

401(k) Advantages for Retirement Investing

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Abstract

There are several investment vehicles through which to save for retirement including 401(k), Roth IRA, and ordinary investment accounts. Each of these account types have different characteristics that affect their suitability and effectiveness. When the primary objective is to maximize available funds during retirement, most investors should fund their 401k, Roth IRA, and ordinary investment accounts in that order. This article details both the behavioral and the mathematical reasoning behind this strategy. The equations driving this conclusion also show when an alternative strategy should be taken due to changing circumstances — namely tax rates.

1 Introduction

After you retire and no longer collect a paycheck, you will still need money.¹ The financial decisions you make decades before you retire will determine the quality of your life during retirement.²³ The more money you have, the better your probable quality of life. The primary vehicles for your retirement dollars currently include the 401(k) (a.k.a. 403(b) from certain tax-exempt employers), Roth IRA, and ordinary, everyday investment accounts.⁴ The essential difference between these types of accounts is the way in which they are taxed. The tax rules encourage different behavior and lead to different balances in your retirement account.

Your whole financial picture should be considered before you do anything based on my recommendations. Things like debt, insurance, and kids require special consideration outside of the scope of this article. I assume you have the means to fully fund all retirement options and still have enough income leftover to live, destroy your debts, save for big ticket items, have fun, etc. and the only question left is whether the \$17,000 budgeted for retirement this year be distributed \$14,000 in the 401(k) and

¹Of course, you already know this or else you wouldn't be reading this article.

²If you don't have decades to go until you retire, God help you. Buy some lottery tickets.

³Don't buy lottery tickets. Save your money like a mad man and treat your kids really well.

⁴The Traditional IRA has been left out because you're probably not eligible to deduct contributions. If you can deduct the contributions and that drops you to a lower tax bracket, it may be worthwhile to fund this instead of a Roth IRA. The analysis is similar to that shown in this article and is left as an exercise for the reader.

\$3,000 in the Roth IRA, or \$4,000 in the Roth IRA and \$13,000 in the 401(k), or some other way.

If you haven't figured out how much you're going to need in retirement, do that now.⁵ Then calculate how much you will need to invest every year until retirement assuming a 'reasonable' rate of return.⁶ If it looks like you're not going to have enough money to live through your retirement, you need to tighten your belt today so you won't be living off of cat food when you're old.

2 Behavioral Considerations

If you favor freedom and liquidity, ordinary investment accounts score a point. Ordinary investment accounts should not be the primary retirement vehicle for those without the discipline to handle this freedom responsibly. If you don't have the self control to keep yourself from cashing out some of your retirement money early to buy a sports car when you turn 45, ordinary investment accounts score negative two points. If you don't have the wherewithal to budget for living expenses, emergency expenses, future purchases, etc., ordinary investment accounts score negative two points. If you have this sort of leaning, it's very likely you'll find yourself in a hole and your retirement money will seem like an easy way out. Instead, you'll be moving the hole from today, when you're young and healthy, to retirement, when you're old and no longer have the strength to pull yourself out.

If you like free money, 401(k) contributions up to your employer's match scores 10,000 points. If you like being able to set something up and forget about it, automatic deductions and professional management are your friends — 401(k) scores a point. If you foresee situations where you need to address a severe cash crunch by cashing out your 401(k) early, 401(k) scores a negative point, and you should immediately start work on a financial plan that will help you deal with those situations.

If you like having the option of pulling out some money while simultaneously having restraints that keep you from emptying your entire account, Roth IRA scores two points. Roth IRAs give you the freedom to withdraw your investment capital penalty free should some catastrophe demand it while simultaneously encouraging you to keep your hands off of part of your retirement money through a tax penalty. From a behavioral standpoint, the Roth IRA is the great middle ground.

3 Mathematical Considerations

Those with the mental fortitude and a rock solid balance sheet will only be interested in the strategy that will net them the most money for their sunset years. Math is the candle that lights the way. Let us begin with the equation for the future value of money.

$$f(P) = P * (1 + r)^n \tag{1}$$

⁵Roughly: $(age\ at\ death - age\ at\ retirement) * current\ income$ — you'll find a way to spend at least as much money as you make now.

⁶ $\frac{amount\ saved\ by\ retirement * rate\ of\ return}{-1 + (1 + rate\ of\ return)^{years\ until\ retirement}}$

Equation (1) gives us the value of an initial investment P growing after compounding for n periods at a periodic rate r . For this exercise, the rate of growth and the time line for the investment are assumed to be the same regardless of the investment vehicle. Note that there is no need to model the multiple contributions that you would make on your way to retirement.

The income tax rate⁷ for single filers can be expressed as a step function (2).

$$t_{inc}(P) = \begin{cases} 10\% & \text{if } P < \$7,150, \\ 15\% & \text{if } \$7,151 \leq P \leq \$29,050, \\ 25\% & \text{if } \$29,151 \leq P \leq \$70,350, \\ 28\% & \text{if } \$70,351 \leq P \leq \$146,750, \\ 33\% & \text{if } \$146,751 \leq P \leq \$319,100, \\ 35\% & \text{if } P > \$319,100. \end{cases} \quad (2)$$

Assume long term capital gains⁸ will continue to be taxed in the same manner at today (3).

$$t_{cg}(P) = 15\% \quad (3)$$

Let (4) be a convenience notation that gives one the remainder of an investment after the government has taken its share.

$$P_{t_{rate}} = P * (1 - t_{rate}(P)) \quad (4)$$

Investment in a Roth IRA account is subject only to income tax before investing (5).

$$g_{roth}(P) = f(P_{t_{inc}}) \quad (5)$$

Investment in a regular trading account is subject to both income tax before investing and capital gains tax after cashing out (6).

$$g_{regular}(P) = f(P_{t_{inc}}) - t_{cg} * (f(P_{t_{inc}}) - P_{t_{inc}}) \quad (6)$$

Investment in a 401(k) account is subject to income tax only after cashing out, the deduction to your current tax liabilities will leave you with extra income to invest, and

⁷2004 rates from <http://taxes.yahoo.com/rates.html>

⁸<http://taxes.yahoo.com/guide/begin/cgcateg.html>

the deduction may even lower your tax bracket leaving you with extra tax savings to invest in a regular account (7). Let I be your income before 401(k) contributions, and $I - P$ be your income after.

$$g_{401k}(P) = f(P) * (1 - t_{inc}(f(P))) + g_{regular}(t_{inc}(I) * I - t_{inc}(I - P) * (I - P)) \quad (7)$$

Letting S represent the tax savings $t_{inc}(I) * I - t_{inc}(I - P) * (I - P)$, (7) can be simplified to (8).

$$g_{401k}(P) = f(P) * (1 - t_{inc}(f(P))) + g_{regular}(S) \quad (8)$$

Note that these equations model total cash out amounts instead of the more realistic scenario of a small draw down over a period of time. This is sufficient to establish how the end values relate to each other.

It takes no leap of faith to see why the Roth IRA (5) will always beat a regular account (6) assuming both a positive return and a continuing governmental lust for your gains. If the tax code changes such that capital gains tax no longer exists, (6) reduces to (5) and even without the contribution limit of the Roth IRA, the results of the analysis remain the same. Let us compare the returns of a Roth IRA to those of a 401(k) while ignoring the effect of the tax savings for simplicity.

$$\begin{aligned} g_{roth}(P) & ? g_{401k} \\ f(P_{t_{inc}}) & ? f(P) * (1 - t_{inc}(f(P))) \\ P * (1 - t_{inc}(P)) * (1 + r)^n & ? P * (1 + r)^n * (1 - t_{inc}(f(P))) \\ (1 - t_{inc}(P)) & ? (1 - t_{inc}(f(P))) \end{aligned} \quad (9)$$

Equation (9) shows that deciding which type of account should be funded before the other is a matter of assumptions about your current income tax rate and your expected income tax rate in retirement. If you plan on living on less during retirement (hardly likely), then a 401(k). If you plan on living on about the same amount of income, they are equivalent. If you plan to live on a much larger income in retirement than you do now, a Roth IRA will serve you better than a 401(k). Bringing the invested tax savings back into the picture in favor of the 401(k), it is apparent that the income tax rate difference has to be greater (spending much more in retirement) than the effect of the invested tax savings for the Roth IRA to best the 401(k).

$$\begin{aligned} g_{roth}(P) & ? g_{401k} \\ f(P_{t_{inc}}) & ? f(P) * (1 - t_{inc}(f(P))) + g_{regular}(S) \\ P * (1 - t_{inc}(P)) * (1 + r)^n & ? P * (1 + r)^n * (1 - t_{inc}(f(P))) + \\ & S * (1 + r)^n - t_{cg} * (S * (1 + r)^n - S) \\ (1 - t_{inc}(P)) & ? (1 - t_{inc}(f(P))) + \frac{S}{P} \left(1 - t_{cg} \left(1 - \frac{1}{(1 + r)^n} \right) \right) \end{aligned} \quad (10)$$

When comparing the different retirement investment strategies, take care to compare them on equal footing. To compare different allocations fairly, one allocation must not require a greater sacrifice than another. The effect of retirement investments on current finances can be seen in (11).

$$(Salary - 401k)(1 - t_{inc}) - Roth = disposable + extra \quad (11)$$

Different scenarios must be based on the same *Salary* and the same *disposable* income. The *extra* income can come from tax savings or under-invested funds and is assumed to be invested for retirement as well.

4 Examples

The following examples illustrate the effect of different allocations using different current and retirement tax bracket scenarios.

4.1 Retire At Current Tax Bracket

Alice makes a comfortable living with an \$85,000 annual salary. Her income puts her in the 28% tax bracket now, and she expects to use the same relative amount of income in retirement and therefore expects to be in the same tax bracket. If she allocates her retirement investments such that her Roth IRA is fully funded at the expense of her 401(k), (11) fills in as follows:

$$(\$85,000 - \$10,000)(1 - .28) - \$4,000 = \$50,000 \quad (12)$$

If she allocates her retirement investments such that her 401(k) is fully funded, (11) fills in as follows:

$$(\$85,000 - \$14,000)(1 - .28) - \$1,120 = \$50,000 \quad (13)$$

When Alice's retirement allocation favors her 401(k), she is able to invest an additional \$1,120 for retirement with no effect on her current disposable income.

The advantage of the 401(k) is even more pronounced when it results in a tax bracket drop. This can be illustrated by assuming Alice makes \$84,000.

$$(\$84,000 - \$10,000)(1 - .28) - \$4,000 = \$49,280 \quad (14)$$

$$(\$84,000 - \$14,000)(1 - .25) - \$3,220 = \$49,280 \quad (15)$$

In case an additional \$3,220 does not sound like much of a bonus, consider that it becomes an additional \$47,600 in retirement assuming it compounds at 8% annually over 35 years.

4.2 Retire At A Higher Tax Bracket

Bob is starting his career with a \$60,000 salary. He expects his retirement income needs to put him one tax bracket higher than he is now. Assuming an 8% annual return for 35 years, his returns for this year's retirement allocation unfold as follows.

$$(\$60,000 - \$10,000)(1 - .25) - \$4,000 = \$33,500 \quad (16)$$

$$(\$10,000)(1.08)^{35}(1 - .28) - \$4,000(1.08)^{35} = \$165,600 \quad (17)$$

With an inclination toward his Roth IRA, Bob's investments for this year yield him \$165,600 in retirement as shown in (17).

$$(\$60,000 - \$14,000)(1 - .25) - \$1,000 = \$33,500 \quad (18)$$

$$(\$14,000)(1.08)^{35}(1 - .28) - \$1,000(1.08)^{35} = \$163,820 \quad (19)$$

With an inclination toward his Roth IRA, Bob's investments for this year yield him \$163,820 in retirement as shown in (19). Ignoring any potential employer matching, Bob would do better to invest as much as he can in his Roth IRA before funding his 401(k).

5 Conclusion

Deciding between the various retirement allocations strategies depends not only on the math but also on your psychological and fiscal tendencies. The greater freedom allowed with the Roth IRA and a regular trading account may offer a peace of mind that is more valuable than the financial advantage of the 401(k). Only you can evaluate and strengthen this area of retirement planning. This paper can help figure out the math.

Ultimately, you should fully fund your 401(k), Roth IRA, and a separate regular trading account reserved for retirement. For most situations, you need to save beyond the tax-advantaged account limitations to have a comfortable retirement. However, there are certainly times when the belt just cannot be tightened any further. When the only consideration is the math that gives the best return, this paper has shown that deciding between the 401(k) and the Roth IRA depends on current income level relative to retirement income level. If you plan to retire around your current income level, favor the 401(k) over the Roth IRA. If you plan to retire at a higher income level, especially at the start of a career, favor the Roth IRA over the 401(k).