Journal of Applied Financial Research

Volume 3, Fall 2009 Issue

Academic Journal of
The Center for Business and Economic Development
School of Business Administration

Gaynor Cheokas, Director
Randall Valentine, PhD
Executive Editor
John Kooti, PhD
Editor

Determining Optimal Tax Deferral Strategies in an Ordinary Tax Environment

Terrance Jalbert, PhD
Professor of Finance
College of Business Administration
University of Hawaii at Hilo
200 W. Kawili St.
Hilo, HI 96720
Tel: (808) 974-7456
Fax: (808) 974-7685
Email: jalbert@hawaii.edu

Mercedes Jalbert
The IBFR
P.O. Box 5569
Hilo, HI 96720
808-959-8156
mercedesjalbert@yahoo.com

Steve Landry, PhD, CPA (Colorado), CMA, CFM, CFP®
Professor of Accounting
The Fisher Graduate School of International Business
The Monterey Institute of International Studies
460 Pierce St.
Monterey, CA 93940
Tel: (831) 647-6407
Fax: (831) 647-6506
Email: steve.landry@miis.edu

Determining Optimal Tax Deferral Strategies in an Ordinary Tax Environment

ABSTRACT

Several articles in the literature have examined optimal tax-deferral strategies. This paper extends this literature line by using a combination of tax assumptions that differ from most previous work. Specifically, we assume all future income is taxed at ordinary income tax rates. This tax assumption is relevant for individuals who invest primarily in investments that do not produce capital gains. Moreover, the tax assumptions here allow for simpler analyses easier to understand than found in most previous work.

INTRODUCTION

Individuals have many options to defer taxes including Individual Retirement Accounts, 401K, 403B, and 457 contributions. While many popular press articles tout the advantages of tax deferral, this may not prove optimal for all individuals. Relatively few articles have examined tax optimality conditions for individuals. Of interest to these individuals are those conditions under which they are made better or worse off by deferring taxes. Failure to properly determine tax deferral optimality can result in the overpayment of taxes and reduced funding amounts available for retirement needs. While seemingly a simple question, the analysis of optimal tax deferral requires complex computations and assumptions about several variables affecting the decision. Specifically, these variables consist of the amount of time to retirement, current and future tax rates, the taxable nature of future income, and the return that an individual will earn on his or her investments.

This paper extends the literature by using a set of assumptions that differ from typical analyses. Namely, the focus here is on how the taxable nature of future income affects the analysis. We assume that all future income will be taxed at the then prevailing ordinary income tax rate. This assumption differs from that used by Jalbert Rask and Jalbert (RJR) (2007) who incorporated differential ordinary income and capital gains tax rates in their analysis. While simplified, the assumptions used here are relevant for many individuals. First, for some individuals the capital gains and ordinary income tax rates are equal because of their income levels. Second, some individuals might expect rates to change in the future such that the two rates become equal. Third, many individuals invest in securities that produce only ordinary income, rendering capital gains tax rates irrelevant. Finally, some individuals might be satisfied with a simple approximation and are willing to ignore differences resulting from differential ordinary income and capital gains tax rates. In each of these instances, the equations developed in this article represent an important simplification of the work by JRJ (2007). While incorporating this ordinary income tax simplification may seem restrictive, it is not without precedent (see Randolph 2007 as noted in Jalbert, Clayton and Rask (JCR) 2007).

Utilizing the same set of assumptions, Jalbert, Clayton and Rask (2007) examined the effect of tax credits on optimal tax deferral conditions. This article differs from JCR (2007) in that where JCR incorporated tax credits in their analysis, the work here ignores the effects of tax credits. By utilizing the same set of assumptions other than considering tax credits, one can directly compare the results here with the results of JCR (2007).

The remainder of this paper is organized as follows. In the next section, we discuss the relevant literature. In the following section we develop a set of equations for determining optimal tax deferral strategies. The paper closes with some concluding comments.

LITERATURE REVIEW

Noting that relatively few articles have examined tax deferral optimality conditions is surprising given the magnitude of the tax deferred market and amount of money at stake. Nevertheless, the issue remains quite important. Articles examining tax deferral include Sibley (2002), Horan, Peterson and McLeod (1997) Horan and Peterson (2001), Randolph (1994) and others. As the third in a series, the interested reader is referred to the two prior articles in the series, Jalbert, Rask and Jalbert (2007) and Jalbert, Clayton and Rask (2007) for a complete literature review. This paper limits the literature review to those articles with specific implications here.

Early papers to examine optimal tax deferral strategies included Kirshnan and Lawrence (2001) and Burgess and Madeo (1980). These papers solved for future tax rates and investment horizons at which individuals would be indifferent between tax deferral and non-deferral holding the return on investment constant. Here, we predefine changes in tax rates and solve for break-even returns on investment for both tax deferred and non-deferred investments. While possessing some similarities to other research, the Jalbert, et. al., (JRJ 2007 and JCR 2007) series permits the explicit examination of multiple tax structures. In addition, the research herein may prove more suitable for most investors because it requires investors to focus on expected returns and required returns. Earlier work required investors to compare expected tax rates to implied tax rates. Since investors are better acquainted with comparing expected returns and required returns, they should find the work here easier to use in their everyday investment decisions.

The first paper in the Jalbert, et. al., series examined optimal tax deferral when tax rates were expected to change in the future (Jalbert, Rask and Jalbert 2007). This seminal article incorporated different tax rates with respect to capital gains and ordinary income into the analysis. That article treated the future course of tax rates as unknown. To facilitate analysis, the authors conducted their investigation under three different assumptions about the future course of taxes, each involving a future tax rate change. The first assumption posited that tax rates would make a permanent shift in the year following the investment and remain at that level throughout the life of the individual. The second assumption conjectured that tax rates would shift in the year of retirement, after all funds had been deposited into the account but before any funds were withdrawn. The third assumption imagined that tax rates would make a gradual shift. JRJ (2007) found that under most possible future tax rate scenarios individuals would likely be better off by tax deferral. The results held even in instances involving substantial future tax rate increases. However, the authors identified some instances when tax deferral might not be optimal. In particular, tax deferral was not optimal in some instances when the individual had a relatively short time until retirement.

This research simplifies the work of JRJ (2007) by making the assumption that all future income is taxed at the same rate. Doing so allows for a less complex analysis with respect to individuals who expect to receive all of their income in a form that will be subject to the same current and future tax rate classes.

JCR (2007) extended the work of JRJ (2007) by examining the effects of the Saver's Tax Credit on optimal tax deferral conditions. Unlike JCR (2007), this research does not allow for differential ordinary income and capital gains tax rates, thereby simplifying the analysis. JCR (2007) found that individuals eligible for the Saver's Tax Credit almost always bettered themselves by deferring taxes. Indeed, only in the event of extremely negative returns on investment were individuals better off by not deferring taxes. However, we simplify the work of JCR (2007) by ignoring the Saver's Tax Credit since many individuals do not take the credit given eligibility constraints.

THE MODEL

In this section we develop equations to analyze conditions determining optimal or suboptimal tax deferral. We begin by outlining the assumptions utilized in our analysis. In fact, one cannot know the future course of tax rates. Nevertheless, the future course of tax rates can significantly affect optimal investment decisions of individuals. Specifically, future tax rates greatly affect individuals faced with the decision of deferring taxes. For instance, if tax rates increase over the life of the individual, tax deferral may not prove an optimal investment choice.

Given that future tax rates are unknown and unknowable, investors must estimate future tax rates in order to determine their optimal tax deferral positions. We provide three assumption scenarios concerning the future course of tax rates. We use the same assumptions utilized in JRJ (2007). The first two tax assumptions involve tax rates making a permanent one time shift. The difference in these two assumptions lies in the timing of the tax rate change. In the first assumption, the tax rate change occurs in the year following the initial investment and remains at that level throughout the retired life of the individual. The second assumption has the shift occurring after the last amount of interest has been earned, but before any funds have been withdrawn from the accounts. The third assumption keeps tax rates constant at their current level for one year. After one year, rates gradually increase, in equal annual increments, to the new rate. Certainly, one could conceive other tax rate scenarios. However, we limit ourselves to these three cases for the sake of parsimony. Analyzing the three scenarios noted above provides the user with a representative view of the impact of a set of possible tax rate changes. Table 1 illustrates the three tax assumptions utilized in this paper where current tax rates in 2005 are 10 percent and expected to increase to 20 percent, albeit in different ways, by 2008.

Table 1: Future Course of Tax Rates

Year	One Time Shift Beginning	One Time Shift End	Incremental Change
2005	10%	10%	10%
2006	20%	10%	10%
2007	20%	10%	15%
2008	20% (20%)	10% (20%)	20% (20%)

This table demonstrates the three assumptions regarding the future course of taxes utilized in this paper. The figures in parentheses indicate the rate to be applied to future withdrawals.

Using the three assumptions outlined above, we compute the future value of an investment in each of a tax deferred account and a non-tax deferred account. Next, we equate these future values. Finally, we solve for the return on investment at which investors will be indifferent about the type of investment. We refer to this rate of return at which investors are indifferent about the type of investment as the indifference return on investment (IROI). IROI is solved for several combinations of current tax rates and expected future tax rates. By examining the resulting tables and formulas, any investor can determine if tax-deferral is optimal for him/her given a current tax rate, expectation about future tax rates and time to retirement.

To demonstrate the issues involved, consider an individual who has $30,000 from current earnings to invest today. Through combinations of IRA, 403b, 401k and 457 accounts the individual can tax defer the entire amount if he/she so desires. The investor plans to retire in two years. The investor will withdraw all the funds from the retirement account at that time. The investor has a current marginal tax rate of 18 percent and due to the political climate expects the marginal tax rate at the time he/she withdraws funds from the account to be 20 percent. The investor plans to invest in the same securities regardless of the type of account within which the money is held. Moreover, the investor expects to earn a 10 percent annual ROI on the investment. The investor plans to invest in items that are likely to produce ordinary income. The investor wishes to determine if it is preferable to invest through a tax-

deferred account or pay taxes currently and invest the remaining proceeds. We provide the analysis for this individual for each of the three future courses of tax rates noted above.

One Time Shift at the Beginning of the Period Scenario

Recall that in our first tax assumption, tax rates will make a permanent shift which occurs in the year following the initial investment. Utilizing this assumption, we determine the amount of money that the individual will have if he/she elects to defer taxes and if he/she elects not to defer taxes. The investor who defers taxes will place the money he/she has saved into a qualified retirement account. The individual leaves the funds in this account until retirement. Upon retirement, the individual removes the funds from the account paying taxes at the then prevailing tax rate. While the analysis here assumes the individual removes the funds from the account upon retirement, the analysis could also easily accommodate a delayed withdrawal scenario. Consider an individual who has saved some money from his/her current income that he/she intends to use for retirement needs, *S*. The individual has an investment horizon *n,* and expects to earn an annual rate of return of *i*. If the investor defers taxes, prior to paying taxes at retirement, the individual will have the before tax future value, *BTFV,* computed as:

$$BTFV_n = S(1+i)^n \tag{1}$$

The individual must pay taxes at the future tax rate (Tf) on the funds withdrawn from the account leaving him/her with the after tax future value *ATFV* computed as follows:

$$ATFV_n = BTFV(1-Tf) \tag{2}$$

Combining equations 1 and 2 gives:

$$ATFV_n = S(1+i)^n(1-Tf) \tag{3}$$

Using the demonstration data noted above for this individual, the computations yield the following result:

$$ATFV_n = \$30{,}000(1+.10)^2(1-.20) = \$29{,}040$$

Thus far, the analysis is analogous to JRJ (2007). That will not be the case, however, if the individual does not defer taxes. In not deferring taxes, the investor pays taxes on the funds today at the current tax rate, *Tc,* and invests the remaining proceeds. After having paid the current taxes due, the investor can invest the remaining proceeds, *FI*:

$$FI = S(1-Tc) \tag{4}$$

The investor also pays taxes each year on the earnings at *Tf*. Considering both tax effects, the amount of money available to the individual in retirement computes as:

$$ATFV_n = FI\{1+[i*(1-Tf)]\}^n \tag{5}$$

Substituting Equation 4 into Equation 5 gives:

$$ATFV_n = S(1-Tc)\{1+[i*(1-Tf)\}^n \tag{6}$$

For the investor described above, the after tax money available to fund his/her retirement needs follows as:

$$ATFV_n = \$30{,}000(1-0.18)\{1+[0.10*(1-0.2)\}^2 = \$28{,}693.44$$

In this example, the return on the additional funds available by tax deferral sufficiently offsets the increase in tax rates, so tax deferral is the preferable option with a future value advantage of $346.56 ($29,040-28,693.44). However, this will not always be the case. Consider an individual who can only earn a 3 percent return on his/her investments. If the individual defers tax, he/she will have $25,461.60 at retirement. If he/she does not defer, he/she will have $25,794.97. In this later case, one would prefer not to defer taxes.

Equating the future value of the deferral and non-deferral alternatives and solving for *i* provides a formula for solving for the interest rate at which individuals will be indifferent between tax deferral and non-tax deferral. The equality is expressed as follows:

$$S(1+i)^n(1-Tf) = S(1-Tc)\{1+[i*(1-Tf)]\}^n \qquad (7)$$

Solving Equation 7 for the ROI yields Equation 8, the return on investment at which the individual will be indifferent between tax deferral and non-tax deferral (IROI):

$$IROI = \frac{\left(\frac{(1-Tf)}{(1-Tc)}\right)^{\frac{1}{n}} - 1}{1-Tf-\left(\frac{(1-Tf)}{(1-Tc)}\right)^{\frac{1}{n}}} \qquad (8)$$

Equation 8 allows an individual to easily determine the interest rate at which he/she is indifferent about tax deferral. The equation constitutes a simplification of the equation presented in JRJ (2007) because differential tax rates on capital gains and ordinary income are ignored. For the demonstration problem discussed here with an 18 percent current tax rate, a 20 percent future tax rate, and a two-year investment horizon, the equation is computed as:

$$IROI = \frac{\left(\frac{(1-0.2)}{(1-0.18)}\right)^{\frac{1}{2}} - 1}{1-.20-\left(\frac{(1-0.20)}{(1-0.18)}\right)^{\frac{1}{2}}} = 0.06536$$

Individuals expecting to earn a 6.536 percent ROI will be indifferent about deferral. Individuals expecting to earn a rate above the IROI better themselves by deferring taxes. Those expecting to earn a rate of return below the IROI better serve themselves by avoiding tax deferral. Table 2 demonstrates the computations for various combinations of tax rates for an individual with 20 years to retirement. For the instance where the current tax rate is 30 percent and the future tax rate is 20 percent, as long as the return achieved is above negative 3.24 percent, the individual is made better off by tax deferral. In the case where tax rates are expected to increase from 20 percent to 40 percent, the individual must earn an ROI above 3.70 percent in order to gain from tax deferral. For an individual that plans to invest in short-term

certificates of deposit, achieving such a return may prove questionable depending on prevailing market rates of interest.

In general, as the number of years to retirement increases, the IROI approaches zero. For example, in the case of an individual with a 10 percent current tax rate and a 20 percent expected future tax rate with 40 years to retirement, the IROI calculation yields 1.5 percent, as opposed to 3.02 percent for the individual with 20 years to retirement. Similar results can be computed for various retirement timelines.

Table 2: Indifference ROI (IROI) for a 20-years to Retirement and a One-Time Tax Rate Shift at the Beginning of the Investment Horizon

	Future Tax Rate										
Present Tax Rate	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
	5	0.00	2.77	3.84	4.47	4.93	5.32	5.67	6.02	6.37	6.74
	10	-5.14	0.00	1.94	3.02	3.77	4.34	4.83	5.28	5.71	6.15
	15	-10.03	-2.78	0.00	1.54	2.56	3.33	3.96	4.51	5.03	5.53
	20	-14.72	-5.58	-1.98	0.00	1.31	2.27	3.04	3.70	4.30	4.87
	25	-19.21	-8.39	-4.02	-1.59	0.00	1.16	2.08	2.85	3.54	4.18
	30	-23.53	-11.23	-6.11	-3.24	-1.36	0.00	1.07	1.96	2.74	3.45
	35	-27.70	-14.09	-8.26	-4.96	-2.79	-1.22	0.00	1.01	1.88	2.68
	40	-31.73	-17.00	-10.48	-6.75	-4.30	-2.51	-1.13	0.00	0.97	1.85
	45	-35.65	-19.95	-12.79	-8.64	-5.88	-3.89	-2.34	-1.08	0.00	0.96
	50	-39.48	-22.97	-15.20	-10.63	-7.57	-5.35	-3.64	-2.24	-1.05	0.00

One Time Shift at the End of the Period Scenario

Recalling our second tax assumption, the tax rate remains unchanged throughout the pre-retirement years. However, the tax rate makes a sudden shift, immediately after all investments have been earned, but before any funds are withdrawn from the account. Under this tax assumption, again assuming ordinary tax type investments by the individual, the capital gains tax rate does not enter into the computations. Thus, the solution here will be identical to that provided by JRJ (2007) and no simplification is possible. For convenience purposes, we reproduce the formula developed in JRJ (2007) here:

$$IROI = \frac{\left(\frac{(1-Tf)}{(1-Tc)}\right)^{\frac{1}{n}} - 1}{1 - Tc - \left(\frac{(1-Tf)}{(1-Tc)}\right)^{\frac{1}{n}}} \qquad (9)$$

Others Tax Rate Changes

Our third tax assumption kept tax rates constant at their current level for one year, then gradually changing in equal annual increments to a new rate. This new rate may be higher or lower than the currently prevailing tax rate. As noted in JRJ (2007) and JCR (2007), the mathematics for developing a generalized solution for IROI in this scenario are complex. In such instances, we advise solving the problem using a spreadsheet program.

The procedure involved in using a spreadsheet to solve for IROI is to compute the future value of the cash flows for the tax deferred and the non-tax deferred cases in a manner similar to what was done

earlier utilizing formulas. The inputs for the computations will consist of the current tax rate, future tax rate and return on investment. For the next step, compute the difference between these two future values. Investors will be indifferent between tax deferral and non-tax deferral when this difference equals zero. Adjust the interest rate in the problem until the difference becomes zero. This can be done manually, or by utilizing the solver function available in many spreadsheet programs. The ROI that produces a zero difference in future values is the indifference ROI. For the investor with an 18 percent current tax rate, 20 percent future tax rate and 2 years to retirement, the indifference ROI calculates as 6.904 percent: Table 4 shows IROI computations for an individual with 20 years to retirement at different tax rate combinations.

Table 4: Indifference ROI for a 20-years to Retirement and a Gradual Tax Rate Shift

Future Tax Rate											
Present Tax Rate	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
	5	0.00	3.70	5.90	7.30	8.50	9.50	10.30	11.20	12.00	12.90
	10	-3.50	0.00	2.30	4.10	5.50	6.70	7.70	8.70	9.70	10.70
	15	-5.30	-	0.00	1.80	3.20	4.50	5.60	6.70	7.70	8.70
	20	-6.50	-	-1.70	0.00	1.50	2.70	3.90	5.00	6.10	7.10
	25	-7.40	-	-3.00	-	0.00	1.30	2.40	3.50	4.60	5.70
	30	-8.10	-	-4.20	-	-1.20	0.00	1.20	2.20	3.30	4.40
	35	-8.80	-	-5.10	-	-2.30	-1.10	0.00	1.20	2.10	3.20
	40	-9.40	-	-6.00	-	-3.30	-2.20	-1.10	0.00	1.00	2.10
	45	-10.00	-	-6.80	-	-4.30	-3.10	-2.10	-1.00	0.00	1.00
	50	-11.00	-	-7.70	-	-5.20	-4.10	-3.00	-2.00	-1.00	0.00

CONCLUDING COMMENTS

We examined optimal tax deferral strategies in the presence of expected future tax rate changes. This paper extends two earlier papers in this series as well as other literature on the issue of tax deferral. Specifically, we extend the literature by using a simplifying set of assumptions commonly experienced by many investors noting their propensity to invest in ordinary tax type instruments like certificates of deposit, money market funds, and so forth. Investors should find the resulting equations easier to use. The results show tax deferral as usually optimal under most future tax rate combinations. The only exceptions occur when tax rates change in extreme ways, or when expected returns on investment are very low. The issue of optimal tax deferral choices has received relatively little attention in the academic literature even thought there exist significant economy-wide issues. The topic comprises a fertile area for future research with a great many issues not yet addressed.

REFERENCES

Burgess, R.D., and Madeo, S.A. (1980) “A Simulation study of tax Sheltered Retirement Plans,” Journal of American Taxation, vol. 1, p. 34-41.

Horan, S.M. (2002) “After-Tax Valuation of Tax-Sheltered Assets,” *Financial Services Review*, vol. 11, p. 253-275.

Horan, S.M., and J.H. Peterson (2001) “A Reexamination of tax-Deductible IRAs, Roth IRAs, and 401(k) Investments,” *Financial Services Review*, vol. 10, p. 87-100.

Horan, S.M. and J.H. Peterson and R. McLeod (1997) “An Analysis of Nondeductible IRA Contributions and Roth IRA Conversions,” *Financial Services Review* vol 6(4) p. 243-256.

Jalbert, Terrance, Justin Clayton and Eric Rask (2007), “Optimal Tax Deferral in the Presence of Deferral Bonuses,” *Financial Services Review*, vol. 16(1), p. 41-54

Jalbert, Terrance, Eric Rask and Mercedes Jalbert (2007) “Optimal Tax Deferral Choices in the Presence of Changing Tax Regimes,” *Journal of Applied Business Research*, vol. 23(1) p. 1-12

Krishnan, S.V., and Lawrence, S. (2001) “Analysis of Investment Choices for Retirements: A New Approach and Perspective,” *Financial Service Review*, vol. 10(1) p. 75-86.

Randolph, W.L. (1994) “The Impact of Mutual Fund Distributions on After-Tax Returns,” *Financial Services Review* vol. 3(2) p. 38-42.

Sibley, M. (2002) “On the Valuation of Tax-Advantaged Retirement Accounts,” *Financial Services Review*, vol. 11(3), p. 233-251.