A New Multi-Band Approach for Optimizing Taxes based on Order of Depletion of Accounts

By
Shawn Brayman, PlanPlus Inc. and
Kira Brayman, Oxford University

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Abstract

The Common Rule (CR) for order of withdrawal of investment accounts prescribes deferring tax as long as possible. Research has shown that it is possible, in some cases, to reduce taxes and maximize terminal wealth by withdrawing tax deferred funds earlier at lower tax rates, rather than realizing this taxable income at later times and at higher marginal tax rates. This approach is often referred to as ‘topping up to band’ (1B).

This paper explores the hypothesis that a ‘top up’ to a single band is insufficient in its optimization and that topping up to different bands at different points in time is required to maximize terminal wealth. This is tested through the creation of a 2-Band (2B) optimization strategy and a comparison of the two models in a sophisticated retirement planning software.

We tested 92 different scenarios altering variables such as income type, adjusted cost base, election age of government benefits, proportion of tax deferred and tax free investments, and more. We found that the CR provided the greatest advantage in only 14% of scenarios, while 1B was optimal in 49% of cases and 2B was optimal in 37% of cases.

The fact that the 2B approach provided higher terminal wealth in a significant number of cases proves that a single band to ‘top up’ to is insufficient. We concluded that although both 1B and 2B approaches controlled the triggering of additional taxes, there was a degree of randomness as to where the ‘benefit’ accrued, since models reverted to CR after top up actions were executed. In order to address the inconsistency in these optimization strategies, we have documented the theorization of a new multi-band top up strategy based on a ‘time value of tax’ (TVT). By altering the discount rate (DR), we demonstrate how we can maximize the taxable income that can be relocated from higher tax bands to ‘top up’ lower tax bands, ensuring maximum value by taking advantage of accumulated returns over time as well as the relative tax differential between bands.

Introduction

At the heart of all strategies for optimized withdrawal is an understanding of the time value of money. The Common Rule (CR) defers taxes as long as possible based on the assumption that by not paying taxes earlier, those funds are able to grow, creating an ultimately larger estate for the client. This is accomplished by withdrawing funds from:

- 1) Taxable (non-registered) investments, reducing these accounts as they generate immediate tax consequences from interest, dividends or realized capital gains;
- 2) Tax free assets (Tax Free Savings Account (TFSA)), which can be used without triggering tax consequences; and finally
- 3) Tax deferred assets (Registered Savings Plans (RSP)), as they are 100% taxable on withdrawal.

'Top Up to Band' strategies (1B) recommend utilizing some tax-deferred assets earlier in retirement and paying taxes at a lower tax rate, reducing taxable income that would be received at a higher tax rate later on. Again, this is a matter of the time value of money, in that paying 20% tax now may be better than paying 40% tax in 5 years. The difficulty is that most top-up strategies fill up the lower tax rate band but cannot control where and when the reduced income is applied, as they revert to the CR once the desired band is filled.

Further, in a complex world of different tax bands, tax wrappers, income types, government benefits and more, it is difficult to arrive at an appropriate 'time value of money' or discount rate. If we can pay taxes in a lower band immediately should we reduce the taxes from a higher band within 1 year, 5 years or longer?

This paper proposes that traditional (1B) approaches are insufficient and there is an optimal calculation that may involve toping up to several bands over time. We will demonstrate this by constructing a 'Two-Band' (2B) approach that takes the client's lifetime income and selects the two neighbouring tax bands than can be maintained for life to which withdrawals are topped up to. Although we expect that this approach will be better than the CR and 1B methods in come cases, it will still not fully optimize the time value of taxes.

This led to the theorization of a new multi-band approach we have called 'time value of tax' (TVT) approach for optimized withdrawal, presented at the end of this paper.

Literature Review

Withdrawing taxable savings before tax-deferred capital has been 'the common rule' (Bernacchi, 2008; Coopersmith, Sumutka and Arvesen 2009; Coopersmith & Sumutka, 2011; Huang & Milevsky, 2011; Sumutka, Sumutka and Coopersmith, 2012) of financial retirement planning for years. Whether this intuitive rule is always advantageous in a financial reality that is increasingly complicated by progressive taxes, forced withdrawals, uncertain mortality, estate trade-offs, or differential taxation of accounts, is being questioned. Where people pay different levels of taxes over their lifetime, withdrawing all taxable savings before tax-deferred may result in inefficiently higher tax rates later in retirement or at mortality (Coopersmith et al., 2009; Coopersmith & Sumutka, 2011; Horan, 2006; Huang & Milevsky, 2011; Ragsdale, Seila, and Little, 1994; Reichenstein, 2006; Spitzer & Singh, 2006; Sumutka et al., 2012).

Various strategies have been proposed for optimizing the taxation of withdrawals: Bernacchi (2008) focused on the ideal balance between taxable and tax-deferred savings at retirement; authors such as Horan (2006), Reichenstein (2006), Spitzer (2008), and Sumutka, Sumutka and Coopersmith (2012) attempt to define the particular circumstances under which a new strategy should replace the common rule; while others, like this research, have developed models used to determine the most optimal withdrawal strategy (see Coopersmith et al., (2009), Huang and Milevsky (2011), and Ragsdale et al. (1994)).

Of those articles seeking to contextualize the advantages of different tax optimization strategies, most compared strategies withdrawing from tax-deferred capital up to a certain income tax band, followed by excess withdrawals from taxable, tax-free, then tax-deferred savings (see Horan, 2006; Reichenstein, 2006; Sumutka et al., 2012). Other than the absence of effect of tax optimization where no progressive tax rates exist, these articles reached different conclusions about when such an optimal withdrawal strategy was more advantageous: for Reichenstein (2006) modified strategies worked particularly well for retirees before withdrawals were forced, retirees with unrealized capital gains or retirees with higher tax brackets than their estate beneficiaries; for Horan (2006) it was only when capital and withdrawals were high; whereas Sumutka, Sumutka, and Coopersmith (2012) found that the CR was less effective when higher proportions of capital were tax-deferred, or when initial capital or social security income was lower. Although there are no doubt important differences in the methods in each article, there is nevertheless a lack of consensus on the circumstances in which a top-up withdrawal strategy is more effective than the CR.

A further complication with comparing the relative advantage of tax models lies in whether the distribution of the estate is included as a judge of effectiveness. It is currently common practice for planners to sell insurance to fund potential estate taxes, even though these might be pre-emptively reduced by tax harvesting earlier as part of a top up strategy. Both Horan (2006) and Reichenstein (2006) note that the optimization of estate taxes for retirees depends on whether they have higher tax brackets than their estate beneficiaries. In other words, there can be financial advantages if tax-deferred assets can be transferred on death to a surviving spouse who is in a lower tax bracket.

The variety and nuances of clients' financial situations makes it prohibitively difficult for advisors to select an appropriate tax optimization model at the start. For this reason, models that determine an optimal strategy are more readily applicable to the needs of financial advisors, especially when those models are adaptable to individual financial situations. Ragsdale, Seila and Little (1994) developed a heuristic model of optimal withdrawals from tax-deferred accounts (only), which accounts for individual income needs and financial circumstances in calculating a schedule of withdrawals for maximum net present value. However, Ragsdale, Seila and Little (1994) admit that the heuristic is still not optimal for all individuals, as it is based on particular assumptions (such as withdrawing Required Minimum Distributions (RMDs)) that may be sub-optimal in some (albeit uncommon) circumstances. Huang and Milevsky (2011) broaden the development of a mathematical model for optimizing withdrawals for taxable and non-taxable accounts, with the main aim to embed longevity risk as a variable, stating that as retirees age (and therefore are closer to their mortality) they should be lessening their withdrawals.

While these two models are important contributions towards calculating ideal withdrawals for the clients of financial advisors, they are built on assumptions about how to change the pattern of withdrawals in order to maximize wealth, rather than strategies of maximizing wealth or minimizing taxes in order to determine a withdrawal pattern. The closest exception would be Coopersmith, Sumutka and Arvesen (2009) who develop a mathematical strategy to calculate the ideal withdrawals each year that would create the highest level of wealth accumulation by mortality. This represents a unique attempt to determine a withdrawal strategy based on wealth accumulation, as opposed to a calculation of wealth accumulation based on different withdrawal strategies. They find that the performance of their optimization model is increasingly beneficial as the client's initial capital deviates from the required capital, in a positive or negative direction.

In addition, all of the research models discussed above were applied within the financial context of the United States, barring Huang and Milevsky (2011), whose mathematical model allows for the replacement of tax variables to suit various national tax laws. Nevertheless, Canada remains relatively unexamined; it is important not only to recognize Canada's unique account regulations and tax laws (see Table 1 below) in contextualizing tax optimization of withdrawals, but also to draw connections between broader categories of taxable, tax-deferred and tax-free accounts between countries.

Canada	USA
Tax Deferred	
Registered Retirement Savings Plan (RRSP) – tax deduction on contributions, sheltered growth, minimum distribution rules and 100% taxed on withdrawal. **Locked in Fund (LIF)** – Similar to an RRSP with minimum withdrawal limits as well as maximum annual withdrawal limits.	**IRA, 401K** – tax deduction on contributions, sheltered growth, penalties on early withdrawal, minimum distribution rules and 100% taxed on withdrawal.
Tax Free	
Tax Free Savings Account (TFSA) – No deduction for contributions; tax-free growth and withdrawals. Contributions carry forward.	**ROTH IRA** – No deduction for contributions, tax-free growth or withdrawals. Contribution limited based on income unless rolled over from IRA.
Taxable	
Non-registered/Open – 100% taxable interest, credit on domestic dividends and 50% taxable on capital gains.	**Non-Qualifying/Open** - 100% taxable interest and preferred rate (20%) on capital gains and qualifying dividends.
Government Benefits	
Canada Pension Plan (CPP) & Old Age Security (OAS) – Optional years to trigger from 60 to 70 and new phase-in years based on client's age. OAS "clawed back" over income limit. Total benefits about $19,500 at age 65.	**Social Security** - New phase in for different ages, taxable over income limit and roughly a $20,000 benefit at age 65.

Table 1: Comparison of Canadian and American account types and government benefits

Research Design

Research presenting tax optimization models have generally compared the value of a strategy that tops up income to a single band across the client's life against the CR. Especially given the lack of clear circumstances under which this kind of tax optimization outperforms the CR, the simple substitution of the CR with a single band top up strategy is insufficient in theory and practice. As outlined under the section 'Overview of the Optimization Models', there are other tax optimization models which should be considered by researchers and planners. In particular, topping up to multiple bands over the client's life would better stabilize an ideal rate of taxation.

As such, it is the aim of this paper to present and test a broader range of tax optimization models in order to discern 1) whether there is a tax optimization model that performs better than the CR or existing single band top up strategies, and 2) a 'best approach' optimization model that consistently outperforms other models. The ultimate goal is to arrive at a single strategy that would best serve clients in all cases. Investigating tax optimization in this way is directly pertinent to planners' needs, as it attempts to provide a clear tax optimization method for advisors that will always provide the most benefit to their clients.

Initially, three tax optimization strategies are tested: the CR, a single band top up strategy (1B), and a two-band top up strategy (2B), described in greater detail in the section 'Overview of the Optimization Models'. The performance of the strategies is compared based on the estate residual of the client(s) in the year of their mortality – the total account balance at the end of their 25-year retirement. This does not address the issue of taxes on distribution of the estate, which would be a suitable avenue for further development.

Testing of the three strategies occurred over 92 cases, covering a range of factors regarding the client's financial situation that may effect the success of approaches. For each case, all variables but one are held constant. These variables are described under the section 'Base Case and Factors Impacting Optimality of Withdrawal Strategy'. The hope was to find general trends of when one approach was typically better than the others.

The estate residual in the 92 cases is calculated in a software engine that has been developed by the primary researcher over the last 25 years. The software provides a fully tax sensitive analysis incorporating 2015 tax laws and graduated federal and provincial/state tax rates. In addition, basic deductions or credits are triggered for personal deductions, age credits or pension credits as appropriate, and the taxation on qualifying dividends are subject to appropriate gross-up of dividends and application of dividend tax credits. The software assumes that tax liabilities are payable in the next year, requiring additional withdrawals beyond those required for lifestyle. Where most literature in the area has tested ideal combinations of account withdrawals (Bernacchi, 2008) from taxable and tax-deferred accounts, this paper tests tax optimization strategies for multiple account types (tax wrappers) based on the target income and desired tax band for that year of the plan.

Overview of the Optimization Models

In Figures 1, 2 and 3 depicted in this section, the solid blue area is the taxable income of the client based on taxable investment income, pensions or withdrawals made according to the relevant rule (CR, 1B or 2B). The various horizontal lines illustrate the indexed tax bands to which income can be 'topped up'. In the Canadian context:

- The red line is the level of personal deductions at which no taxes are paid;
- Between the red line and the green line ($43,953 today), individuals pay taxes at a 15% federal rate plus provincial taxes (these vary by province but average about an additional 7.5%), so 22.5% total;
- The purple line is the point at which 'Social Benefits Repayment' takes effect on the Old Age Security (OAS) and benefits are clawed back from higher income earners;
- The blue line ($87,907 today) is the threshold where taxpayers pay at a federal rate of 26% plus 13% provincially, for a total 39% rate; and
- The orange line is the highest bracket with a 29% federal tax rate plus a 14.5% provincial tax rate, or 43.5% taxes on income.

The Common Rule

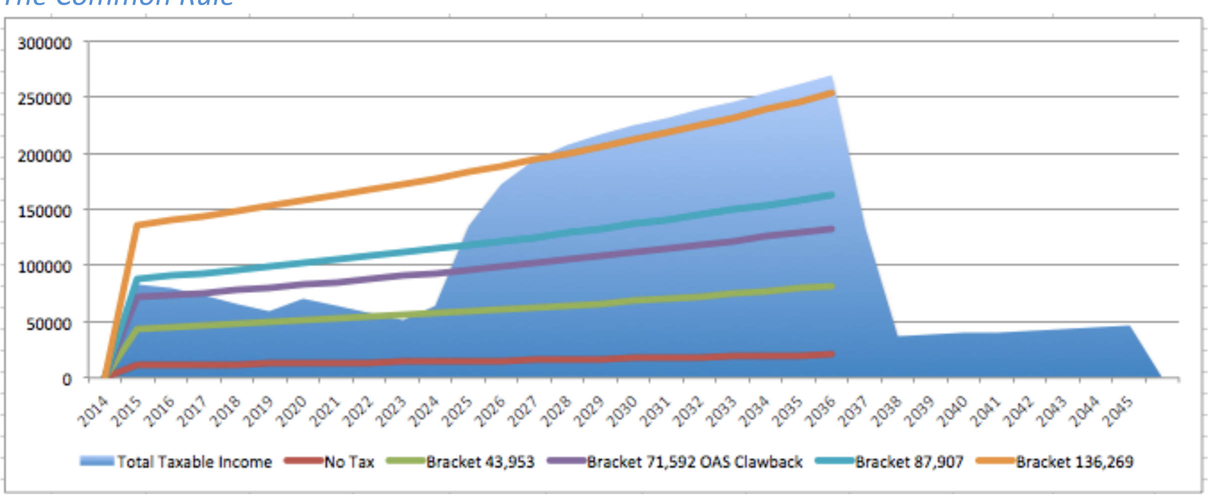

Figure 1: Example of Income over Lifetime Compared to Tax Bands, with Common Rule

Figure 1 shows an example of a single client retiring at age 60 (2015), who has a combination of tax paid and tax deferred investments. The taxable income declines from 2015 to 2019 as the taxable portfolio is depleted and interest or dividend income is reduced with the smaller portfolio size. At age 65 (2020), income goes up as government benefits are received (CPP and OAS), but the income continues to decline as the open portfolio is depleted. At age 71 (2026) the taxable income increases as a result of minimum distributions from the tax deferred investments; since the taxable and tax-free funds are depleted the client must withdraw only tax-deferred funds, which are fully taxable. This puts the client into the highest marginal tax bracket around 2027. In this illustration the client runs out of investments funds so there is a precipitous reduction in income at 2037 and the client only has government benefits for the balance of their life.

1-Band Top Up Model

As outlined in the literature review, if someone has 'un-utilized' room in lower tax brackets, the optimal solution could include generating more income in the form of taxable withdrawals sooner in order to fill these lower bands, rather than deferring the income into higher tax bands later in life. In simple terms the time-value-of-money by deferring taxes may be offset if you could pay taxes at a rate of 20% sooner, compared to paying at 40% later.

The primary alternative approach to the Common Rule is to 'top up' to a particular band with the use of tax-deferred funds. Sumutka, Sumutka, and Coopersmith (2012) called this approach "Informed Strategies" and tested them under different US tax bands and orders of depletion of wrappers. They found that

> [u]sing tax- deferred assets to fill the 10 percent tax bracket (TD_{10}) or the current CR (sequentially deplete taxable, tax-deferred, tax-free accounts) produces optimal results in limited cases and with minor benefits. The arbitrary use of the current CR (Common Rule) results in significantly lower balances. Withdrawing tax-deferred assets beyond TD_{10} or tax-free assets before taxable assets is tax-inefficient (p. 41).

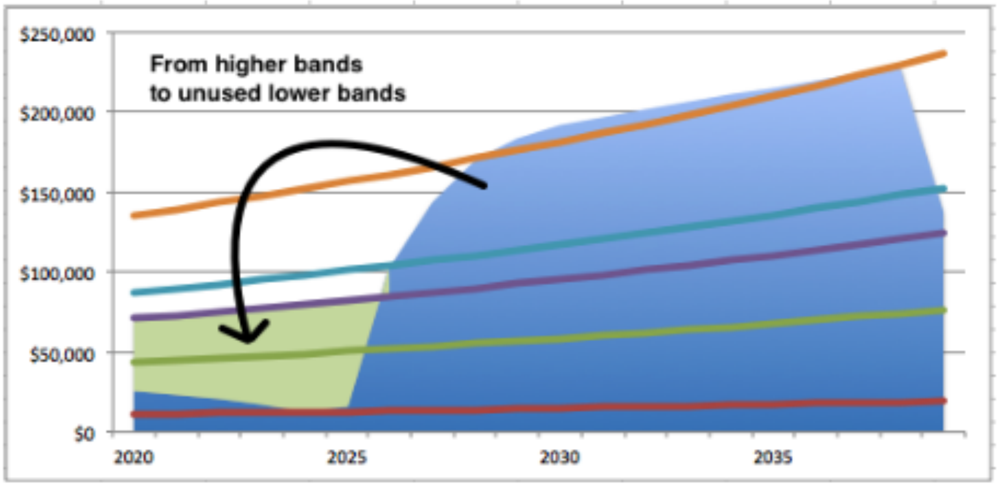

Figure 2: Illustration of 1-Band Approach of Top Up to Band

The basis of the 1B approach is to alter the order of depletion of wrappers by using tax deferred funds first, then taxable and finally tax-free funds to achieve sufficient taxable income to 'top up' to a particular tax band, then revert to the CR to cover any additional income needs of the client.

In our testing, we apply 1B in iterations, where we solve for the estate residual or shortage resultant from topping up to each of the bands. The system then compares the estate residual for each of the six alternatives (CR and 5 bands) and selects the approach that results in the greatest residual estate. In some cases, this may be the Common Rule without top up. Thus, the 1B approach will never result in an estate lower than under the CR, since it falls back to the CR if no improvement is found.

New Two-Band Model

A new approach to optimizing taxation on withdrawals presented in this paper is a top-up strategy that harmonizes taxes between two adjacent bands, as opposed to the traditional approach of filling up to any single band. The 2B model:

- runs the case using the CR, summing the taxable income over the life of the client;
- sums the total taxable income in each band; and then
- determines the two bands within which income can remain for life.

Changing the withdrawal strategy also changes income over the client's lifetime, so calculations are iterated three or four times until the solution stabilizes.

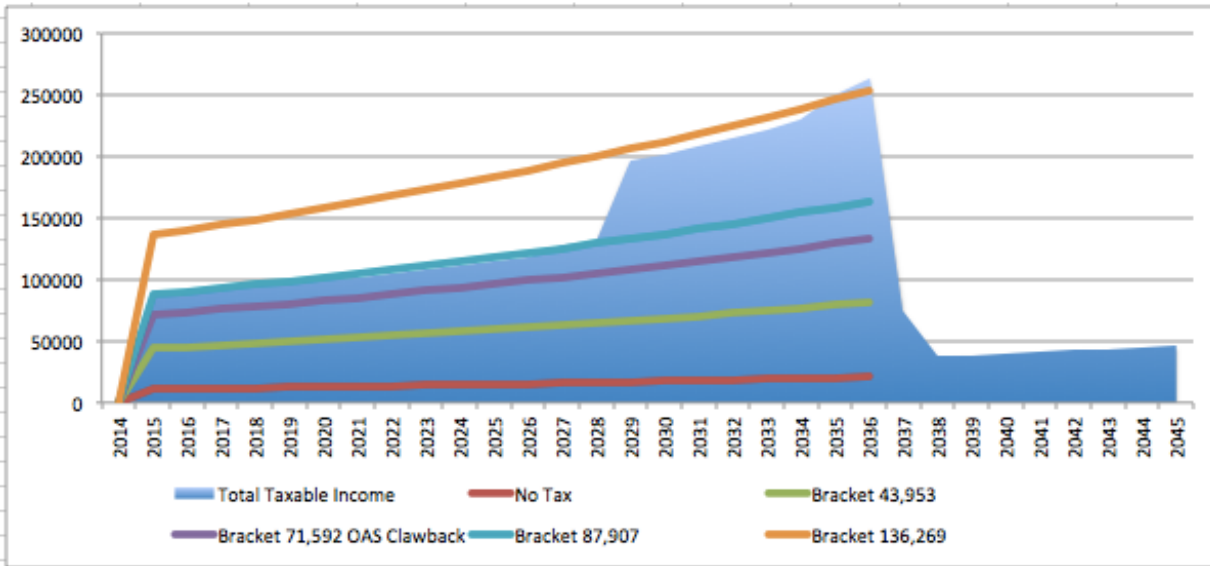

Figure 3: Illustration Based on Two-Band Approach

Figure 3 shows the results of the Two-Band approach. In early years, income is kept just under the lower of the two bands (in this case the blue line). Taxable income in the higher of the two bands is deferred as long as possible, and once activated makes full possible use of this band (up to the orange line) for the remainder of the client's life, while avoiding going into any band higher than this. An exception to this is where the client's plan resulted in an estate, there will often be terminal taxes from the deregistration of tax-deferred funds or accrued capital gains.

When a client's plan has a shortfall (i.e. they will run out of investment funds before their projected mortality, as in Figure 3 above), the top up strategy is relevant only during the years in which funds exist. If the client were to reduce their target lifestyle and thus the shortfall, then the optimization would occur based on the lower lifestyle and longer timeframe.

Additional Details on the Optimization of Multiple Account Withdrawals

Bernacchi (2008) looked for an ideal balance of tax deferred and taxable investments in the withdrawal phase. We have extended this approach to handle more account types: locked-in tax deferred, tax deferred, tax free and taxable accounts. The method can be extended to additional account types as required.

Consider a case where a client wants $80,000 after-tax income per year to fund his lifestyle. In order to top up to a tax band, enough taxable income needs to be generated to come up to this tax band, without crossing the threshold into the next tax band. If we were topping up a 22.5% tax band this would be $43,953.

So the algorithm solves for two values: the client's required 'Lifestyle' of $80,000 after-tax income, as well as the top up amount to a certain 'Tax Level' (in this example, $43,953). To find the account withdrawal combination that will provide for both values our algorithm uses the most highly taxed funds first, then tax-deferred and finally tax-free if required, within each calendar year. If the client has no funds in a particular category, the next combination of account withdrawals will be tried. Where funds are taxed the same (an RSP and a Locked in RSP), it will first liquidate the maximum allowable from the locked-in funds to improve liquidity.

The algorithm considers combinations of three withdrawal types,

A = Non-Registered Withdrawal (taxable),
B = RSP withdrawal (tax deferred) and
C = TFSA withdrawal (tax free),

to solve for

Tax Level = (40%[1]) A + (100%) B + (0%) C and
Lifestyle = A + B + C.

Say the client has the following investment accounts:

- $500,000 Non-registered (taxable), with a $100,000 adjusted cost base;

[1] The effective tax rate on the non-registered is updated in each scenario to reflect differing tax consequences with different investment values and Adjusted Cost Bases (ACBs).

- $500,000 RRSPs (tax deferred); and
- $100,000 TFSA (tax free).

Note that for the non-registered, 50% of the capital gain (account value minus the ACB) is taxed on withdrawal. The effective tax rate on the non-registered therefore equals:

$$\frac{(\text{Current value} - \text{ACB}) \times 50\%}{\text{Current value}}, \text{ or in this case } \frac{(\$500{,}000 - \$100{,}000) \times 50\%}{\$500{,}000} = 40\%$$

Following the CR of depleting non-registered first, Lifestyle would be equivalent to withdrawals from non-registered (A) and the Tax Level would be equal to 40% of A, or

Lifestyle = A = $80,000 and

Tax Level = (40%)A = (40%)$80,000 = $32,000

Since the Tax Level of $32,000 would not meet the sought Tax Level of $43,953, the algorithm would then solve for Lifestyle and Tax Level using withdrawals from tax-deferred and taxable assets:

Lifestyle = A + B = $80000
Tax Level = (40%) A + (100%) B = $43,953

Solving for both by subtracting Tax Level from Lifestyle gives
(60%)A = $36,047
A = $60,078
B = $19,922

The system will withdraw $19,922 from the RSP and $60,078 from the non-registered. Since a different ACB on the non-registered can result in a different effective tax rate, a different proportion from each account would be required to achieve the taxable threshold and cash flow goal.

If the client only had taxable funds and no tax deferred funds, the system would solve to achieve the desired tax band, which would mean:

Tax Level = (40%) A = $43,953
A = $109,883

The system would withdraw $109,883 of non-registered funds, triggering the desired $43,953 in taxable income. As the client only requires $80,000, the balance of $29,883 would be reinvested. This is what is commonly called a 'tax harvesting strategy', increasing the ACB of the taxable funds, which will reduce future capital gains.

In some cases, the client may not have sufficient diversity of tax wrappers to implement a strategy and so may be forced to pay more taxes than desired. In other words, if a client only has tax-deferred investments and no open or tax free investments we have no ability to meaningfully apply a withdrawal model.

The algorithm calculating withdrawal amounts from different wrappers is theoretically independent from the selection of which band(s) to top up to (i.e. 1B or 2B). The algorithm provides a helpful planning tool for advisors seeking to implement the tax optimization strategy with their clients by outlining annual withdrawal amounts from the client's accounts.

Base Case and Factors Impacting Optimality of Withdrawal Strategies

In testing the optimality of the three optimization strategies just outlined, the estate residuals were compared for a base case and a combination of variables. In total the alteration of the variables resulted in 92 different test cases.

The base case constituted a scenario of two married Canadian clients, resident in the Province of Ontario, with the following parameters:

- The client and spouse are both retired and age 60 (in 2015);
- both the client and spouse are assumed to die at age 90;
- inflation occurs at a rate of 2%;
- CPP and OAS start at age 65, at an amount of $12,780 and $6,765 each, respectively;
- the client's RRSP accounts are valued at $400,000 and the spouse's at $200,000;
- their joint taxable investments amount to $350,000, with a $350,000 ACB;
- they each have $25,000 in their tax free accounts (TFSA);

- they have a $75,000 after-tax income goal;
- their income is split for taxation purposes; and
- their investments are achieving a 5.46% Return on Investment (ROI), with investment income that is 70% interest and 30% deferred capital gains.

Several factors that could impact the value (of the residual estate) of tax strategies were tested:

- The <u>marriage status of clients</u> (two married clients or one single client). For married clients an additional variable included whether they were <u>filing income separately or jointly</u>. In Canada, retired couples can 'split' certain income (including tax deferred income or pensions), but not other income (interest or capital gains from investments);
- <u>Age of triggering government benefits,</u> from 60 to 65;
- <u>Investment income distribution</u> between interest and deferred capital gains, only effecting the taxable investments as it is irrelevant to tax-free and tax-deferred accounts. Investment income distribution was tested in proportions of 100% interest to 0% deferred gains, then 70:30, 50:50, 30:70 and 0:100;
- <u>The Adjusted Cost Base of the taxable investments</u> from $50,000, $150,000, $250,000 to the maximum amount of $350,000 (the current value of the open investments);
- <u>The proportion of tax-deferred versus tax free investments, as either</u> $600,000 tax deferred and $50,000 tax-free, or $400,000 tax deferred and $250,0000 tax-free;
- <u>The size of the client's goal and initial investments relative to the tax bands, since</u> low income clients may see less impact of tax optimization, as they may never be in higher tax bands regardless. Conversely, high-income clients may never have unused tax bands to utilize. We tested this by reducing target income and initial capital pro-rata to a:
    - $75,000 goal and $1,000,000 in investments;
    - $62,500 goal with $750,000 investments;
    - $50,000 goal with $500,000 investments; and
    - $42,500 goal with $250,000 of investments.

Results

We ran 92 unique cases varying marriage and filing status, ages to trigger government benefits, investment income distribution, ACBs on taxable investments, proportions of capital across different tax wrappers, and the size of the client's goals and investments. From the total 92 scenarios we found:

- In 13 scenarios neither top-up strategy of withdrawal optimization (1B or 2B) showed a benefit over the CR. In other words, 14% of the time the CR had the same result as or outperformed both the 1B and 2B tax optimization strategies;
- The 1B proved superior to the CR and the 2B approach for 45 scenarios (49%).
  - In 74 cases (80%) the 1B outperformed the CR;
  - In 28 cases (30%) the 1B outperformed the CR while the 2B did not;
- In 34 scenarios (37%) the 2B strategy proved superior to the 1B and the CR;
  - In 51 cases (55%) the 2B outperformed the CR;
  - In 5 cases (5%) the 2B outperformed the CR while the 1B did not.

The full list of scenarios and resulting estate residuals is included under Appendix A.

Government Benefits

Overall the impact of delaying the start of Canada Pension Plan (CPP) government benefits had no clear impact on the advantage of a particular withdrawal strategy. Delaying CPP resulted in a higher estate residual, but this was attributable to the higher benefits accruing until the clients' assumed mortality of age 90.

The CR was never the best performing model for married clients. The CR was always outperformed by the 1B strategy (especially for clients with less tax free capital, albeit marginally) or the 2B strategy (but only where clients had more tax free capital). 1B resulted in the same or a minimally higher estate residual than the CR in the majority of cases. The comparative value of the 1B or 2B strategies over the CR was generally higher when the election of CPP was earlier, declining as married clients elected to start CPP later.

On the other hand, the CR most often resulted in the greatest estate residual for scenarios with a single client.

Scenario		Election Age for CPP					
% of Capital that is Tax-Free	Income Splitting	60	61	62	63	64	65
40%	Split	6.9%	3.7%	2.6%	1.9%	1.9%	1.5%
	Not Split	10.2%	7.8%	5.0%	3.7%	3.4%	3.0%
	Single				3.5%		
60%	Split	22.7%	***13.4%***	***8.6%***	5.8%	5.0%	4.5%
	Not Split	18.7%	***11.4%***	***8.1%***	***5.2%***	3.8%	3.9%
	Single					***15.2%***	***14.3%***

Table 2: Tax Efficiency of Top Up Models by CPP Election Age

Note: In Table 2 above, as well as Table 3, 4 and 5 to follow, the percentages indicate the percentage increase in the estate residual between the CR and the better performing top up model (1B or 2B). Where entries are blank, neither top up model produced a greater estate residual than the CR. Where entries are in regular script with a white background, the 1B model produced the greatest estate residual. Where entries are boldfaced, italicized, and highlighted in green, the 2B model produced the greatest estate residual. Each entry represents the result of a unique case, with all other variables held constant other than those presented on the left-hand side of the table.

Conclusion: The age at which government benefits are triggered does not show any consistent rule about which top-up strategy advisors should select.

Investment Income Distribution

As expected, any shift from interest to deferred income resulted in an increase in the residual estate due to the reduced taxes over the clients' retirement.

Scenario		% Interest (vs. Deferred Gain)				
% of Capital that is Tax-Free	Income Splitting	100%	70%	50%	30%	0%
40%	Split	2.1%	1.5%	***13.6%***	***16.5%***	***23.9%***
	Not Split	***4.2%***	3.0%	***11.2%***	***21.1%***	***29.4%***
	Single					28.1%
60%	Split	5.0%	4.5%	4.4%	***7.0%***	***13.0%***
	Not Split	***4.4%***	3.9%	***5.6%***	***9.3%***	***14.6%***
	Single		***14.3%***	***16.4%***	***22.0%***	***25.2%***

Table 3: Tax Efficiency of Top Up Models by Income Distribution

As seen in Table 3 above, as the proportion of deferred gain increased, the 2B strategy more often resulted in the greatest estate residual and the relative value of the 2B strategy against the CR increased. This held true for scenarios with greater proportions of tax-free and tax-deferred capital, although the comparative value of 2B was more dramatic for scenarios with less (40%) tax free capital.

The reverse was true however, for scenarios with a single client: when the client had more in TFSAs, the 2B option was notably more advantageous. In these cases, more deferred gain improved the value of a 2-Band top-up strategy in terms of creating a greater estate residual, quite considerably.

Figure 4: Estate Residual of Tax Optimization Models by Investment Income Distribution

Figure 4 reinforces the effectiveness of the 2B model in scenarios with greater proportions of deferred capital gains. However, there is still a fair degree of inconsistency, as Figure 4 also shows the 1B model spiking to higher estate residuals when there is no interest income. Also, the 2B does not perform consistently better with low levels of interest income – in several cases it matches or falls below the estate residual of the 1B or even CR.

<u>Conclusion</u>: The proportion of interest income to deferred gains is an important variable impacting taxable income, although it is not so clear what this means for the comparative effectiveness of withdrawal strategies. Structuring open portfolios with growth equities, when possible, will allow advisors and their clients to take better advantage of tax

optimization strategies. This is not a surprise, as it is consistent with 'asset location strategies'.

Adjusted Cost Base

As one would expect, reducing the ACB increases the accrued tax liability and reduces the estate residual. For this reason, using the CR results in a decrease of the estate residual as the ACB declines in all scenarios.

	Adjusted Cost Base (out of maximum possible $350,000)						
	CPP Start Age	% of Capital that is Tax-Free	Income Splitting	$50,000	$150,000	$250,000	$350,000
Scenario	60	40%	Split	6.9%	2.7%	***3.8%***	2.3%
			Not Split	10.2%	6.9%	***8.6%***	4.8%
			Single		20.6%	***28.4%***	***21.9%***
		60%	Split	22.7%	***11.7%***	7.6%	26.0%
			Not Split	18.7%	***8.0%***	4.9%	8.3%
			Single		21.5%	26.9%	25.7%
	65	40%	Split	1.5%	***6.1%***	6.0%	***11.4%***
		60%	Split	4.5%	3.4%	2.6%	***7.9%***

Table 4: Tax Efficiency of Top Up Models by ACB

Changes in the ACB made little or no difference to the advantage of a particular strategy.

For a single person, 1B and 2B strategies offered significantly higher estate residuals than the CR when the ACB was above $150,000. There did not seem to be a pattern as to when the 1B was more effective than the 2B, or the change in the relative value of either top-up strategy over the CR as ACB values increased above $150,000.

The lack of discernable trends also applied to married clients, regardless of income splitting status, the proportion of tax-free capital, or election age of CPP.

<u>Conclusion</u>: There is no single rule for which strategy is better when clients have greater or lesser ACBs on their non-registered investments, although the CR was less than optimal in almost all cases.

Level of Income (Goal and Investments)

In the base case, the client had a target income of $75,000 after tax, of which about half was generated from government benefits and half from their investments. As the target income was reduced, so were all investment accounts on a pro-rata basis. The same rate of reduction was applied to all accounts.

Scenario	Level of Income (Retirement Goal and Investments)					
	% of Capital that is Tax-Free	Income Splitting	$42,500	$50,000	$62,500	$75,000
	40%	Split		***11.9%***	13.2%	***11.4%***
	60%	Split	1640.4%	***16.5%***	***11.3%***	***7.9%***

Table 5: Tax Efficiency of Top Up Models by Level of Retirement Income

The 2-Band approach performed the best in most of the cases, except where the retirement goal and income are at their lowest. The value of the 2B over the 1B and CR however, was relatively less as the retirement income increased. The CR only had the highest estate residual in one scenario when the target goal was the lowest and tax-free capital was lower.

Conclusion: Variance in the clients' levels of income did not uniformly effect the comparative advantage of tax optimization strategies.

Proportion of Tax Free Versus Tax Deferred Investments

Having more money in tax free as opposed to tax deferred investments increased the estate residual (as there was a reduced tax liability).

Half of the 92 cases had 40% of capital in tax free investments, and the other half of cases had 60% of capital in tax free investments. The two sets of 46 cases were identical on all other variables. Overall, the 1B strategy produced the greatest total residual estate (across multiple cases) for both proportions of capital, as displayed in the table below, regardless of marriage or income filing status. This does not mean that the 1B model performed the best in every case: 1B was the best performing model for 24 of the 46 cases with 40% tax free capital, and 21 of the 46 cases with 60% tax free capital.

	% of Capital that is Tax Free			
	Income Splitting	Scenarios	40	60
Scenario	Split	1 - 40	5.5%	8.4%
	Not Split	41 - 66	6.9%	6.6%
	Single	67 - 92	8.4%	6.0%

Table 6: Tax Efficiency of Top Up Models by Proportions of Tax Free Capital

The comparative value of 1B did not differ greatly between cases with different proportions of tax free capital. The 2B model outperformed other models more often when tax free investments were greater.

Income Splitting

Looking at Table 6 from the opposite perspective, it remains that the 1B strategy produced the greatest total residual estate (across multiple cases) for married couples both with and without income splitting. Again, the 1B model did not perform the best in every case: 1B was the best performing model for 25 of the 40 cases with married clients splitting income, 14 of the 26 cases with married clients filing separately, and 6 of the 26 cases with a single client.

The comparative value of 1B did not differ greatly or in a consistent direction for cases with different marriage and filing status. The CR model only outperformed other models when the client was single.

Discussion

We created and tested two withdrawal optimization routines: one that filled up income to a single band (1B) and a second that utilized two neighbouring bands across the client's retirement (2B). For every variable altered there was no clear trend indicating in which instances the CR, 1B or 2B approach would prove superior. There was no single approach that was consistently better for increasing client's estate residual.

Even though the success of the 2-Band approach was very erratic, it resulted in higher residual estate balances than both the CR and 1B in 37% of cases. This demonstrates that the concept of topping up to a single band is not optimal. The fact that it succeeded at all demonstrates that a multi-band approach is warranted.

The lack of clear patterns with all variables indicates that none of these factors is important in isolation. Our conclusion is that the only factor that matters is the taxable income and what causes the income is not a critical factor.

The time value of money remained an important consideration. Although the tax optimization strategies tested may reduce the real amount of taxes paid over the lifetime, a larger discount rate (the more value we place on a dollar of tax paid today versus in the future) reduces the advantage to either tax optimization strategy.

The application of the 1B or the 2B approach provided no controls to ensure that the additional taxes paid earlier were offset by higher taxable amounts latter. The overall results appear to be based on 'chance' to some extent, as the tax savings may be triggered in one year or ten years, from income one band higher or even several bands higher (for the 1B).

In the Canadian context, differences between tax bands are not equal increments. There is a significant jump from a tax rate of 0% to 22.5%, and then to 39%, but only a small jump to 43.5%. So shifting withdrawals between bands 1 and 2, and bands 3 and 4 would result in different tax savings.

Given the points above, it follows that there would be a 'magnitude' of difference between bands that is necessary to offset the time value of paying taxes sooner. In other words, if paying taxes 5 years earlier meant we only reduced taxes from a 17% tax band to a 14%

tax band, this optimization may be insufficient to offset the value of the return on the investment if it were saved longer. On the other hand, if in a 5-year period the taxes were reduced from a 40% band to a 20% band, the payback could be sufficient.

Further Research: Multi-Band Approach

This section of the paper focuses on developing a method to calculate optimal bands throughout the life of the client. A discount rate was estimated by calculating a time value factor where proximity to the final year of the plan was smaller and today was largest value (i.e. an inverted time value):

$$(1+DR)^{(Horizon-Yr)}.$$

We then created a time-value grid where 'value' was a function of the tax rate multiplied by the inverted time value (see Figure 5 below).

0.00%	Band 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24.15%	Band 2	0.78	0.75	0.72	0.70	0.67	0.64	0.62	0.60	0.57	0.55
32.98%	Band 3	1.07	1.03	0.99	0.95	0.91	0.88	0.85	0.81	0.78	0.75
39.41%	Band 4	1.28	1.23	1.18	1.14	1.09	1.05	1.01	0.97	0.93	0.90
43.41%	Band 5	1.41	1.35	1.30	1.25	1.20	1.16	1.11	1.07	1.03	0.99
48.00%	above	1.56	1.50	1.44	1.38	1.33	1.28	1.23	1.18	1.14	1.09

Figure 5: Tax Rate Value over Time

The grid allows us to estimate the relative cost of a dollar income at different times based on income thresholds of different tax bands (we will refer to these values as TVT for 'Time Value of Tax'). The most expensive dollar would be income this year at the highest marginal tax rate. The least expensive dollar would be income in the lowest level (where there is effectively no tax) in the year of the client's assumed mortality. The grid creates a relative cost of each dollar of income across all tax bands and years of the client's retirement. As an example, if we move a dollar of income from Band 5 (at 43.41%) four years from now (TVT = 1.25 in Figure 5) to be paid in the first year at Band 3 (TVT = 1.07), the real value of tax savings is improved (assuming the discount rate is an accurate estimate).

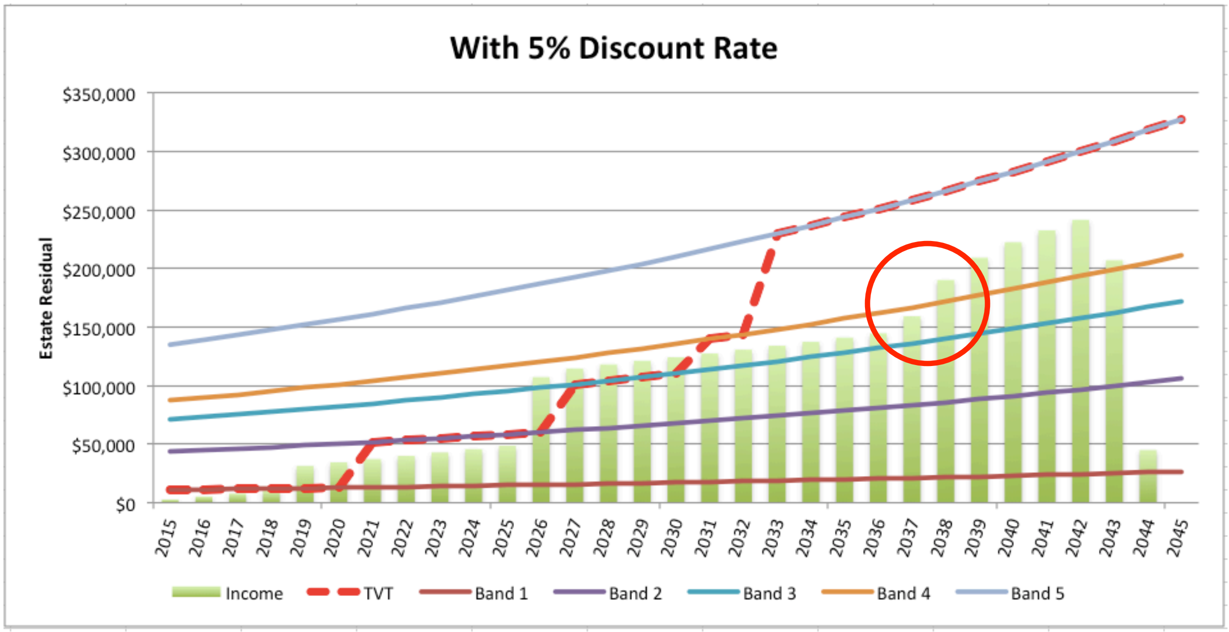

Figure 6: Time Value of Tax with 5% Discount Rate

In Figure 6 the dashed line represents a 5% discount rate and a common TVT. In any year the income could be below the target value indicated by the dashed line, which means we can increase the taxable income, or if the income is above the target we can pull this income forward from the higher rates. We solve for a value of TVT that maximizes the 'repositionable income'.

Because the solution is linked to a number of factors – the tax bands, the assumed discount rate, the client's income – there can be more than a single optimal TVT value across the client's retirement. The dashed line illustrates an optimal solution from 2015 to 2031. Using this solve we can maximally reposition income from higher tax bands to lower tax bands. We can also see in Figure 6 the red circle, showing that there could be a second opportunity to shift income in 2037 and 2038 from above band 4 to below band 4.

The objective is to maximize the highest amount of income that can be pulled from above a higher band later in the timeframe to a lower band based on a set discount rate.

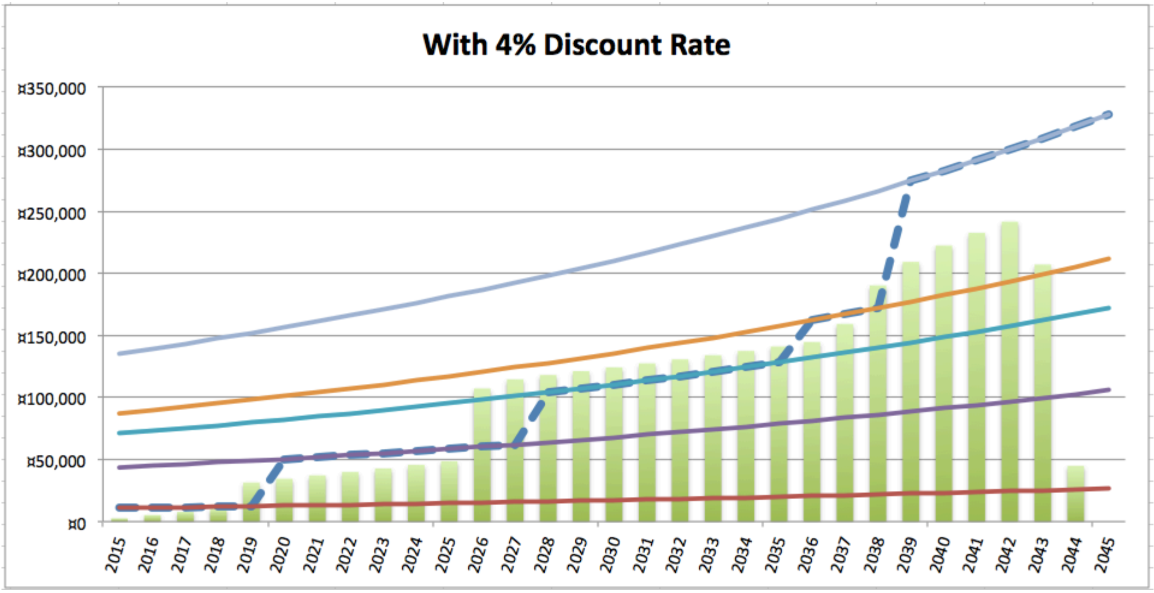

Figure 7: Time Value of Tax with 4% Discount Rate and Multiple Solve Points

In Figure 7 we can see the impact of a lower discount rate and solving for multiple values over the life of the client on an optimal withdrawal pattern. We solve for the TVT from 2015 to 2031, then again from 2032 to 2043. Because of the lower discount rate, the opportunity cost of paying a dollar of taxes sooner is reduced, so the comparable dollars of income are more evenly distributed over the 30 years. In this example, we can reposition $122,319 (topping up in earlier years from excess income in later years based on the assumed discount rate) in total, with about $97,000 in the first timeframe and an additional $25,000 around 2038.

In an example where we use a 2% discount rate, we are able to reposition a total of $170,270 in income from higher to lower bands.

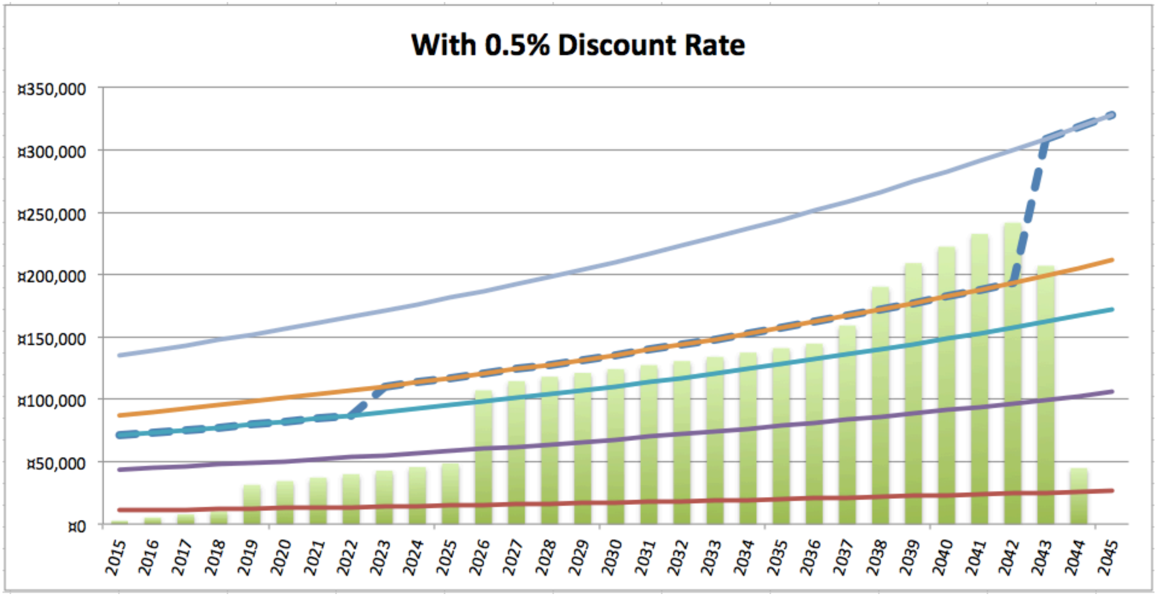

Figure 8: Time Value of Tax with 0.5% Discount Rate

Figure 8 shows the impact of a 0.5% discount rate. As we can see, this is approaching the same behaviour as the 2-Band solution. The logical limit would be a 0% discount rate, which would mean that there is no difference between paying a dollar taxes now and 20 years in the future, in which case the dashed line would be on the same band for the full 30-year period.

Solving for the Proper Discount Rate (DR)

The concept of the discount rate is an abstraction. An after-tax rate of return estimate is based on changing tax rates over time, the impact of different tax wrappers, receipt of government benefits and more. The after-tax value of a dollar of income might be lower if the client is withdrawing mostly tax-deferred funds or higher if they were withdrawing tax free funds. There is no simple method to estimate this directly.

If we underestimate the discount rate (DR) it means our solution will pay more taxes sooner than optimal, as we have set the opportunity cost too low, and the actual estate residual will decrease. If we overestimate the DR, it means taxes would not be optimized when they should have been, so the actual estate will be lower. Thus, we must solve for the

DR by solving for the highest estate residual. In this case the DR will be the best reflection of the average DR over the life of the client.

Next Steps

We have demonstrated that the 1B approach for top up strategies is not sufficient and that a 2B model outperformed the 1B model in many cases.

We developed a new methodology that allows us to solve for optimal 'repositioning' of income from higher bands to lower bands over a client's life, allowing for more control over both the bands being topped up to and the bands from which income is reduced in particular years. We also created a way to solve for a discount rate that is reflective of the client's situation and theoretically should maximize the estate residual in all cases.

Next, the time value of tax algorithm needs to be constructed as the full calculator and tested using a similar method as in this paper. If tests confirm its theoretical robustness, it should replace both the 1-Band approach and the 2-Bands approach, which appear to be a subset of this more robust algorithm.

Since we could have different effective DR at different times, a small but measurable difference in the optimal DR value could be realized in cases where there are multiple solution points.

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Appendix A: Full Results

Scenario	Marriage	CPP Start Age	CPP Amount	Income Splitting	Client's (& Spouse's) RSP	Client's (& Spouse's) TFSA	Joint Open	ACB	Retirement Income	% Interest	CR Estate Residual	1B Estate Residual	2B Estate Residual
1	Married	60	$8,333	Split	$400,000	$25,000	$350,000	$350,000	$75,000	70	$110,415	$112,949	$109,353
2	Married	60	$8,333	Split	$400,000	$25,000	$350,000	$250,000	$75,000	70	$100,540	$103,097	$104,367
3	Married	60	$8,333	Split	$400,000	$25,000	$350,000	$150,000	$75,000	70	$89,913	$92,376	$79,806
4	Married	60	$8,333	Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$77,698	$83,086	$69,674
5	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$350,000	$75,000	70	$144,931	$160,037	$161,483
6	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$250,000	$75,000	70	$143,064	$151,629	$150,235
7	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$150,000	$75,000	70	$134,067	$135,464	$142,251
8	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$122,556	$124,406	$116,752
9	Married	61	$9,099	Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$88,521	$91,824	$78,533
10	Married	62	$10,020	Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$101,032	$103,696	$93,024
11	Married	63	$10,940	Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$111,296	$113,385	$103,894
12	Married	64	$11,860	Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$118,589	$120,640	$111,843
13	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$50,000	$75,000	100	$119,344	$121,851	$118,932
14	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$122,556	$124,406	$116,752
15	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$50,000	$75,000	50	$124,569	$126,549	$138,471
16	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$50,000	$75,000	30	$126,299	$128,677	$147,161
17	Married	65	$12,780	Split	$400,000	$25,000	$350,000	$50,000	$75,000	0	$128,911	$135,698	$159,726
18	Married	65	$12,780	Split	$300,000	$18,750	$262,500	$262,500	$62,500	70	$149,381	$169,165	$139,604
19	Married	65	$12,780	Split	$200,000	$12,500	$175,000	$175,000	$50,000	70	$148,851	$165,063	$166,633
20	Married	65	$12,780	Split	$100,000	$6,250	$87,500	$87,500	$42,500	70	-$8,856	$12,733	$1,213
21	Married	60	$8,333	Split	$300,000	$125,000	$350,000	$350,000	$75,000	70	$200,666	$252,808	$189,576
22	Married	60	$8,333	Split	$300,000	$125,000	$350,000	$250,000	$75,000	70	$172,612	$185,675	$182,492
23	Married	60	$8,333	Split	$300,000	$125,000	$350,000	$150,000	$75,000	70	$155,647	$170,454	$173,802
24	Married	60	$8,333	Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$138,205	$169,541	$164,800
25	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$350,000	$75,000	70	$235,125	$252,808	$253,663
26	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$250,000	$75,000	70	$232,625	$238,738	$214,568
27	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$150,000	$75,000	70	$220,637	$228,080	$209,247
28	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$205,094	$214,422	$204,046
29	Married	61	$9,099	Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$154,298	$169,637	$175,004
30	Married	62	$10,020	Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$174,101	$186,763	$189,047
31	Married	63	$10,940	Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$189,440	$200,385	$197,533
32	Married	64	$11,860	Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$200,134	$210,174	$201,586
33	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$50,000	$75,000	100	$200,548	$210,650	$199,897
34	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$205,094	$214,422	$204,046
35	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$50,000	$75,000	50	$207,905	$216,977	$214,189
36	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$50,000	$75,000	30	$210,259	$219,545	$225,044

Scenario	Marriage	CPP Start Age	CPP Amount	Income Splitting	Client's (& Spouse's) RSP	Client's (& Spouse's) TFSA	Joint Open	ACB	Retirement Income	% Interest	CR Estate Residual	1B Estate Residual	2B Estate Residual
37	Married	65	$12,780	Split	$300,000	$125,000	$350,000	$50,000	$75,000	0	$213,825	$223,418	$241,705
38	Married	65	$12,780	Split	$225,000	$93,750	$262,500	$262,500	$62,500	70	$212,180	$229,176	$236,164
39	Married	65	$12,780	Split	$150,000	$62,500	$175,000	$175,000	$50,000	70	$178,313	$203,796	$207,814
40	Married	65	$12,780	Split	$75,000	$31,250	$87,500	$87,500	$42,500	70	$1,177	$20,484	$12,974
41	Married	60	$8,333	Not Split	$400,000	$25,000	$350,000	$350,000	$75,000	70	$100,211	$105,009	$102,284
42	Married	60	$8,333	Not Split	$400,000	$25,000	$350,000	$250,000	$75,000	70	$89,996	$94,697	$97,730
43	Married	60	$8,333	Not Split	$400,000	$25,000	$350,000	$150,000	$75,000	70	$78,712	$84,159	$74,119
44	Married	60	$8,333	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$65,739	$72,422	$63,932
45	Married	61	$9,099	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$77,383	$83,443	$73,528
46	Married	62	$10,020	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$91,181	$95,738	$88,603
47	Married	63	$10,940	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$101,821	$105,610	$99,426
48	Married	64	$11,860	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$109,508	$113,252	$107,418
49	Married	65	$12,780	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	100	$110,564	$114,531	$115,230
50	Married	65	$12,780	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	70	$113,859	$117,305	$112,411
51	Married	65	$12,780	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	50	$115,770	$119,196	$134,513
52	Married	65	$12,780	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	30	$117,362	$121,145	$142,138
53	Married	65	$12,780	Not Split	$400,000	$25,000	$350,000	$50,000	$75,000	0	$119,775	$154,411	$154,968
54	Married	60	$8,333	Not Split	$300,000	$125,000	$350,000	$350,000	$75,000	70	$224,733	$243,401	$176,731
55	Married	60	$8,333	Not Split	$300,000	$125,000	$350,000	$250,000	$75,000	70	$167,180	$175,332	$169,861
56	Married	60	$8,333	Not Split	$300,000	$125,000	$350,000	$150,000	$75,000	70	$150,214	$159,704	$162,219
57	Married	60	$8,333	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$132,774	$157,587	$152,599
58	Married	61	$9,099	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$148,021	$158,274	$164,877
59	Married	62	$10,020	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$166,730	$174,907	$180,160
60	Married	63	$10,940	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$181,068	$188,344	$190,453
61	Married	64	$11,860	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$190,754	$198,010	$195,650
62	Married	65	$12,780	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	100	$190,159	$198,568	$194,060
63	Married	65	$12,780	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	70	$194,700	$202,309	$199,047
64	Married	65	$12,780	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	50	$197,513	$204,828	$208,555
65	Married	65	$12,780	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	30	$199,870	$207,348	$218,461
66	Married	65	$12,780	Not Split	$300,000	$125,000	$350,000	$50,000	$75,000	0	$203,433	$232,318	$233,045
67	Single	60	$8,333	N/A	$600,000	$50,000	$350,000	$350,000	$60,000	70	$72,812	$88,524	$88,738
68	Single	60	$8,333	N/A	$600,000	$50,000	$350,000	$250,000	$60,000	70	$62,467	$78,107	$80,207
69	Single	60	$8,333	N/A	$600,000	$50,000	$350,000	$150,000	$60,000	70	$53,001	$63,916	$17,189
70	Single	60	$8,333	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	70	$41,723	$41,723	$16,220
71	Single	61	$9,099	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	70	$46,405	$46,405	$22,399
72	Single	62	$10,020	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	70	$52,013	$52,013	$30,359
73	Single	63	$10,940	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	70	$55,909	$57,841	$36,375
74	Single	64	$11,860	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	70	$58,749	$58,749	$41,177
75	Single	65	$12,780	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	100	$56,745	$56,745	$40,939

Scenario	Marriage	CPP Start Age	CPP Amount	Income Splitting	Client's (& Spouse's) RSP	Client's (& Spouse's) TFSA	Joint Open	ACB	Retirement Income	% Interest	CR Estate Residual	1B Estate Residual	2B Estate Residual
76	Single	65	$12,780	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	70	$60,378	$60,378	$44,314
77	Single	65	$12,780	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	50	$62,440	$62,440	$47,739
78	Single	65	$12,780	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	30	$64,421	$64,421	$54,337
79	Single	65	$12,780	N/A	$600,000	$50,000	$350,000	$50,000	$60,000	0	$67,797	$86,831	$67,173
80	Single	60	$8,333	N/A	$400,000	$250,000	$350,000	$350,000	$60,000	70	$186,565	$234,475	$228,280
81	Single	60	$8,333	N/A	$400,000	$250,000	$350,000	$250,000	$60,000	70	$171,756	$218,018	$216,583
82	Single	60	$8,333	N/A	$400,000	$250,000	$350,000	$150,000	$60,000	70	$157,509	$191,340	$190,894
83	Single	60	$8,333	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	70	$141,691	$141,691	$88,616
84	Single	61	$9,099	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	70	$148,109	$148,109	$99,913
85	Single	62	$10,020	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	70	$156,321	$156,321	$110,631
86	Single	63	$10,940	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	70	$162,134	$162,134	$156,129
87	Single	64	$11,860	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	70	$165,755	$165,755	$191,016
88	Single	65	$12,780	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	100	$161,766	$161,766	$90,224
89	Single	65	$12,780	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	70	$167,058	$167,058	$190,952
90	Single	65	$12,780	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	50	$170,146	$170,146	$198,042
91	Single	65	$12,780	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	30	$173,116	$173,116	$211,187
92	Single	65	$12,780	N/A	$400,000	$250,000	$350,000	$50,000	$60,000	0	$177,594	$177,594	$222,424