

Non-qualified Annuities in After-tax Optimizations

Presented at
“Fixed and Variable Annuities: A Do-It-
Yourself Pension Plan?”

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Outline

1. An After-tax Asset Allocation

- What is it, and why does it make sense?
- Comparing apples to apples

2. Mean Variance Optimization for Individuals

- After-tax risk and after-tax returns across savings vehicles
- Implications for asset *location*
- demand for non-qualified annuities with a 15% capital gain tax rate

Assumptions

Betty and Bob are married

--in the 28% ordinary income tax bracket before retirement, $t = 0.28$,

--expect to remain in the 28% bracket during retirement, $t_r = 0.28$, and

--in 15% capital gain tax bracket, $t_c = 0.15$.

Terminology

Canada

1. Registered retirement savings plans
2. Nothing comparable

United States

1. Qualified retirement accounts, e.g., 401(k)
2. Non-qualified annuity: invest after-tax funds, funds grow tax deferred, but taxed at withdrawal at ordinary income tax rate

Compare Savings Vehicles

		Original Investment	Ending Wealth
Bob	401(k)	\$1,000 pretax <u>\$ 280 saved</u> \$ 720 after tax	\$2,000 pretax <u>\$ 560 tax</u> \$1,440 after tax
Betty	Roth IRA	\$ 720 after tax	\$1,440 after tax

Lessons

- The traditional approach to calculating the asset allocation is wrong, because it considers the 401(k) as worth 39% more than the Roth IRA.
- By failing to distinguish between the *pretax* funds in the 401(k) and the *after-tax* funds in the taxable account, the traditional approach mixes apples and oranges.

Lessons

- When calculating their asset allocation, this 401(k) should be considered the same size as the Roth IRA because each purchases the same amount of goods and services.
- You can convert pretax dollars in qualified retirement accounts to after-tax dollars by multiplying by $(1 - t_r)$, where t_r is the tax rate in retirement.

What if Taxes Drop from 28% to 25%?

		Original Investment	Ending Wealth
Mike	401(k)	\$1,000 pretax <u>\$ 280 saved</u> \$ 720 after tax	\$2,000 pretax <u>\$ 500 tax</u> \$1,500 after tax
Mary	Roth IRA	\$ 720 after tax	\$1,440 after tax

Lessons

- You can convert pretax dollars in qualified retirement accounts to after-tax dollars by multiplying by $(1 - t_r)$, where t_r is the tax rate in retirement.**
- For Bob, the after-tax value grows from \$750 today to \$1,500.**
- The after-tax value of funds in qualified retirement accounts grows effectively tax exempt.**

Taxes, Optimizations, and Asset Location

In this segment, we will look at mean-variance optimizations from a traditional approach and from an after-tax approach.

Traditional Tax-Oblivious Optimization

	Portfolio Weights	Expected Returns	Standard Deviation
Stocks	50%	8%	15%
Bonds	50%	4%	6%

Maximize Utility = $E(\text{return}) - \text{Variance} / \text{RiskTol} = 6.0 - 69.67/47 = 4.52$

Constraints: $S \geq 0$, $B \geq 0$, $S + B = 1.0$

Correlation of stocks and bonds = 0.1

Jan's Portfolio: Traditional, Tax Oblivious Approach

	Market Value	Savings Vehicle
Stocks	\$500,000	401(k)
Bonds	<u>\$500,000</u>	Taxable acct
Total	\$1,000,000	

Stock Allocation: 50%

Stock Location: The traditional approach ignores an asset's location. This example assumes the investor favor stocks in retirement account.

After-tax Optimization

- Let's begin with an example that assumes two assets—stocks and bonds—that can be held in two locations
 - taxable accounts or
 - Tax-exempt retirement accounts, e.g., Roth IRA, qualified retirement accounts or registered retirement savings plans

So, there are effectively four different assets.

- An asset's location affects its after-tax risk and after-tax return
- Therefore, a bond held in a 401(k) is effectively a different asset than a bond held in a taxable account.

Different SVs = Different Assets

	After-tax Expected Return	After-tax Standard Deviation
Bond in 401(k)	4%	6%
Bond in taxable acct	2.88%	4.32%

After-Tax Expected Returns and Risk across Savings Vehicles

	Exp Ret	St Dev
Active Investor		
1. Stocks in retirement account, Sr*	8.0%	15.00%
2. Bonds in retirement accounts, Br	4.0%	6.00%
3. Stocks in taxable accounts, St**	6.8%	12.75%
4. Bonds in taxable accounts, Bt	2.88%	4.32%

*Tax-exempt retirement accounts include the Roth IRA and qualified retirement accounts, e.g., 401(k), or registered retirement savings plans.

**Assumes active investor who will realize all gains after one year and a day and pay taxes at 15%.

Optimal After-Tax Asset Allocation for Active Investor

	Asset Weight	Exp Ret	Stan Dev
1. Stocks in tax-exempt retirement accounts	0%	8.0%	15%
2. Bonds in tax-exempt retirement accounts	42%	4.0%	6%
3. Stocks in taxable account	58%	6.8%	12.75%
4. Bonds in taxable account	0%	2.88%	4.32%

Maximize Utility = $E(\text{return}) - \text{Variance}/\text{RiskTol} = 5.62 - 64.76/47 = 4.25$

Constraints: $S_r, B_r, S_t, B_t \geq 0$, $S_r + B_r = .42$, $S_r + B_r + S_t + B_t = 1.0$

Correlation of stocks and bonds = 0.1

Risk Tolerance = 47

Jan's Portfolio: After-tax Approach

	After-tax Value	Market Value	Savings Vehicle
Bonds	\$360,000	\$500,000	401(k)
Stocks	<u>\$500,000</u>	\$500,000	Taxable acct
Total	\$860,000		

Stock Allocation: 58%

Stock Location: Bonds held in tax-exempt retirement accounts and stocks held in taxable accounts.

Optimal Combination of Asset Location and Stock Management Style for an Active Investor

<i>Asset Location*</i>	<i>Stock Management Style</i>
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Strategy 1. Stocks in taxable accounts	15% tax rate
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Bonds in tax-exempt retirement accounts	0% tax rate
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Strategy 2. Bonds in taxable accounts	28% tax rate
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Stocks in tax-exempt retirement accounts	0% tax rate
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*Assume there are only stocks and bonds and only taxable accounts and tax-exempt retirement accounts

After-tax Optimization: Two Assets and Three Savings Vehicles

- The two assets—stocks and bonds—can be held in three effectively different savings vehicles
 - tax-exempt retirement accounts
 - taxable accounts, and
 - annuities.
- So, there are effectively six different assets.

After-Tax Expected Returns and Risk across Savings Vehicles

	Exp Ret	St Dev
Active Investor		
1. Stocks in tax-exempt retirement accounts*	8.0%	15.00%
2. Bonds in tax-exempt retirement accounts	4.0%	6.00%
3. Stocks in taxable accounts**	6.8%	12.75%
4. Bonds in taxable accounts	2.88%	4.32%
5. Stocks in non-qualified annuities	6.83%	13.85%
4. Bonds in non-qualified annuities	3.20%	5.15%

*Tax-exempt retirement accounts include the Roth IRA and qualified retirement accounts, e.g., 401(k).

**Assumes active investor who will realize all gains after one year and a day and pay taxes at 15%.

Simulations for Annuities

- Annual bond returns are normally distributed, $\sim N(4\%, 6\%)$. After 25 years, funds withdrawn and taxes paid at 28%.
- 10,000 simulations: after-tax mean wealth \$2.20 $= (1.04)^{25} - 0.28\{(1.04)^{25} - 1\}$. So expected return set at 3.20% or $2.20^{1/25} - 1$.
- Standard deviation of 25-yr geometric average return = 2.77%, which suggests investors bear approximately 1.03/1.20 or 85.8% of risk. So standard deviation is set at 5.15% or $6\%(.858)$.

Simulations for Annuities

- Annual stock returns are normally distributed, $\sim N(8\%, 15\%)$. After 25 years, funds withdrawn and taxes paid at 28%.
- 10,000 simulations: after-tax mean wealth \$5.21 $= (1.08)^{25} - 0.28\{(1.08)^{25} - 1\}$. So expected return set at 6.83% or $5.21^{1/25} - 1$.
- Standard deviation of 25-year geometric average return = 2.77%, which suggests investors bear approximately $2.77/3 = 92.3\%$ of risk. So standard deviation is set at 13.85% or $15\%(.923)$.

Intuition

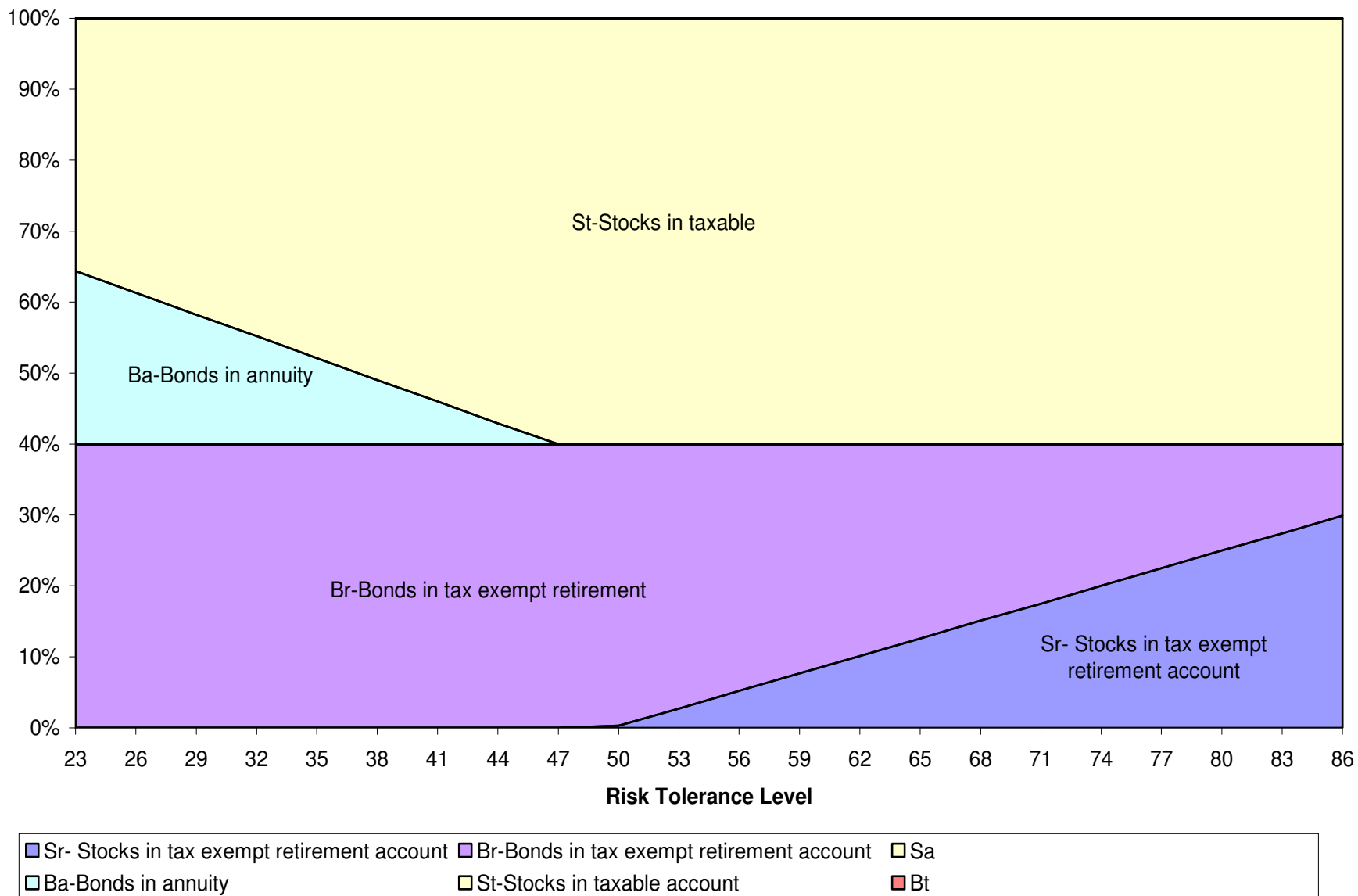
- Investors bear more of an asset's risk when it is held in a non-qualified annuity than in a taxable account.
- Because annuity returns are tax deferred their effective tax rate is lower, which implies that the investor bears more of the risk.

Optimal After-Tax Asset Allocation for Active Investor

	Asset Weight	Exp Ret	Stan Dev
1. Stocks in tax-exempt retirement accounts	0%	8.0%	15%
2. Bonds in tax-exempt retirement accounts	40%	4.0%	6%
3. Stocks in taxable account	60%	6.8%	12.75%
4. Bonds in taxable account	0%	2.88%	4.32%
5. Stocks in annuities	0%	6.83%	13.85%
6. Bonds in annuities	0%	3.2%	5.15%

Risk Tolerance = 47

Exhibit 1 - Optimal Asset Allocation by Risk Tolerance Level for Active Investor



Generalized Advice on Asset Location

- Place bonds, REITs, and hedge funds and other assets with returns taxed at ordinary income tax rates in Roth IRAs and qualified retirement accounts.
- Place stocks, especially passively held stocks, in taxable accounts.

Generalizing Across Other Stock Management Styles

- Passive and Exempt Investor: Awaits the step-up in basis at death or gives appreciated asset to charity
- Passive Investor: buys and holds until end of investment horizon and then pays taxes at 15%
- Trader: Realizes all gains within a year and pays taxes at 28%

Exhibit 2- Optimal Asset Allocation by Risk Tolerance Levels for Passive and Exempt Investor

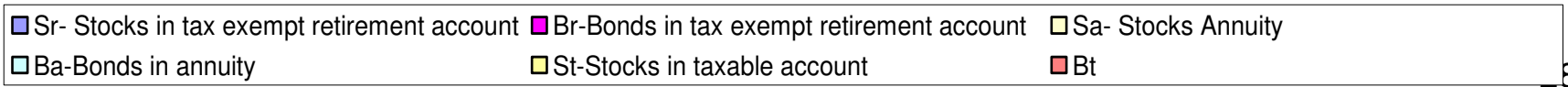
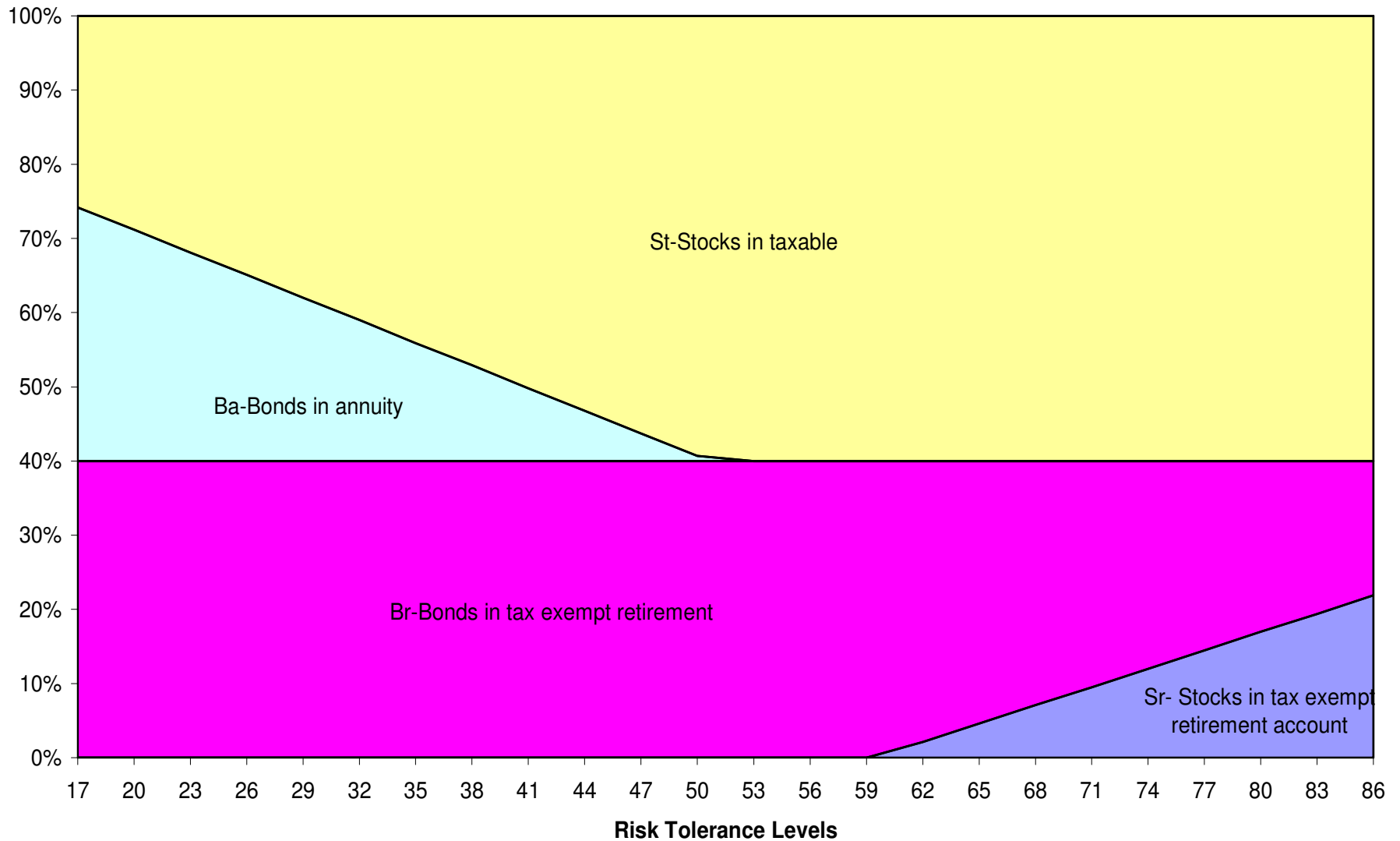


Exhibit3- Optimal Asset Allocation by Risk Tolerance Levels for Passive Investor

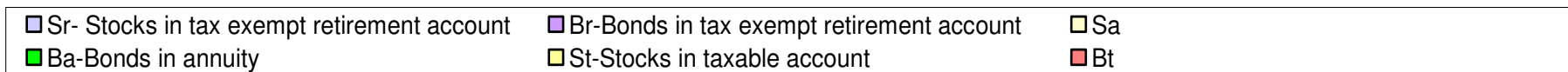
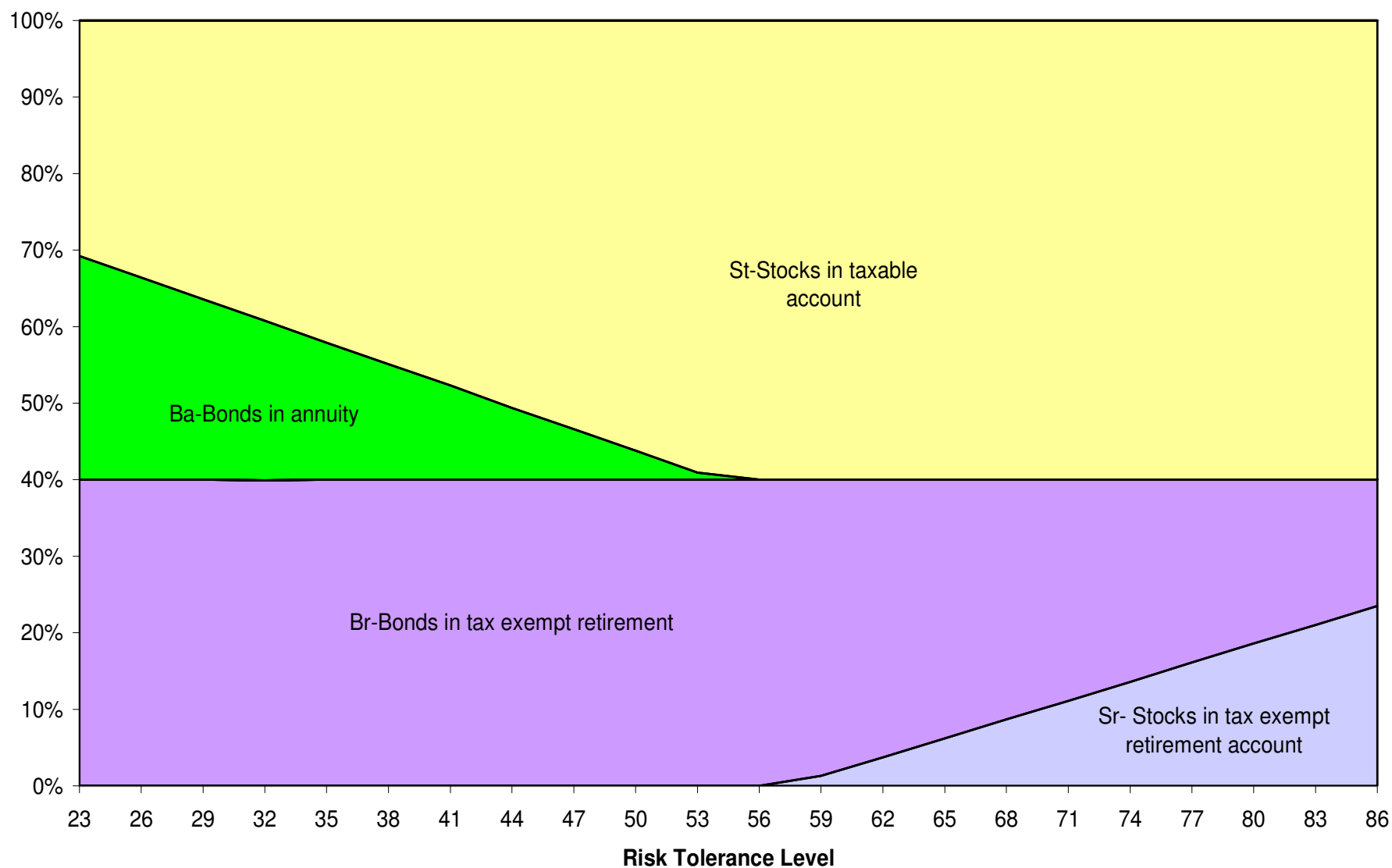
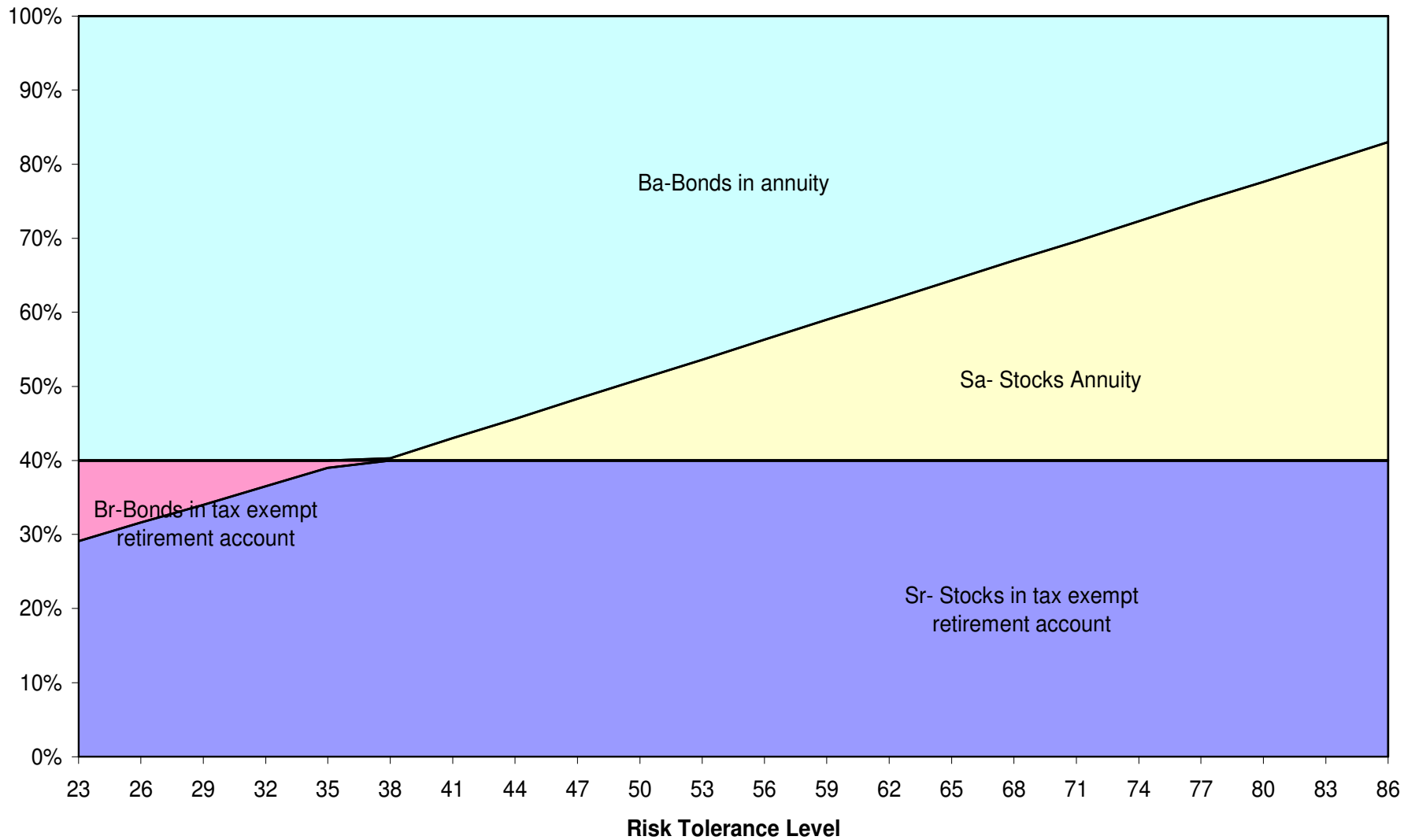


Exhibit 4- Optimal Asset Allocation by Risk Tolerance Levels for Trader



■ Sr- Stocks in tax exempt retirement account
 ■ Br-Bonds in tax exempt retirement account
 ■ Sa- Stocks Annuity
 ■ Ba-Bonds in annuity
 ■ St-Stocks in taxable account
 ■ Bt

Demand for Stocks Inside Non-Qualified Annuities

- Active, passive, and passive-and-exempt investors should not want to hold stocks inside qualified plans. Only the trader should want to hold stocks inside a *low-cost* non-qualified annuity.
- With the 15% capital gain tax rate, there should be little demand for stocks held in non-qualified annuities—even annuities that do not cost more than mutual funds.

Conclusions

- An after-tax asset allocation makes sense since it distinguishes between pretax and after-tax dollars.
- Place bonds, REITs, and other assets with returns taxed at ordinary income tax rates in retirement accounts. Place stocks, especially passively held stocks, in taxable accounts.

Conclusions

- Individuals with lower risk tolerances, should hold bonds in low-cost annuities.
 - As long as stocks receive preferential tax treatment, only traders should be interested in holding stocks in non-qualified annuities for tax deferral.
- *This study looks only at taxes and ignores the value of annuity's death benefit and other non-tax-related benefits.*