

## 26. Investing 9: Understanding Portfolio Performance, Rebalancing, and Evaluation

---

### Introduction

In addition to the steps you have taken to build your portfolio, you must repeat three steps throughout the life of your portfolio in order for it to be a success. First, you must monitor your portfolio's performance and compare asset performance to benchmarks; second, you must evaluate asset performance; and third, you must rebalance your portfolio as necessary to keep it within the targets for risk defined in your Investment Plan. This chapter will begin with a discussion of benchmarks and will then explain each of the three steps that must be repeated throughout the life of your portfolio.

### Objectives

When you have completed this chapter, you should be able to do the following:

- A. Understand portfolio rebalancing
- B. Understand the importance of portfolio management and evaluation
- C. Calculate risk-adjusted performance measures.

Understanding how and when to rebalance and evaluate your portfolio is an important part of successful investing.

### Understand Portfolio Rebalancing

Portfolio rebalancing is the process of buying and selling assets to align your portfolio with the target asset-allocation percentages you determined in your Investment Plan. Over time, a portfolio can become unbalanced, or different from your target asset allocations, due to changes in asset and asset class performance, changes in your personal objectives or risk-tolerance level, and the introduction of new capital or new asset classes that you consider attractive.

It is important to rebalance your portfolio to ensure you continue moving toward your personal goals at an acceptable level of risk. The challenge of rebalancing is that each time you sell a security, you incur transaction costs; if the account is taxable, you also create a taxable event.

### Portfolio Rebalancing Strategies

There are many different strategies for rebalancing a portfolio. In this chapter we will discuss two strategies: periodic-based rebalancing and percent-range rebalancing.

In **periodic-based rebalancing** (also called calendar-based rebalancing), you must decide how often you will rebalance your portfolio—monthly, quarterly, or annually. After each designated period of time, you will rebalance your portfolio to make it consistent with the target asset-allocation percentages listed in your Investment Plan. Allowing longer periods of time to pass between each rebalancing entails lower transaction costs but higher tracking error (the difference between the return you actually receive and the return you would have received if your portfolio had been at its target asset allocations).

The advantage of periodic-based rebalancing is that it is a simple method. The disadvantage is that it does not account for current market performance, which influences overall portfolio performance.

In **percent-range rebalancing** (also called volatility-based rebalancing), you rebalance your portfolio every time the portfolio's target asset-allocation percentages stray a predetermined percentage from your target percentages (e.g., plus or minus five percent). A higher percentage will reduce transaction costs but raise tracking error, while a smaller percentage will reduce tracking error but raise transaction costs.

The advantage of this method is that it is easy to implement because asset performance will indicate when you should rebalance. The disadvantages include that it is difficult to set an ideal range and that assets with higher target percentages and more volatility will have to be rebalanced more often than assets with lower target percentages and less volatility.

**New money/donations (NMD) addendum:** Regardless of which rebalancing strategy you use, I recommend you also consider using an NMD addendum. Since most of you pay yourselves monthly, donate to charities on a monthly basis, and use caution in your selection of assets, you are in a strong position to combine the aforementioned strategies with an NMD strategy.

An NMD addendum may be used when the following situation applies: in the process of rebalancing, you may find that you need to sell assets on which you have large capital gains. If this is the case, you may want to use the NDM addendum to donate the appreciated asset instead of selling the asset and paying taxes on the capital gains.

You can donate appreciated assets to churches and other qualified charities tax free. For members of the Church of Jesus Christ of Latter-day Saints, you can donate to tithing, fast offerings, missionary fund donations, and almost any other type of donation listed on the ward donation slips. This may be the same for other churches as well. The “donation-in-kind” of an appreciated asset can take the place of your tithing, fast offerings, or other charitable contributions. Then, since you have paid your tithes and offerings through donated securities, you can use the cash you would have paid for your contributions to buy securities to rebalance your portfolio back to your asset-allocation target percentages. (For more information on how to donate appreciated assets to the Church of Jesus Christ of Latter-day Saints, please see the website at [ChurchofJesusChrist.org](http://ChurchofJesusChrist.org).) Within about four to six weeks of donating an asset to the Church, you will receive a donation-in-kind receipt (see [Tithing Share Transfer Example](#)

(LT08)). Keep this receipt as well as a copy of the *Wall Street Journal* to verify the value of the assets on the day you made your donation. You can then use these two documents to report a charitable donation on your tax return next year.

The key to rebalancing is minimizing market impact, transaction costs, and taxes due. By donating assets “in-kind,” you eliminate capital gains taxes on your donated assets, minimize transaction costs and market-impact costs, contribute to a reputable charity (the charity must be a 501(c)(3) organization), and get a tax deduction.

Which rebalancing method is best? For most people, the strategy that is easiest for them will likely be the strategy that is most useful for them. A combination of periodic-based rebalancing and percent-range rebalancing usually works well, especially for smaller portfolios. These strategies can also be combined with the new money/donations addendum to minimize tax implications.

### **Managing the Costs of Rebalancing Your Portfolio**

When you rebalance your portfolio, pay attention to the cost basis of the assets you plan to sell. The cost basis is the amount you paid for the assets. If you sell assets at a loss—in other words, if you sell the assets for less than the amount you paid for them—you will not incur any taxes by selling. Keep good records of the assets you sell at a loss because you can use capital losses to offset capital gains. If you have more capital losses than capital gains, you can deduct the excess (up to \$3,000 per year) from your taxable income in 2018. By rebalancing your portfolio through selling assets at a loss, you can avoid paying taxes on capital gains, you can deduct the capital loss on your income taxes, and you can buy the assets you need to rebalance your portfolio while minimizing market impact, taxes, and transaction costs.

### **Understand the Importance of Portfolio Management and Evaluation**

Portfolio management is the process of developing and maintaining your portfolio as a means of achieving your financial goals. Performance evaluation is the process of analyzing your portfolio’s return performance with the goal of identifying your key sources of return. These two processes are somewhat complicated, but both are critical to successful investing.

### **Portfolio Management Styles**

In **active portfolio management**, investors use publicly available data to make decisions about actively buying and selling financial assets. The goal of this investment strategy is to beat the benchmarks after all transaction costs, taxes, management fees, and other expenses have been accounted for. This strategy can be considered successful only if it works consistently year after year—not if the strategy works for one lucky trade. Active management is expensive: management fees for actively managed mutual funds that consistently outperform benchmarks are 5 to 25 times higher than the management fees for passively managed mutual funds (18 basis points for an index fund versus 250 basis points for an actively managed fund).

In **passive portfolio management**, you buy a well-diversified portfolio of financial assets (usually a broad market index) and do not attempt to outperform the market by buying underpriced securities or selling over-priced securities. Most actively managed funds fail to outperform their benchmarks, especially after transaction costs and taxes have been accounted for. Many investors have realized that the saying “if you can’t beat them, join them” applies well to investing, so they buy low-cost, passively managed index funds, which consistently match their benchmarks and minimize taxes.

### **Factors That Lead to Above-Benchmark Returns**

Two main factors lead to above-benchmark returns: superior asset allocation and superior stock selection.

**Superior asset allocation** requires you to be sensitive to changes in the market and adjust your portfolio’s asset allocations accordingly: you must change allocations from poorly performing asset classes to high-performing asset classes to receive above-benchmark returns. You must shift your portfolio’s allocations among stocks, money market funds, bonds, and other asset classes based on your expectations for return from each of these asset classes. Superior asset allocations yield higher returns with lower risk. If assets are not allocated well, the result is lower returns, higher transaction costs, and higher taxes.

**Superior stock selection** requires you to pick sectors, industries, or companies that correspond to a specified benchmark and together outperform the specified benchmark. To build an investment portfolio that earns returns in excess of the benchmark, you must carefully buy or sell undervalued stocks while working to purchase securities in an index that contains stocks with the highest growth potential. Superior stock selection yields higher returns with lower risk. Poor stock selection yields lower returns, higher transaction costs, and higher taxes.

### **Performance Evaluation**

Performance evaluation, or portfolio evaluation, is the process of monitoring the performance of your financial assets by comparing them to the relevant benchmarks. Unless you regularly monitor your portfolio’s performance, you will not know how well you are moving toward achieving your personal goals. If an asset in your portfolio consistently underperforms its benchmark, you may want to sell that asset and purchase another asset that more closely follows its benchmark. By making adjustments to your portfolio along the way, you can achieve your financial goals more quickly.

To evaluate your portfolio’s performance, calculate the following:

1. The period returns on each asset (the return after all taxes and fees have been accounted for)
2. The index returns on each asset’s benchmark (the return on the benchmark whose performance most closely mirrors the performance you are trying to achieve)
3. The difference between the asset returns and benchmark returns

4. The weight of each asset or fund in the overall portfolio
5. The overall portfolio return

With this information, you can evaluate how each of your funds or assets is performing compared to its benchmark and how well the portfolio is performing as compared to the goals outlined in your Investment Plan.

### **Portfolio Reporting**

Thomas S. Monson gave the following counsel, “When performance is measured, performance improves. When performance is measured and reported, the rate of improvement accelerates.”<sup>1</sup> Although he was speaking about a different type of activity, his counsel is still important.

Portfolio reporting is the process of reviewing your portfolio’s performance with everyone who is affected by the portfolio’s performance. This would include you, your spouse if married, and any other individuals affected. If you are responsible for managing your family’s portfolio, you should report performance to your spouse (and perhaps older children) at least quarterly. If others are helping you manage your portfolio, they should report performance to you and your spouse at least monthly and quarterly as well.

### **Calculate Risk-Adjusted Performance**

As you analyze the returns on the various assets in your portfolio, how can you tell how well you are doing? Is only the total return on each asset important, or should you consider other factors to determine whether each asset performed as well as it should have? How do you determine whether a portfolio manager is generating excess returns (returns that are higher than the portfolio’s benchmarks)? Is performance just a matter of high returns, or should you also be concerned about risk?

It is important to understand risk in managing portfolios. For example, two portfolios have the same 5 percent annual return. One is 100 percent invested in Treasury bonds, and the other is 100 percent invested in small-cap stocks. With the Treasury portfolio, there is very little risk or volatility in returns. With the small-cap portfolio, there is very high risk and extreme volatility in returns. Clearly, risk matters.

One of the easiest and most popular ways of comparing risk is to compare the return rates of investment funds that have similar investment objectives and similar risk characteristics. For example, all large-cap “blend” mutual funds are grouped in the same category, all small-cap “growth” mutual funds are grouped in another category, and all international stocks are grouped in a third category. The average return on each fund within a specific category is calculated, and each fund is given a percentile ranking depending on its relative performance within the category and within the same time period. Generally, the lower the percentile ranking (the range is between 1 and 100), the better the performance. If your fund’s percentile ranking is 16, that fund is in the top 16 percent of all mutual funds within its category. To see an example of a mutual

fund and the performance tab giving its relative ranking, see Chart 1, which is a Morningstar Mutual Fund Performance tab, from the Morningstar Library Edition, 2019, or which can also be found at [www.morningstar.com](http://www.morningstar.com). The chart shows the fund's total return, the fund's return minus the category average, and the return minus the index return. The "percent rank in category" shows the fund's percentile ranking for each year that the fund has reported its performance to mutual fund reporting companies.

Comparing the managers of similar investment groups is another useful first step in evaluating performance, but the numbers may be misleading. Some managers may concentrate on very narrow sub-groups of their investment objectives, so portfolio characteristics may not be comparable. For example, in the large-cap "blend" category, some managers may concentrate on high beta (more volatile) stocks, while others may take a more balanced approach. In addition, some managers may change style. Managers may watch the performance of growth stocks versus value stocks and invest in the style that is currently performing the best.

There are a number of accepted ways of measuring portfolio performance: the most widely used measuring tools include the Sharpe measure, the Treynor measure, and the Jensen measure. Each of these measures means little in and of itself; rather, they have meaning when compared to the measure of the relevant market benchmarks.

### **Sharpe Measure**

The Sharpe measure is a ratio of your portfolio's excess return divided by your portfolio's standard deviation. The portfolio's excess return is found by subtracting the risk-free rate (the rate of return you are guaranteed to make with limited risk) from the amount of the portfolio's actual return. The risk-free rate is the benchmark over which all other financial or real assets are compared. The rate is considered by most investment professionals as the amount of return you receive on a 6- or 12-month Treasury bill. Since these bills are default-free, they are considered a proxy for the risk-free rate. The difference between an asset's return and the risk-free rate is called the risk premium, or excess return. The Sharpe measure is calculated as follows:

$$(r_p - r_f) / s_p$$

$r_p$  = the average return on the portfolio

$r_f$  = the risk-free rate

$s_p$  = the standard deviation of portfolio returns

The Sharpe measure is found by dividing the portfolio risk premium, or the return on the portfolio minus the risk-free rate, by the portfolio risk as measured by the standard deviation.

An asset's Sharpe measure in isolation means little. It must be measured against the market's Sharpe measure, which is calculated the same way: by dividing the market risk premium, or the return on the market minus the risk-free rate, by the standard deviation of the market. If the asset's Sharpe measure is greater than the market's Sharpe measure, the asset has outperformed

the market on a risk-adjusted basis.

Because Morningstar does not calculate the Sharpe and Treynor ratios versus the index, we do not have a totally correct ratio. However, they do calculate them versus all companies in their respective asset class, which is an acceptable proxy for the index. The Sharpe ratio is in blue (see Chart 1). Morningstar is as of June 27, 2017.

**Chart 1. Performance History**

MPT Statistics SWPPX						
3-Year	5-Year	10-Year	15-Year			
3-Year Trailing	Index	R-Squared	Beta	Alpha	Treynor Ratio	Currency
<b>vs. Best-Fit Index</b>						
SWPPX	S&P 500 TR USD	100.00	1.00	-0.05	—	USD
<b>vs. Standard Index</b>						
SWPPX	S&P 500 TR USD	100.00	1.00	-0.05	12.67	USD
Category: LB	S&P 500 TR USD	98.80	0.99	-1.33	11.21	USD

Source: Morningstar Library Edition 2017-06-27  
06/30/2019

  

Volatility Measures SWPPX						
3-Year	5-Year	10-Year	15-Year			
3-Year Trailing	Standard Deviation	Return	Sharpe Ratio	Sortino Ratio	Bear Market Percentile Rank	
SWPPX	12.18	14.13	1.03	1.53	—	
S&P 500 TR USD	12.19	14.19	1.03	1.53	—	
Category: LB	12.48	12.53	0.90	1.34	—	

06/30/2019

### Treynor Measure

The Treynor measure is similar to the Sharpe measure, but the Treynor measure uses the portfolio's beta instead of the portfolio's standard deviation. The Treynor measure is calculated as follows:

$$(r_p - r_f) / \beta_p$$

$r_p$  = the average return on the portfolio

$r_f$  = the average risk-free rate

$\beta_p$  = the weighted average beta of the portfolio

The Treynor measure is found by dividing the portfolio risk premium by the portfolio risk as measured by the beta.

An asset's Treynor measure in isolation also means little. It must be measured against the market's Treynor measure, which is calculated by dividing the market risk premium, or the return on the market minus the risk-free rate, by the beta of the market, which is 1.0. If the asset's Treynor measure is greater than the market's Treynor measure, the asset has outperformed the market on a risk-adjusted basis. See Chart 1, in red.

### **Jensen Measure**

The Jensen measure is the ratio of your portfolio's return minus the portfolio's expected return as determined by the Capital Asset Pricing Model (CAPM). The CAPM is an economic theory that describes the relationship between the risk of assets and the pricing of those assets. This theory suggests that the only risk that should be priced by investors is risk that cannot be eliminated through diversification. In its most simple form, the CAPM shows that the expected return of an asset or portfolio is equal to the rate on a risk-free security plus the asset's risk premium multiplied by the asset's beta, or, in mathematical terms:  $[r_f + \beta_p (r_m - r_f)]$ .

The Jensen measure incorporates the CAPM into its calculation. The Jensen measure is calculated as follows:

$$a_p = r_p - [r_f + \beta_p (r_m - r_f)]$$

$a_p$  = the alpha for the portfolio, or the return over and above your benchmark

$r_p$  = the average return on the portfolio

$\beta_p$  = the weighted average beta of the portfolio

$r_f$  = the average risk-free rate

$r_m$  = the average return on the market index

This measure is the portfolio's performance ( $r_p$ ) minus the expected portfolio return as determined by CAPM.

Note that this measure can also be used to determine risk-adjusted performance. Since we know the market's beta is 1.0 (by definition), and since we both add and subtract the risk-free rate, the CAPM return is just the market return. So if the Jensen measure is positive, the asset has outperformed the market on a risk-adjusted basis. See Chart 1, in green.

### **Which measure is most appropriate?**

Because different risk-adjustment measures can give different implications about a portfolio's performance, it is important to choose the appropriate measuring tool for your particular portfolio.

Generally, if a portfolio represents an individual's entire investments, or if there are few financial assets in the portfolio, many academics and practitioners consider the Sharpe measure to be the best measurement option. Use the Sharpe measure if you are concerned with the overall



variability of the portfolio.<sup>2</sup> Remember, the portfolio's Sharpe measure must be compared to the market's Sharpe measure to measure performance.

If your portfolio comprises many different assets and asset classes, or if you are evaluating only a portion of your portfolio, most recommend the Jensen or the Treynor measures. If your portfolio is well diversified, your main concern will generally be non-diversifiable risk (the risk you cannot eliminate through diversification). Of these two measures, the Treynor measure is more complete because it adjusts for non-diversifiable risk (ibid.).

The assumptions that underlie risk-adjustment measures limit their usefulness. Understanding these assumptions is important. For example, these measures assume that a portfolio is basically stable: however, when the portfolio is actively managed, basic stability requirements for some statistical measures are not met. Risk-adjustment measures should be used with caution.

In addition to using risk-adjustment measures, investors should measure performance by comparing their portfolios with portfolio benchmarks as well as with the portfolios of other investors in the same investment-objective category.

### Summary

Portfolio rebalancing is buying and selling of assets to align your portfolio with the target asset-allocation percentages in your Investment Plan. Over time, a portfolio can become unbalanced due to changes in asset and asset class performance, changes in your personal objectives or risk-tolerance level, and the introduction of new capital or new asset classes. Rebalancing your portfolio helps ensure that you are moving toward your personal goals and have a comfortable level of risk. However, each time you sell a security you incur transaction costs and, if the account is taxable, you create a taxable event. In this chapter, we discussed two strategies for rebalancing a portfolio: periodic-based rebalancing and percent-range rebalancing.

Portfolio management is the process of developing and maintaining your financial assets. Performance evaluation is the process of analyzing your portfolio's performance to identify your key sources of return. These two processes are complicated but critical to successful investing. The most widely used tools for measuring portfolio performance include the Sharpe measure, the Treynor measure, and the Jensen measure. These measures are then compared to the measures of the relevant benchmarks.

### Assignments

#### Financial Plan Assignments

Continue to work on your Investment Plan. As you do, select your portfolio rebalancing method and include this in Section IV.B. Generally, the easiest method of rebalancing is periodic-based rebalancing.

Second, I encourage you to use the new money/donations addendum to minimize market impact, transaction costs, and taxes on your portfolio. Use new money to purchase your underweight asset classes. This way you do not need to sell your overweight asset classes.

Third, determine how often you will monitor and report on your portfolio and include that information in Section IV.A.

Finally, determine how you will communicate the results of the portfolio performance to everyone who is affected by the portfolio's performance. These are your accountability partners.

Once you have completed your Investment Plan, review it and make sure it is consistent with your vision, goals, plans and strategies. It is a challenging Plan to put together, but its dividends are more than money.

## Learning Tools

### [Tithing Share Transfer Example](#) (LT08)

This document is an example of a form you can use to pay your tithes and other offerings with appreciated stocks or mutual funds.

### [Portfolio Attribution Example – Illustration Only](#) (LT17)

This Excel spreadsheet helps you perform a simple portfolio attribution analysis based on your asset-allocation targets and benchmarks. This analysis will help you understand the distribution of return in your portfolio. It is for illustration only.

## Review Materials

### Terminology Review

**Active portfolio management.** It is the process of using publicly available data to actively manage a portfolio in an effort to beat the benchmark after all transactions costs, taxes, management, and other fees. However, to do this successfully you must do this consistently year-after-year, and not just from luck.

**Jensen's Alpha.** This is a risk-adjusted performance measure. This is the ratio of your portfolio return less CAPM determined portfolio return, or  $\alpha = r_p - [r_f + \beta_p (r_m - r_f)]$  where  $\alpha$  = alpha for the portfolio,  $r_p$  = average return on the portfolio,  $\beta_p$  = Weighted average Beta,  $r_f$  = average risk free rate, and  $r_m$  = average return on market index port. It is portfolio performance less expected portfolio performance from CAPM model.

**Monitor performance.** The process of understanding and reviewing the performance of a portfolio. Unless you monitor performance, you will not know how you are doing in working toward accomplishing your objectives. You need to know how every asset you own is performing, and performing versus its benchmark, so you can determine how well you are moving toward your goals.

**NMD (New Money / Donations) Addendum.** This is a way to rebalance using either of the rebalancing methods. Rebalance as determined previously, but pay your charitable donations

using appreciated assets, and use the money you would have spent on charity to purchase the “underweight” assets, so you do not have to sell and incur transactions costs or taxable events.

**Passive portfolio management.** It is the process of buying a diversified portfolio which represents a broad market index (or benchmark) without any attempt to outperform the market or pick stocks. Since most active managers fail to outperform their benchmarks, especially after costs and taxes, investors have realized that if you can’t beat them, join them, so they buy low-cost passive funds which meet their benchmarks consistently and minimize taxes.

**Percent-range-based rebalancing.** This is the process of rebalance the portfolio every time actual holdings are +/-5% (or +/-10%) from target ratios. Rebalance whenever you are outside this range. It is easy to implement and wider ranges will reduce transactions costs (at the expense of higher tracking error).

**Performance evaluation.** It is the process of evaluating a portfolio’s performance with the goal of understanding the key sources of return.

**Periodic-based rebalancing.** This is the process of rebalancing where you specify a time period, i.e. bi-annually, annually, etc. After each time period, rebalance the portfolio back to your original asset allocation targets. It is the most simple of the methods, and longer periods have lower transactions and tax costs (but higher tracking error costs).

**Portfolio attribution.** It is the process of separating out portfolio returns into their related components, generally attributable to asset allocation, securities selection, industry, and currency.

**Portfolio evaluation.** The process of monitoring financial asset performance, comparing asset performance to the relevant benchmarks, and determining how well the fund is meeting its objectives.

**Portfolio management.** It is the development, construction, and management of a portfolio of financial assets to attain an investor’s specific goals.

**Portfolio rebalancing.** It is the process of bringing portfolios back into given target asset allocation ratios. Changes in allocation occur due to changes in asset class performance and investor objectives or risk, or introduction of new capital or new asset classes.

**Portfolio reporting.** The process of reviewing portfolio performance with the necessary participants, i.e. your spouse or your investment advisor.

**Risk-adjusted Performance.** It is the process of determining performance after adjusting for the risk of the portfolio.

**Sharpe Index.** This is a risk-adjusted performance measure. It is the ratio of your “excess return” divided by your portfolio standard deviation, i.e., your  $(r_p - r_f)/s_p$  where  $r_p$  = Average return on the portfolio,  $r_f$  = your riskfree rate, and  $s_p$  = Standard deviation of portfolio return. The Sharpe Index is the portfolio risk premium divided by portfolio risk as measured by standard deviation.

**Style analysis.** It is another way of obtaining abnormal returns is by analyzing the investment style of the portfolio. You can decompose returns by attributing allocation to style, and style tilts and rotation are important active portfolio strategies.

**Taxable accounts.** There are investment vehicles without tax advantages.

**Tracking error.** Tracking error is the return that is lost from your portfolio being different from your target asset allocation.

**Treynor Measure.** This is a risk-adjusted performance measure. This is similar to Sharpe but it uses the portfolio beta instead of the portfolio standard deviation, or  $(r_p - r_f)/\beta_p$  where  $r_p$  = average return on the portfolio,  $r_f$  = average risk free rate, and  $\beta_p$  = weighted average  $\beta$  for portfolio. It is the portfolio risk premium divided by portfolio risk as measured by beta.

## Review Questions

1. What is portfolio rebalancing?
2. What two strategies for rebalancing portfolios are mentioned in this chapter?
3. Why is it important to pay attention to the cost basis when you sell an asset?
4. What is portfolio management? What is portfolio evaluation?
5. What are the two types of portfolio management styles? Which is more costly?

## Case Studies

### Case Study 1

#### Data

Steve and Suzie, both 45 years old, are aggressive investors; they have an investment portfolio worth over \$250,000. Their target asset allocations are 60 percent equities and 40 percent bonds and cash; they have invested these assets in 10 mutual funds. Their actual asset class weights differ from their targets because of the underperformance of the equity part of their portfolio.

Asset Class	Actual	Weight Target	Weight Difference
Equity	70%	60%	10%
Bonds	20%	30%	-10%
Cash	10%	10%	0%

#### Application

When should Steve and Suzie rebalance their portfolio, and how should they do this?

### Case Study 1 Answers

The decision of when to rebalance should be part of Steve and Suzie's Investment Plan. They need to determine the best time to rebalance and the most cost-effective means of rebalancing. The key to rebalancing is minimizing transaction costs and turnover while maintaining adequate diversification and return.

A possible strategy for rebalancing is the NMD strategy: Steve and Suzie can donate appreciated assets to charity and use new money to rebalance their portfolio. If they donate their appreciated equity assets (e.g., donations-in-kind to a charity, see [Tithing Share Transfer](#) (LT08)), they can use the money they would have spent on their charity donations to purchase more of their underweight assets, in this case, they would likely purchase bonds.

### Case Study #2

#### Data

Steve is reviewing the performance of his largest asset, the actively managed Fidelity Magellan Fund (FMAGX) for the most recent 3 and 5 year periods (ending 3/14/2017). The T-bill rate during the period was 0.8%.

	3 Yr-FMAGX	SPX	5-Yr FMAGX	SPX
Average return	9.4%	6.5%	13.1%	13.5%

Beta	1.08	1.0	1.06	1.0
Std. Deviation	9.8%	9.2%	11.4%	10.4%

Calculations and Application

- Calculate the Sharpe, Treynor, and Jensen performance measures for the Fund for the 3 and 5 year periods
- On a risk-adjusted basis, did it outperform the market?
- Which risk-adjusted measure should Steve use?

**Case Study #2 Answers**

	3 Yr-FMAGX	SPX	5-Yr FMAGX	SPX
Average return	9.4%	6.5%	13.1%	13.5%
Beta	1.08	1.00	1.06	1.00
Std. Deviation	9.8%	9.2%	11.4%	10.4%
T-Bill rate	0.8%			

a. Performance measures

	3 Year	5 Year
Sharpe = $(r_p - r_f) / s_d$		
Portfolio	$(9.4 - .8) / .098 = .88$	1.08
Market	$(6.5 - .8) / .092 = .62$	1.23
Treynor = $(r_p - r_f) / \beta_p$		
Portfolio	$(9.4 - .8) / 1.08 = .08$	.116
Market	$(6.5 - .8) / 1.0 = .06$	.128
Jensen's alpha = $r_p - [r_f + \beta_p (r_m - r_f)]$		
3 Yr Alpha	$= .094 - [.8 + 1.08 (.065 - .008)] = 3.3\%$	
5 Yr Alpha	$= .131 - [.8 + 1.06 (.135 - .008)] = -0.4\%$	

b. Steve's Fund risk adjusted performance:

	3 Year	5 Year
Sharpe Ratio	.88 vs .62 (Y)	1.08 vs 1.23 (N)
Treynor measure	.08 vs .06 (Y)	.116 vs .128 (N)
Jensen's Alpha	3.3% (Y)	-0.4% (N)

c. Which measure is most appropriate?

Generally, if the portfolio represents the entire investment for an individual, the Sharpe Index compared to the Sharpe Index for the market is best. This is not the case here. If many alternatives are possible, or if this is only part of the overall portfolio, use the Treynor measure versus the Treynor measure for the market, or the Jensen's alpha. Of these two, the Treynor measure is more complete because it adjusts better for risk.

**Case Study #3**

Data

You have five mutual funds in your portfolio, an emergency bond fund (VIPSX), a large cap index fund (SWPPX), a small cap fund (FSCRX), an emerging markets fund (SSEM), and a REIT (VGSIX). How have they done versus their benchmarks (or categories) over the past three years?

Calculations

Using the data from Morningstar at the BYU Library, type in the ticker and go to the Risk tab for each fund. Look at their 3 year performance versus their categories (as a proxy for the market). Did they outperform their benchmarks?

Did these funds outperform over the past three years on a risk-adjusted basis?

Case Study #3 Data

MPT Statistics VIPSX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Index	R-Squared	Beta	Alpha	Treynor Ratio	Currency	
<b>vs. Best-Fit Index</b>							
VIPSX	BBgBerc US Treasury US TIPS TR USD	98.47	1.03	-0.18		USD	
<b>vs. Standard Index</b>							
VIPSX	BBgBerc US Agg Bond TR USD	65.65	0.95	-0.48	0.08	USD	
Category: IP	BBgBerc US Agg Bond TR USD	49.60	0.79	-0.42	0.17	USD	
02/28/2018							

Volatility Measures VIPSX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Standard Deviation	Return	Sharpe Ratio	Sortino Ratio	Bear Market Percentile Rank		
VIPSX	3.18	0.62	0.04	0.06			
Bloomberg Barclays US Aggregate Bond TR USD	2.68	1.14	0.23	0.33			
Category: IP	3.11	0.57	0.04	0.07			
02/28/2018							

MPT Statistics FSCRX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Index	R-Squared	Beta	Alpha	Treynor Ratio	Currency	
<b>vs. Best-Fit Index</b>							
FSCRX	Morningstar US Small Cap JR USD	90.13	0.89	-0.80		USD	
<b>vs. Standard Index</b>							
FSCRX	S&P 500 TR USD	50.49	0.85	-3.08	6.31	USD	
Category: SB	S&P 500 TR USD	54.93	0.97	-2.81	7.15	USD	
02/28/2018							

Volatility Measures FSCRX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Standard Deviation	Return	Sharpe Ratio	Sortino Ratio	Bear Market Percentile Rank		
FSCRX	12.19	5.92	0.49	0.65			
S&P 500 TR USD	10.16	11.14	1.04	1.69			
Category: SB	13.36	7.37	0.56	0.97			
02/28/2018							

MPT Statistics SWPPX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Index	R-Squared	Beta	Alpha	Treynor Ratio	Currency	
<b>vs. Best-Fit Index</b>							
SWPPX	S&P 500 TR USD	100.00	1.00	-0.06		USD	
<b>vs. Standard Index</b>							
SWPPX	S&P 500 TR USD	100.00	1.00	-0.06	10.54	USD	
Category: LB	S&P 500 TR USD	91.04	0.98	-1.53	8.88	USD	
02/28/2018							

Volatility Measures SWPPX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Standard Deviation	Return	Sharpe Ratio	Sortino Ratio	Bear Market Percentile Rank		
SWPPX	10.13	11.05	1.04	1.87			
S&P 500 TR USD	10.16	11.14	1.04	1.89			
Category: LB	10.47	9.21	0.85	1.48			
02/28/2018							

MPT Statistics SSEMXX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Index	R-Squared	Beta	Alpha	Treynor Ratio	Currency	
<b>vs. Best-Fit Index</b>							
SSEMXX	Morningstar EM GR USD	95.18	0.86	-5.73		USD	
<b>vs. Standard Index</b>							
SSEMXX	MSCI ACWI Ex USA NR USD	78.20	0.99	-3.85	1.48	USD	
Category: EM	MSCI ACWI Ex USA NR USD	72.60	1.03	1.69	7.12	USD	
02/28/2018							

Volatility Measures SSEMXX							
3-Year	5-Year	10-Year	15-Year				
3-Year Trailing	Standard Deviation	Return	Sharpe Ratio	Sortino Ratio	Bear Market Percentile Rank		
SSEMXX	14.02	2.01	0.17	0.26			
MSCI ACWI Ex USA NR USD	12.46	6.24	0.51	0.80			
Category: EM	15.13	7.90	0.54	0.90			
02/28/2018							

MPT Statistics VGSIX						
3-Year	5-Year	10-Year	15-Year			
3-Year Trailing	Index	R-Squared	Beta	Alpha	Treynor Ratio	Currency
<b>vs. Best-Fit Index</b>						
VGSIX	S&P United States REIT TR USD	99.86	0.99	0.00		USD
<b>vs. Standard Index</b>						
VGSIX	MSCI ACWI NR USD	24.13	0.63	-4.75	-0.96	USD
Category: SR	MSCI ACWI NR USD	29.19	0.64	-4.41	0.23	USD
02/28/2018						

  

Volatility Measures VGSIX						
3-Year	5-Year	10-Year	15-Year			
3-Year Trailing	Standard Deviation	Return	Sharpe Ratio	Sortino Ratio	Bear Market Percentile Rank	
VGSIX	13.76	-0.07	0.02	0.03		—
MSCI ACWI NR USD	10.83	8.34	0.75	1.22		—
Category: SR	12.94	0.48	0.07	0.12		—
02/28/2018						

### Case Study #3 Answers

We will use the category as the proxy for the market (as of March 12, 2018)

Name	Sharpe	3 Year Category	5 Year Category	Treynor	Outperformed*	Sharpe	Treynor
VIPSX	.04	.04	.08	.17	E	N	
SWPPX	1.04	.85	10.54	8.88	Y	Y	
FSCRX	.49	.56	6.31	7.15	N	N	
SSEMXX	.17	.54	1.48	7.12	N	N	
VGSIX	.02	.07	-0.96	.23	N	N	

\* Y = yes, N = no, E = Equal

<sup>1</sup> “Sheep, Shepherds, and Sheepherders,” *New Era*, Jun. 1977, 20

<sup>2</sup> Zvi Bodie, Alex Kane, Alan Marcus, *Essentials of Investment*, 6<sup>th</sup> Edition, McGraw-Hill Irwin, New York, 2007, 579