. The effect is greater for higher investment return rates.

Using an investment return distribution with a 12.5% mean and 6.25% standard deviation, the results are:



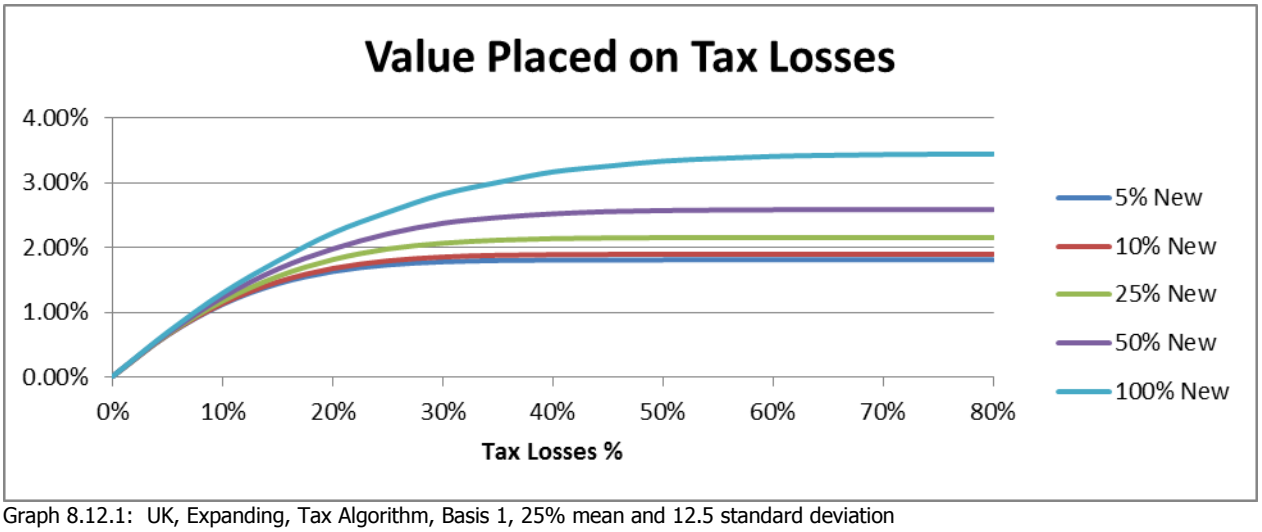
Graph 8.11.5: UK, Expanding, Tax Algorithm, 12.5% mean and 6.25% standard deviation

As expected, this reduces the effect for lower rates of investment return and increases the effect for higher rates of investment return.

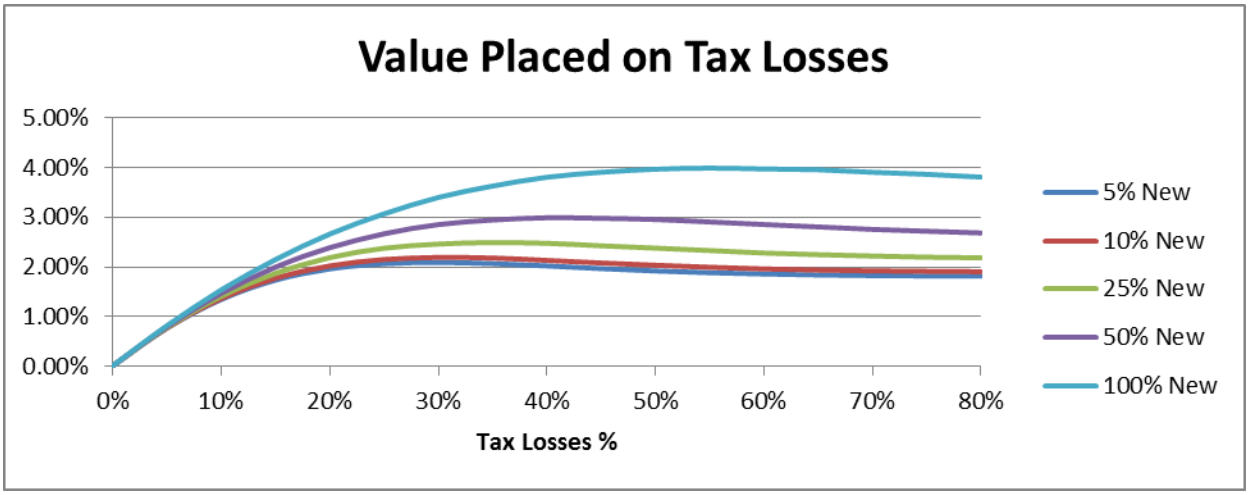
8.12. Sensitivity of Value Placed on Tax Losses

We can consider the sensitivity of the value placed on tax losses to various assumptions.
As per section 8.10, the main sensitivity is to the assumed investment return distribution.
We can now vary some of the other assumptions and assess their impact on various approaches to valuing tax losses.

Using the method described in section 8.5 with various assumptions for a [New Entrant % Inflow] and a [New Entrant Investment Term] of 12 quarters, the results are:



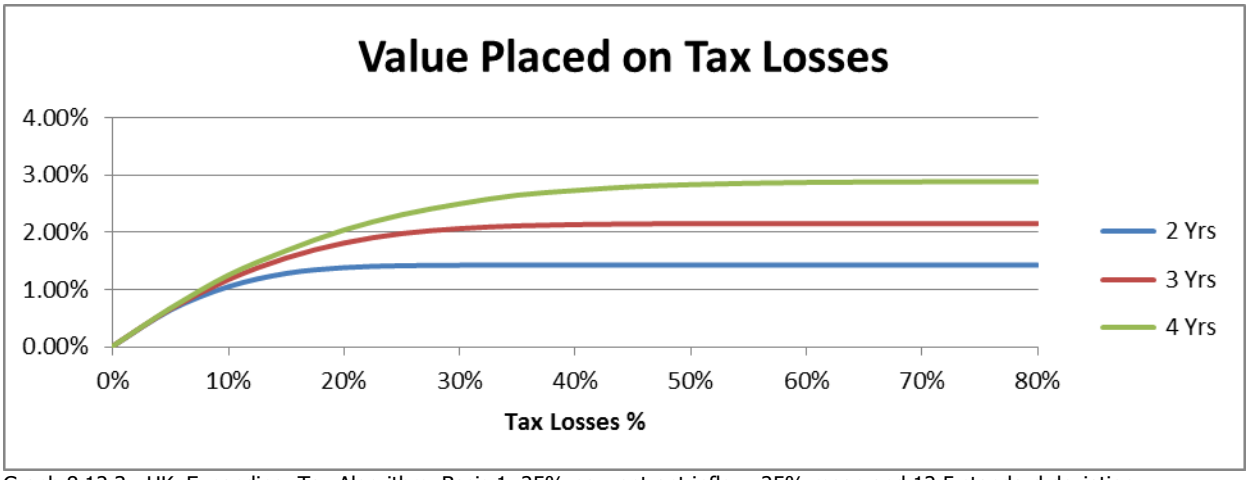
Graph 8.12.1: UK, Expanding, Tax Algorithm, Basis 1, 25% mean and 12.5 standard deviation



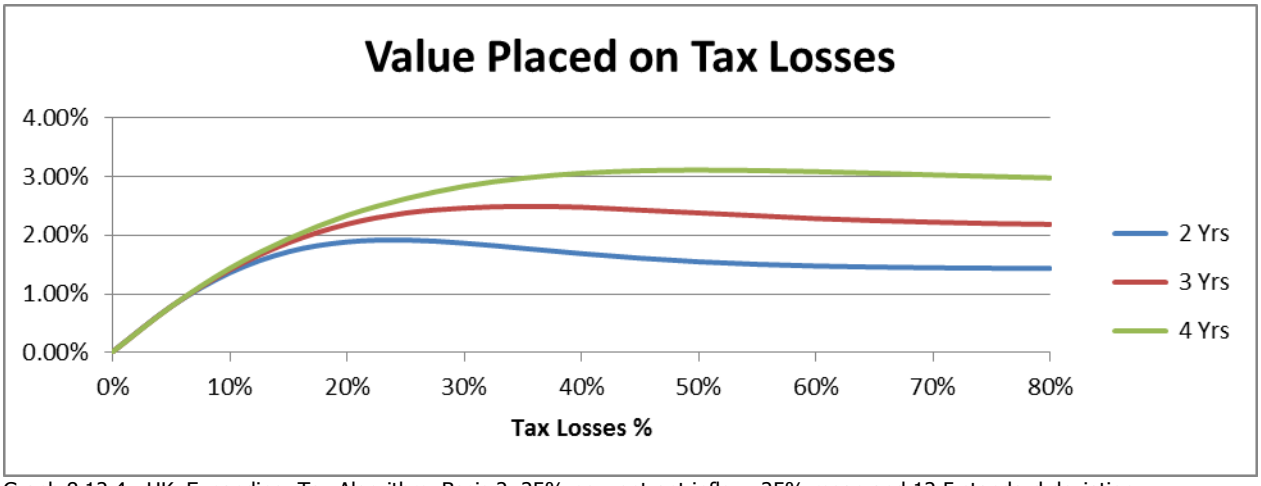
Graph 8.12.2: UK, Expanding, Tax Algorithm, Basis 2, 25% mean and 12.5 standard deviation

It can be seen that the higher the level of the new entrant percentage inflow that the higher the value to be placed on tax losses. This is as expected as the higher the level of the new entrant percentage inflow the lower the resultant tax losses as percentage of fund level and hence the more likely that the tax losses will be relieved in full.

Using the method described in section 8.5 with a [New Entrant % Inflow] of 25% and various assumptions for the [New Entrant Investment Term], the results are:



Graph 8.12.3: UK, Expanding, Tax Algorithm, Basis 1, 25% new entrant inflow, 25% mean and 12.5 standard deviation



Graph 8.12.4: UK, Expanding, Tax Algorithm, Basis 2, 25% new entrant inflow, 25% mean and 12.5 standard deviation

It can be seen that the greater the [New Entrant Investment Term] the higher the value to be placed on tax losses.

Differences between UK and ROI Results

9.1. Differences between UK and ROI I-E Tax Regimes

There are a number of fundamental differences as set out in Section 7.1 between the UK and ROI I-E tax regimes that impact on the valuation of tax losses. The result is that the value placed on tax losses would be lower for a UK life fund than for an otherwise identical ROI life fund.

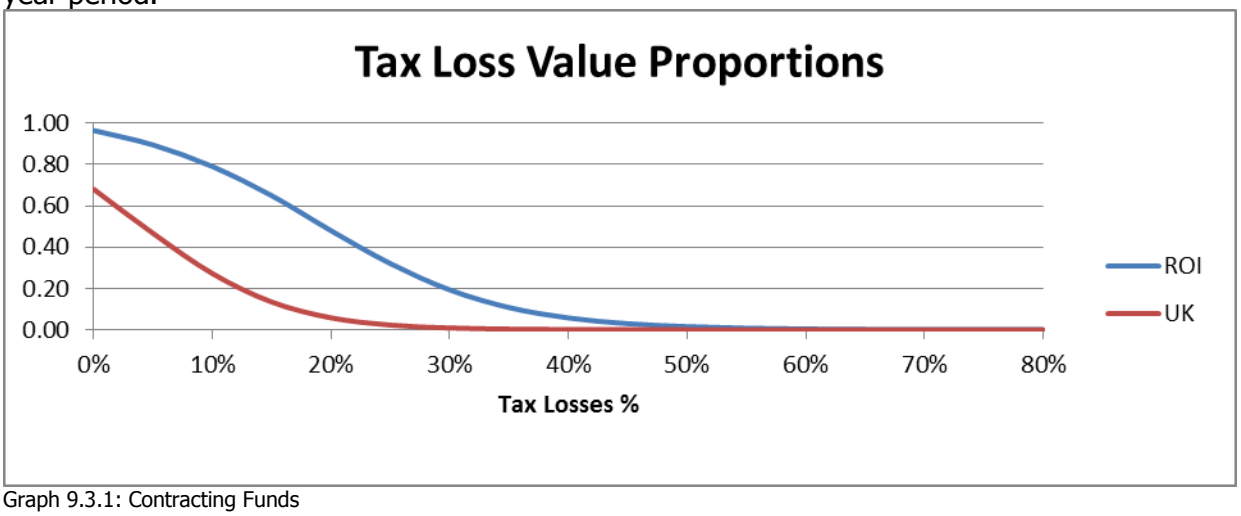
9.2. Other Complications

In the UK, a fund could hold both CGT assets and loan relationship assets. Tax losses arising from CGT assets can't be offset against loan relationship gains. This creates practical problems for the approach of deriving [Tax Loss Value Proportion] figures based on a taxable gain probability distribution (as that probability distribution is dependent on the mix of CGT assets and loan relationship assets and there could be valid reasons why that that mix would be expected to change over time for a particular fund).

9.3. Tax Loss Value Proportions – Contracting Funds

The graphs of tax loss value proportions for contracting funds are shown below.

Note: These assume a normal distribution for the 5-year total investment return with a 40% mean and 20% standard deviation and that the total investment return is uniform over the five-year period.



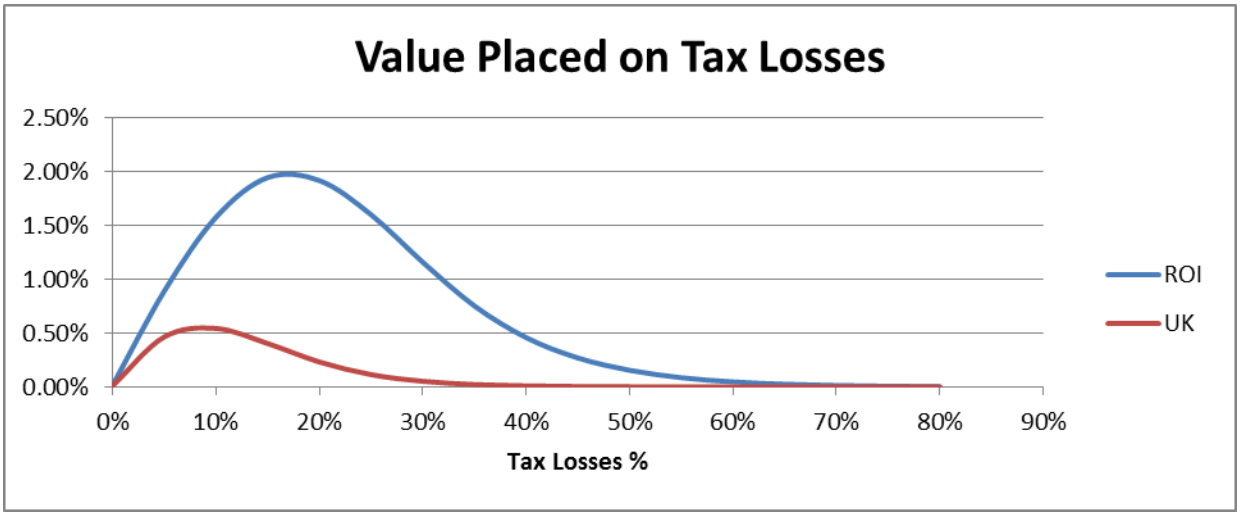
Graph 9.3.1: Contracting Funds

It can be seen that the tax loss value proportions are higher for ROI funds than for UK funds.

9.4. Value Placed on Tax Losses – Contracting Funds

The graphs of the value placed on tax losses for contracting funds are shown below.

Note: These assume a normal distribution for the 5-year total investment return with a 40% mean and 20% standard deviation and that the total investment return is uniform over the five-year period.



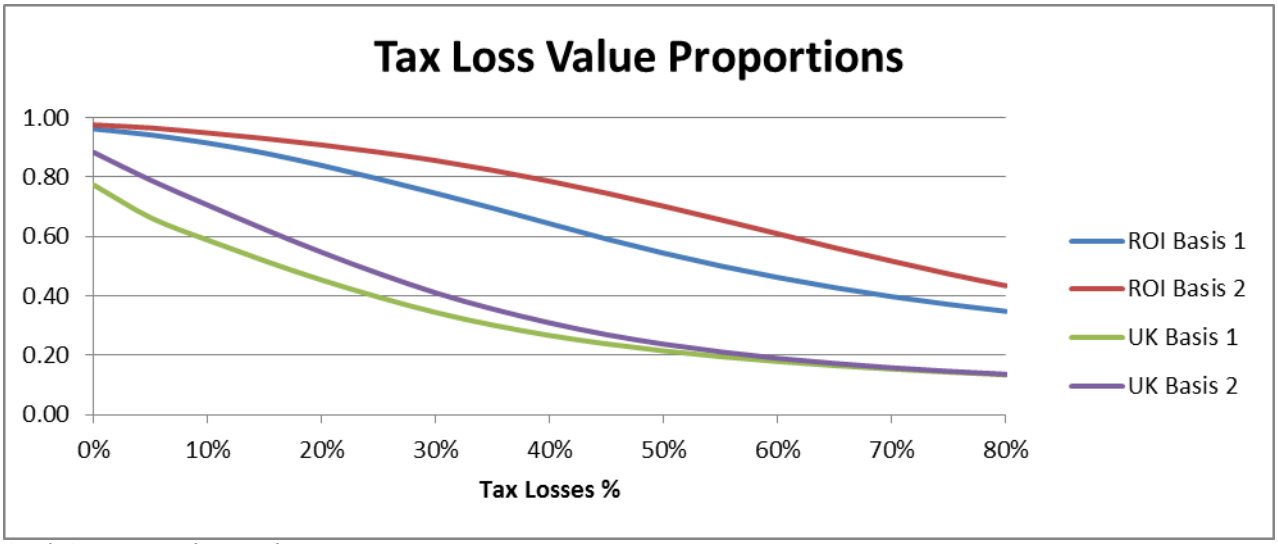
Graph 9.4.1: Contracting Funds

It can be seen that the values placed on tax losses for contracting funds are significantly higher for ROI funds than for UK funds.

9.5. Tax Loss Value Proportions – Expanding Funds

The graphs of tax loss value proportions are shown below.

Note: These assume a normal distribution for the 3-year total investment return with a 25% mean and 12.5% standard deviation and that the total investment return is uniform over the three-year period.



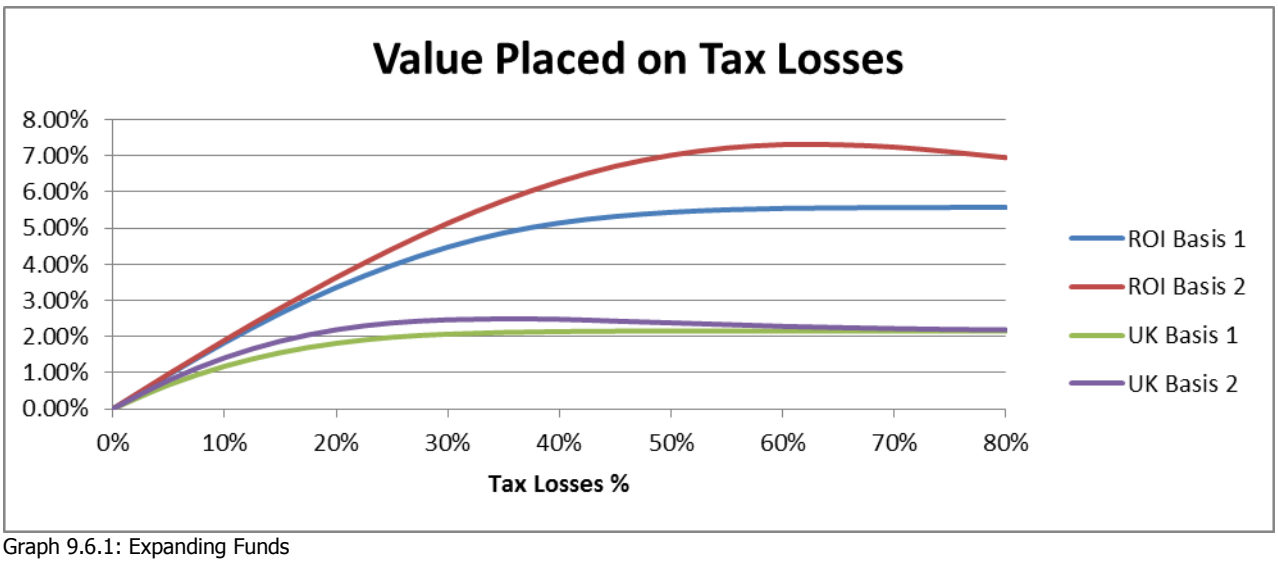
Graph 9.5.1: Expanding Funds

It can be seen that the tax loss value proportions are higher for ROI funds than for UK funds.

9.6. Value Placed on Tax Losses – Expanding Funds

The graphs of the value placed on tax losses for expanding funds are shown below.

Note: These assume a normal distribution for the 3-year total investment return with a 25% mean and 12.5% standard deviation and that the total investment return is uniform over the three-year period.



Graph 9.6.1: Expanding Funds

It can be seen that the values placed on tax losses for expanding funds are significantly higher for ROI funds than for UK funds.

Conclusions

10.1. Necessity to Place Value on Tax Losses

The key questions are:

- Is it appropriate to place value on tax losses in unit pricing?
- What value would be placed on tax losses in unit pricing?

The conclusions of the paper are that it is necessary to apply a tax loss value algorithm method to determine the value to place on tax losses in unit pricing for equity in unit pricing. That doesn't mean that the method used will result in a value materially different from zero being placed on tax losses in some circumstances and particularly so in the case of contracting funds depending on the size of the tax losses as a percentage of the fund value.

Much of the numerical analysis in the paper is based on a single tax loss percentage (40%). The numerical analysis is very helpful in illustrating the issues. It would be dangerous to draw conclusions based solely on that single percentage tax loss.

However if it is accepted that

- The methods set out in section 4.7 (for ROI) and section 7.4 (for UK) are appropriate methods for placing value on tax losses in unit pricing for contracting funds; and
- The methods set out in section 6.5 (for ROI) and section 8.5 (for UK) are appropriate methods for placing value on tax losses in unit pricing for expanding funds

then general conclusions can be drawn simply by looking at the value placed on tax losses implicit in the tax loss value proportions derived.

We now consider the two tax regimes and contracting/expanding funds.

10.2. ROI Contracting Funds

The values to be placed on tax losses for ROI Contracting Funds are dependent on the assumptions and in particular on the assumed investment return distribution. It is apparent from the graphs in section 4.15 that the value is significant in certain circumstances (depending on the tax loss % and the assumed investment return distribution) and that placing a zero value in unit pricing would be inappropriate in those circumstances.

10.3. ROI Expanding Funds

The values to be placed on tax losses for ROI Expanding Funds are dependent on the assumptions and in particular on the assumed investment return distribution. It is apparent from the graphs in section 6.10 that the value is significant in most circumstances depending on

the tax loss percentage and the assumed investment return distribution and that placing a zero value in unit pricing would be inappropriate in those circumstances.

10.4. UK Contracting Funds

The values to be placed on tax losses for UK Contracting Funds are dependent on the assumptions and in particular on the assumed investment return distribution. It is apparent from the graphs in section 7.12 that the value is insignificant in most circumstances (depending on the tax loss percentage and the assumed investment return distribution).

However, a default approach of placing a zero value on tax losses in unit pricing would not be appropriate in all circumstances. For example as per graph 7.12.1, a non-zero value would be appropriate for low tax loss percentages for the assumed investment return distribution.

It is understood that the norm in the UK is to place zero value on tax losses for funds in a contracting position. The analysis in the Paper supports the general validity of that approach in most circumstances but not in all circumstances as some value would generally be appropriate where the tax losses as a percentage of the fund value are low.

10.5. UK Expanding Funds

The values to be placed on tax losses for UK Expanding Funds are dependent on the assumptions and in particular on the assumed investment return distribution. It is apparent from the graphs in section 8.10 that the value is significant in most circumstances (depending on the tax loss percentage and the assumed investment return distribution) and that placing a zero value in unit pricing would be inappropriate in those circumstances.

10.6. Main Conclusion

The main conclusion is that it is necessary to use a tax loss value algorithm approach to determine the values for the [Tax Loss Value Proportion] figures in the tax loss value formula used to place on tax losses in unit pricing for both contracting and expanding funds and for ROI & UK funds. For contracting funds this should be based on deriving the [Tax Loss Value Proportions] using an investment return distribution in conjunction with the method described in section 4.7 for Republic of Ireland ("ROI") funds and section 7.4 for UK funds. For expanding funds this should be based on deriving the [Tax Loss Value Proportions] using an investment return distribution in conjunction with the method described in section 6.5 for ROI funds and section 8.5 for UK funds.

In some circumstances a zero value will be shown to be appropriate but that will be the consequence of the particular tax loss percentage and the particular investment return distribution rather than as a result of a default zero approach.

This is consistent with the APRA Guide statement "*We would not expect to see a tax policy that always, or never, recognises FITBs.*"

10.7. Maximum Value Placed on Tax Losses

It is recommended that a limit be placed on the percentage of the fund value that can be represented by the value placed on tax losses. This limit should vary by fund (i.e. according to the investment return distribution and according to the withdrawal assumptions) and also according to whether the fund is contracting or expanding.

Note: Whilst this is a necessary approach, it is not sufficient for contracting funds. For contracting funds, the value placed on tax losses initially increases as the tax losses percentage increases but then hits a peak and then quickly tapers down to zero. The results shown for contracting funds don't incorporate the [Residual Term Weighting Factor] which would reduce the maximum value percentages over time as a fund approaches its envisaged expiry date.

This is consistent with the APRA Guide statement "We would not expect to see a tax policy that always, or never, recognises FITBs. It is reasonable to consider capping the amount of FITBs included in unit prices."

This recommendation is at variance with the general practice in the Irish market as per the December 2009 unit pricing survey.

Excerpt: "*Surprisingly, a majority of companies didn't place % limits on the % of the fund value that can be represented by the value of tax losses."*

	N/A	Yes	No
Does the company place % limits on the % of the fund value that can be represented by the value of tax losses (Y/N)?	0	2	4

The order of magnitude of the maximum value can be seen from the graphs in section 4.15 for ROI contracting funds, the graphs in section 6.10 for ROI expanding funds, the graphs in 7.12 for UK contracting funds and the graphs in section 8.10 for UK expanding funds.

10.8. Practicality of Transaction Value Method

The Transaction Value Method is practical and easy to implement for unit pricing.

Life companies would probably be already using a formula of the form [Value Placed on Tax Losses] = [Tax Loss Value Proportion] * [Tax Rate] * [Tax Losses] in the unit pricing process.

The only change required is that the [Tax Loss Value Proportion] figures be calculated using a different method.
Note: For contracting funds, either the [Tax Loss Value Proportion] figures could be recalculated as the fund lifetime changes or else a [Residual Term Weighting Factor] could be introduced to give a formula of the type [Residual Term Weighting Factor] * [Tax Loss Value Proportion] * [Tax Rate] * [Tax Losses].

Whilst the capability to apply the [Residual Term Weighting Factor] figure or compute the [Tax Loss Value Proportion] figure automatically from the [Tax Losses %] figure might be problematic, a figure for [Residual Term Weighting Factor] * [Tax Loss Value Proportion] for a fund could be easily determined off-line on a weekly basis for each fund. The [Tax Loss Value Proportion] could then be updated manually as this figure and the value placed on tax losses would then be derived as [Tax Loss Value Proportion] * [Tax Rate] * [Tax Losses].

The first step of the process is to prepare for each fund a schedule of values for the [Tax Loss Value Proportion] figures specified according to [Tax Losses as a Percentage of Fund Value] and separately for contracting and expanding funds.

Note: The [Tax Loss Value Proportion] would vary by unit pricing basis (cancellation/intermediate/creation) and by [Tax Losses as a Percentage of Fund Value] and by fund. It would vary by fund depending on the withdrawal assumptions (for contracting funds) and new entrant assumptions (for expanding funds) and according to the fund's investment return distribution.

The second step is to calculate the daily unit prices using the straight-forward formula for [Value Placed on Tax Losses].

The third step of the process would be to monitor the on-going appropriateness of the [Tax Loss Value Proportion] figures used for a fund having regard to the assumptions underlying those figures.

The assumptions relevant for a contracting fund are:
- Investment Return Distribution
- Withdrawal Rates
- Fund Duration

The assumptions relevant for an expanding fund are:
- Investment Return Distribution
- New Entrant %
- New Entrant Investment Term

10.9. Placing Value on Tax Losses and Unit Pricing Errors

The question arises as to what circumstances could the basis used by a life company for placing value on tax losses constitute a unit pricing error.

Whilst this issue is not directly addressed in regulatory guidance, one possible interpretation is that if the approach actually used breached the principles of treating policyholders fairly and ensuring broad equity between generations of policyholders and fairness between the company and the fund, that this would constitute a unit pricing error.

The Dublin Funds Industry Association Guidance Paper 6 has the definition "A compensatable error is defined as one resulting from a mistake or negligence on behalf of the Manager, Directors, the Registrar, the Administrator or their respective delegates involved in the NAV calculation. Examples of mistakes would include incorrect input of data, improper checking, incorrect interpretation of data and the adoption of an interpretation that would not be considered reasonable by another professional. Negligence would include an inadequate control environment or incompetent staff."

The above definition perhaps need to be tweaked as 'considered reasonable by another professional' suggests that if one other professional disagrees with a firm's interpretation then it's an example of a mistake. The replacement of 'another professional' by 'most professionals' might be appropriate.

The above definition could be interpreted to mean that an approach to placing value on tax losses that would not be considered reasonable by most professionals would constitute a compensatable error.

Appendix 1

11.1. Extract from paper of 2009 Unit Pricing Working Party of SAI

This section shows an extract from Section 3.7 of the paper "Unit Pricing Practices" by the Unit Pricing Working Party of the Society of Actuaries in Ireland.

Section 7 – Tax Issues and Tax Losses

In general, it is company policy that value from tax losses within a unit fund should accrue to the shareholder only in exceptional circumstances.

One of the "No" answers "Value for losses given to policyholder in all cases, not shareholder" was effectively a stronger "Yes" answer.

	N/A	Yes	No
Is it company policy that value from tax losses within a unit fund should accrue to the shareholder only in exceptional circumstances e.g. where a unit fund ceased with tax losses and it was not reasonably possible to transfer such tax losses to other funds(or the shareholder) for value at earlier periods (Y/N)?	0	4	2

There were differing practices on whether or not the company actively sought to transfer tax losses (unlikely to be relieved) in one fund at an appropriate price to other internal funds which can utilise those tax losses. One of the "No" answers "but value will be given if the losses are offset by gains in other funds" was effectively a "Yes".

Similar replies were received as to whether or not the company actively sought to transfer such tax losses at an appropriate price to the shareholder.

	Where a unit fund has realised tax losses and such losses are unlikely to be tax relieved within the fund itself, does the company actively seek to:	N/A	Yes	No
(i)	Transfer such tax losses at an appropriate price to other internal funds which can utilise those tax losses (Y/N)?	1	2	3
(ii)	Transfer such tax losses at an appropriate price to the shareholder itself if it can use those tax losses (Y/N)?	1	2	3

Surprisingly, a majority of companies didn't place % limits on the % of the fund value that can be represented by the value of tax losses.

	N/A	Yes	No
Does the company place % limits on the % of the fund value that can be represented by the value of tax losses (Y/N)?	0	2	4

The placing of an appropriate value on tax losses is a complex issue. This is likely to depend on a number of factors such as whether the fund is on a cancellation or creation pricing basis, the expected fund inflow/outflow position for the foreseeable future, the size of the tax losses as a % of the assets value, the investment outlook for the fund, etc.

Consider the scenario where a fund which has tax losses is experiencing an on-going net outflow position (which is not expected to reverse); where the fund is being priced on a cancellation basis and where there is considerable doubt about whether or not the tax losses are likely to be tax relieved within the fund itself. In this scenario, the exiting policyholders at a valuation date are leaving their share of the tax losses at the valuation date in the fund and possible value could accrue to the continuing policyholders in the future from those tax losses. Consequently, the issue is what % tax relief value ought to be placed on the tax losses as that value effectively determines the consideration paid by the continuing policyholders to the exiting policyholders. The potential value is a contingent value where the probability of the scenarios where value might arise (from the exiting policyholders' share of the tax losses) needs to be assessed.

Actuaries might take different views on the value to be placed on the tax losses in this scenario.

- One perspective is that the size of tax losses as a % of the assets value is directly relevant in determining the % tax relief value that ought to be placed on the tax losses and that the higher the size of tax losses as a % of the assets value, the lower the % tax relief value that ought to be placed on the tax losses. That % figure could be zero. The argument is that if the continuing unit-holders share of tax losses at a point in time were likely to be sufficient to cover their future likely investment return (without recourse to the tax losses left behind by the exiting unit-holders) that no consideration should be paid to the exiting unit-holders in respect of their share of tax losses left behind in the fund. In other words the % tax relief value to be placed on tax losses would differ depending on whether the size of tax losses as a % of the assets value was say 5% or 80%.
- An alternative perspective is that the size of tax losses as a % of the assets value is not relevant in determining the % tax relief value that ought to be placed on the tax losses and that a reasonable value can be given whilst ensuring that value for tax losses is not excessive as a % of fund and that there is a strong likelihood that not all policyholders will exit in a short time.

These perspectives might seem quite differ but in practice with the latter perspective the proviso that value for tax losses is not excessive as a % of fund would result in the % tax relief value being placed on the tax losses being flexed having regard to the size of tax losses as a % of the assets value.
The survey results are that companies don't place a zero value on tax losses within the fund even where there is no realistic prospect in the short-term of transferring the tax losses to other funds (or the shareholder) for value. One commented "Even on a cancellation basis the fund

can still potentially gain benefit from tax losses in the future as it can still be a tax payer in the future. In this circumstance a value is placed on the losses within the fund".

	N/A	Yes	No
If a unit fund is being priced on a cancellation basis, does the company place a zero value on tax losses within the fund if there is no realistic prospect in the short-term of transferring the tax losses to other funds (or the shareholder) for value (Y/N)?	1	0	5

It is accepted that there might be legitimate circumstances where the shareholder might benefit from tax losses within unit funds. For example, a fund might be closed with tax losses at a point in time where payment of a consideration for those tax losses by another fund or by the shareholder might not reasonably be warranted. However, circumstances might change in the future whereby the shareholder subsequently received value for those tax losses. Is there a case that unit-holders at the time that the fund is closed should receive a possible future contingent payment particularly if the life company has itself chosen to close the fund?

The issue is whether or not, for the viewpoint of transparency, that there should be a requirement for disclosure to the Financial Regulator (on the basis that the life company would expect to be clearly able to justify the appropriateness of the circumstances) of what might be considered to be windfall gains. There is a regulatory obligation on life companies to disclose transactions with connected parties but this scenario falls outside that obligation.

There was a consensus that, where the shareholder benefits from tax losses within unit funds, that there should not be a requirement for disclosure to the Financial Regulator.

	N/A	Yes	No
If the shareholder benefits from tax losses within unit funds, should there be a requirement for disclosure to the Financial Regulator (Y/N)?	2	0	4
Are group tax gains made on gross unit funds which on a stand-alone basis which would not get this tax benefit shared with unit fund? Should any likely group tax gains be treated as a charge for disclosure (Y/N)?	3	0	3

Appendix 2

Notes for Actuarial Students

The authors are of the view that actuarial students new to the area of pricing unit funds which are subject to tax on investment income or gains might benefit from a more detailed exposition of some of the key points in the paper and have therefore prepared this Appendix 2, Notes for Actuarial Students.

Looking at the Graphs

It is important to bear in mind when looking at most of the graphs (for contracting funds) in this paper that the proportion in force, the number of unit-holders remaining in the fund, falls with increasing duration and that the proportion in force at the later durations is quite small.

The Base Case Set of Unit Prices

The base case set of unit prices over time represents the unit price that would apply if all policyholders exited at that time and therefore does not place any value on tax losses in striking the unit prices over time.

Interaction of Variables

There are two critical variables which determine tax losses as a percentage of the fund value (and hence affect the unit prices other than the base case set of unit prices) for any given rate of investment return: (i) commencing tax losses as a percentage of the fund; and (ii) the rates of withdrawal at different durations.

Tax losses as a percentage of the fund value is 100*{max (0, [Start Tax Losses] – [Investment Return Rate]*[Fund Value])}/ {[Fund Value]*(1+ [Investment Return Rate])*(1-[Withdrawal Rate])}

- ✓ If the withdrawals rates are high, the denominator might reduce proportionately more than the numerator i.e. the tax losses as a percentage of fund value may increase over time because tax losses may reduce at a slower rate than the fund value is declining because of the assumed rate of withdrawals.

- ✓ If the commencing tax losses are small the numerator might reduce proportionately more than the denominator i.e. tax losses as a percentage of fund value may decrease over time because tax losses may reduce at a faster rate than the fund value is declining because of the assumed rate of withdrawals.

The value placed on tax losses as a percentage of the fund may become very large in circumstances where the investment return rate is very low and the withdrawal rate is very high.

Distinguishing between Terms: "Algorithm" and "Formula"

In the paper, we make reference to the need for a formula which can be used for daily/weekly unit pricing. The calculation of tax losses in daily/unit pricing might use a formula like:

*[Value Placed on Tax Losses] = [Tax Loss Value Proportion] * [Tax Rate] * [Tax Losses].*

When we refer to a formula for calculating tax losses we mean the formula above.

We use the term 'algorithm' in this paper to mean the process used to derive the key parameter of the above formula, namely, [Tax Loss Value Proportion].

Unit Price Discontinuities

In the paper, we make reference on a number of occasions to desirable features of a tax loss value algorithm. In the case of a ***contracting fund***, we say that the set of prices produced by a tax loss value algorithm should not be materially different from the base case set of prices in order to avoid a unit price discontinuity on the change of basis that would arise from mass exits from the unit fund.

Apart from mass exits, a unit price discontinuity may arise from such other events like:

- A change of the assumed term to expiry of the fund. Such a change may arise if say, legislation were passed to wind up the 'I-E' basis of taxation over say a period of two years.
- The parameters of the distribution of investment returns change. The volatility assumption for Irish equity funds prior to the 'credit crunch' were probably too low and in the future higher volatility assumptions may be warranted.
- Aside from mass exits, a significant change in the distribution of exits over time may also give rise to a unit price discontinuity.

References

[i] "Unit Pricing Practices" by the 2009 Unit Pricing Working Party of the Society of Actuaries in Ireland

[ii] "Unit Pricing and Equity in the Management of Life Assurance Unit Funds" by the 1993 Unit Pricing Working Party of the Society of Actuaries in Ireland

[iii] "Taxation and Disclosure Issues in Unit Linked Life Assurance" by John Caslin and George McCutcheon

[iv] The Australian Prudential Regulation Authority (APRA) is the prudential regulator of the financial services industry. It oversees banks, credit unions, building societies, general insurance and reinsurance companies, life insurance, friendly societies, and most members of the superannuation industry. APRA is funded largely by the industries that it supervises. It was established on 1 July 1998. APRA currently supervises institutions holding approximately $3 trillion in assets for 21 million Australian depositors, policyholders and superannuation fund members.

[v] Both APRA and ASIC have regulatory jurisdiction for aspects of the practice of life companies, superannuation providers and fund managers. After noting concerns about unit pricing practice in these entities in recent years, APRA and ASIC undertook a joint review of unit pricing practice from July to December 2004. The review included a survey of aspects of unit pricing, outsourcing and tax practice that was sent to 95 entities. The response rate overall was high at 85% with replies from 29 operators of managed investment schemes (93% response rate), 16 life companies (100%) and 36 superannuation funds (80%).