The Asset Allocation Worksheet: Version 1.2

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Changes from version 1.1: Corrected tax rate computation on taxable account to be the fraction of gains lost to taxes. Adjusted example tax rates for 2013 tax changes, which are now permanent. If you upgrade from version 1.1, you need only copy cell B34.

This Microsoft Works/Excel worksheet is intended to help you keep track of your asset allocation. It will not make the asset allocation decisions, but once you have made the decision, it will tell you what percent of your portfolio is in each asset class, adjusting for funds which cover multiple asset classes. Then, when you are ready to invest new money, or to rebalance, you can increase your allocation to those classes in which you are below the target allocation.

You can adjust for the different tax treatment of assets in different accounts. If you have $60,000 in bonds in a 401(k), and $40,000 in stocks in a Roth IRA, your effective allocation is not 40% stock. If you will be in a 33% tax bracket at retirement, the IRS and state treasury effectively own 33% of your 401(k) but none of your Roth IRA, and thus your portfolio is effectively 50% in stock. William Reichtenstein mentions this issue in [2].

General instructions

The sample worksheet includes example entries for several funds using common account types and definitions of asset classes. The tax rates used are the ones in the example in the appendix; your own tax rates may be different.

1. Define your asset classes. Assets can be divided into general classes, such as US stocks, international stocks, and bonds, and sometimes into specific subclasses, such as large-growth US stocks, emerging-markets stocks, and inflation-indexed bonds.

The sample worksheet includes a common set of asset classes. To add a new specific class, copy columns D and E, and insert the copied columns to the right of another column in the same general class, or to the right of the real estate or cash column if the new class does not fit in any general class. You can also delete a class by deleting its pair of columns.

2. Choose your target allocation. For each class, enter your target percentage (including the percent sign) at the bottom of its column, in the line labeled "Target Allocation". It may be easiest to do this in several stages, first deciding your allocation to large classes such as stocks and bonds, and then dividing each class into subclasses. For example, if you want to hold 50% stock, and 80% of your stock in the US, and 40% of the US stock in large growth, you would multiply these numbers to get 16% as the target LG allocation.

Columns Y–AA will automatically compute your allocation to the larger classes; real estate and cash are not included in these columns because these classes are not usually divided into more specific classes. If you added or deleted asset classes, check that the totals at the far right are correct. If the totals are not correct, change the columns summed in all four rows in these columns.

3. Enter the classes of your assets. For each fund or individual security that you hold, enter the name in Column A, the balance in Column B, and the asset-class distribution in the % columns for the asset classes (again, with a percent sign). The totals should add to 100%. Remember to include the cash holding in stock funds that have a significant cash position. If you have the same fund in two different accounts such as a taxable account and an IRA, enter the fund twice.

4. Enter the tax rates for your accounts. On each asset line, enter in Column C the effective tax rate (combined federal and state) for the account that contains the asset. For a Roth IRA or Roth 401(k), this is zero. For a traditional IRA, 401(k), or other tax-deferred investment, enter your estimated retirement tax bracket. For a taxable account, use the sub-worksheet at the bottom (lines 28–34), and copy the number from B33 for all funds held in your taxable account. Note that this value is necessarily a rough approximation, as it depends on future tax policy, the future returns of your funds, and the portions of these returns which are dividends and distributed gains.

In B29, enter the percent of your balance which you expect to earn annually in unrealized capital gains. In B30, enter the percent which is in taxable

distributions, both dividends and distributed gains; thus B29+B30 should be the pre-tax return. In B31, enter the percent of your balance which you pay in taxes. Do not enter the raw tax rate; if distributions are 2% short-term gains and non-qualified dividends per year taxed at 25%, and 3% long-term gains and qualified dividends taxed at 15%, enter $(.02 \times .25) + (.03 \times .15) = 0.95\%$. In B32, enter the long-term capital gains tax rate that will apply when you withdraw the money; use zero if you are certain that the account will be passed on to your heirs with a stepped-up basis. In B33, enter the number of years until you withdraw the money. For a retirement fund, B33 should be the middle of your planned retirement period, in order to give an average rate. The formula for calculating B34 is somewhat complicated; its derivation is explained in the appendix.

For tax-exempt municipal bonds, the tax laws still impose a cost; in a tax-free account, you could hold corporate bonds, which have a higher yield. Thus, for the "taxable distribution rate", use the yield on comparable corporate bonds, and for the "tax on distributions", use the difference between the pre-tax corporate and after-tax (allowing for state taxes if the bonds are from a different state) municipal yields. The "unrealized gain rate" for bonds is zero; any gains or losses you actually realize should be small. The "tax" is the cost of holding bonds in a taxable rather than a tax-free account.

Similarly, if you hold savings bonds, which defer all taxes until they are cashed in, the "unrealized gain rate" is the yield of these bonds. The "capital gains tax rate" is the tax rate you will pay on the tax-deferred gains on these bonds; use zero if you will qualify for the exclusion of tax on savings bonds used for educational expenses. For both the "taxable distribution rate" and the "tax on distributions," use the difference between the yield of savings bonds and Treasury bonds (comparing EE bonds to conventional bonds, or I bonds to TIPS).

5. Compare your actual and target allocations. Lines 23–24 will now contain your effective asset allocation in dollars and percent, which you can compare to your target asset allocation.

At the far right, columns Y–AA, you can compare your actual and target allocation in the more general asset classes. This may be useful if you cannot allocate money precisely into the specific asset classes; for example, if your 401(k) has no small-cap international fund, you can still rebalance the 401(k) from US stocks into international stocks to reach your target allocation in all international stocks.

Troubleshooting and special instructions

If unexpected negative or huge numbers appear in the table, check for missing percent signs. If you entered a tax rate as 30 (rather than .30 or 30%), it will be read as 3000%.

The totals in the Asset Allocation line (row 24) will always add to 100% even if there are errors elsewhere in the spreadsheet such as row totals not adding to 100%. Check your row allocations for each fund before looking at the asset allocation.

Once your row allocations are determined, you can hide the % columns in order to display the entire spreadsheet more easily.

The "effective tax rate" column can be used to adjust for any type of cost, not just taxes. For example, if you are locked into a high-expense retirement plan at work, the expenses should be counted against the value of the plan. If the expenses are 1% higher in your work plan than in your other accounts, and you will be able to roll the plan into an IRA when you retire in 20 years, you will keep $(.99)^{20} = .82$ of the value of the plan. If you then add in a 30% tax rate at retirement, you will keep only $.82 \times .70 = .57$ of the total, so your effective tax rate is 43%.

Loans can be entered as negative bonds. If the loan interest is deductible, the loan is equivalent to a negative taxable bond; if the loan interest is not deductible, the loan is equivalent to a negative tax-exempt bond. For example, if you owe $50,000 in student loans at 4% tax-deductible interest, and also have $50,000 in a bond fund yielding 4% taxable dividends, you have no net bond position. You will earn $2000 in taxable dividends on the bonds and pay $2000 in tax-deductible interest on the loan, so you will break even; the principal payments on the loan could be paid out of the bond fund, and if the bond fund still yields 4%, you will still be able to pay off the loan with the bond fund next year. Thus you should enter the $50,000 student loan balance as an investent of $-$$50,000 which is 100% in the "Bond" asset class.

If you need more than 20 fund lines, insert copies of row 22 above, not below, row 22. The TOTALS line is set to total rows 3–22, and rows inserted in this range will expand the totals. Likewise, if you add asset classes, do not insert columns to the left of column D; you may insert them to the right of column W, as the total in B23 goes through empty column X and will thus include columns placed to the right of W.

Explanation for tax methodology

For a taxable account, there are several reasonable definitions of the effective tax rate (see [2]). This spreadsheet defines it as the fraction of gains you expect to lose to taxes, which is reasonable for evaluating the risk of your portfolio. For example, if you expect to lose 30% of the gains on your taxable account to taxes, a loss of $1000 in your taxable account has the same effect as a loss of $700 in your Roth IRA.

For the same reasons, tax adjustments are based on your marginal tax rate. If you retire in a 25% tax bracket, you will pay less than 25% tax on some of your retirement income, but if you lose $1000 in your IRA, that $1000 loss costs you only $750 of spendable cash because it reduces the amount of your income that is taxed at 25%.

Disclaimers

This worksheet is not intended to provide financial advice. This disclaimer is not simply a legal disclaimer. Asset allocation is the most important decision an investor must make, because it is the primary determinant of risk and return. It is impossible for a short worksheet to give proper guidance for this decision. Therefore, the Target Allocation line is deliberately left blank, to avoid creating a suggested allocation which would be appropriate for a few investors but inappropriate for most others.

Past performance is not a guarantee of future results. Calculations which depend on estimates of future pre-tax performance, after-tax performance, or tax rates are dependent on the accuracy of these estimates.

Appendix: Effective tax rate on a taxable account

We will derive the effective tax rate for a fund which generates income both from dividends and from undistributed gains, and which is held in a taxable account. We compare the after-tax value of the fund to the after-tax value of the same fund held in a tax-free account, and then use this to determine how much of the gains were lost to tax. This is essentially the model in the appendix to [1],

In each year, we assume that the fund generates a total gain of $g + d$ on every dollar invested, with g in unrealized gains, and d in distributions, on which the investor pays t in taxes. After N years, the investor will sell the fund, and pay long-term gains tax at a rate r.

If the fund is held in a tax-free account, with initial value 1, its value after N years is simply $(1 + g + d)^N$.

If the fund is held in a taxable account, its value after N years but before redemption is $(1+g+d-t)^N$. Each year, with the distributions re-invested, the fund balance increases by a fraction $g+d-t$; of this total, a fraction $d-t$ is added to the cost basis and g is added to the fund value but not to the basis. Thus the additional unrealized gain is a fraction $g/(g+d-t)$ of the total value of the gains. The initial value of the fund may also include unrealized gains, but any tax on the already-unrealized gains is an unavoidable fixed amount. The investor could consider this portion of the tax to be a fixed-dollar amount that is already owed but has not been paid.

Assuming that the current basis is 1, the tax due at rate r will be

$$r\frac{g}{g+d-t}\left[(1+g+d-t)^N - 1\right]$$

and the after-tax gain will be

$$\left[(1+g+d-t)^N - 1\right] * \left[1 - r\frac{g}{g+d-t}\right].$$

The final effective tax rate is one minus the ratio of the after-tax gains to the tax-free gains; that is, it is

$$1 - \left[\frac{\left[1 - r\frac{g}{g+d-t}\right]\left[(1+g+d-t)^N - 1\right]}{(1+g+d)^N - 1}\right].$$

The tax rates in examples below are based on 2013 tax rates for middle-income investors who also pay state income taxes of 5% (or of 6.67% deducted from 25% federal taxes). The returns on investments in these examples are not necessarily representative of the returns on any particular investment; any stock or bond investment may lose money or fail to pay the expected dividends.

For example, consider an investor who is in a 30% combined Federal and state tax bracket for non-qualified dividends and short-term gains, and 20% for long-term gains. A tax-efficient stock fund, earning 8% in unrealized gains and 2% in qualified dividends, will have the investor pay 0.4% in taxes on the distributions and keep 1.6%. The effective tax rate is 22% for 10 years, 24% for 20 years, and 26% for 30 years. For comparison, a less tax-efficient stock fund, earning 4% in unrealized gains, 3% in non-qualified dividends and short-term gains, and 3% in qualified dividends and long-term gains, for

a distribution tax of 1.5%, has an effective tax rate of 28% for 10 years, 35% for 20 years, and 42% for 30 years. Municipal bonds from the investor's home state yielding 2% when corporate bonds of comparable risk yield 2.8% have an effective tax rate of 31% for 10 years, 34% for 20 years, and 37% for 30 years. If rates return to more normal levels and the municipal bonds yield 5% when corporate bonds yield 7%, the effective tax rate becomes 35% for 10 years, 42% for 20 years, and 50% for 30 years.

Note that these numbers are not necessarily an indication of the relative desirability of different asset classes in a taxable account, because of the different returns on the classes. Even if the fraction of gains lost to taxes is higher for a municipal-bond fund than for a stock fund, the stock fund could lose more in total taxes if bond yields are low.

References

[1] Reichenstein, William E. "Savings Vehicles and the Taxation of Individual Investors." *Journal of Private Portfolio Management* Vol. 2, No. 3 (Winter 1999), 1–12.

[2] Reichenstein, William E. "Calculating the Asset Allocation." *Journal of Wealth Management* Vol. 3, No. 2 (Fall 2000), 20–25.