Learning by Doing: Portfolio Management Using the Bloomberg Professional Service

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ABSTRACT

Portfolio simulations are a popular tool used to teach students how to build, maintain, and assess security portfolios. A number of free online portfolio trackers are available, including www.marketwatch.com/game/, www.howthemarketworks.com, and www.google.com/finance. For those able and willing to pay, www.stocktrak.com is likely the most popular. However, all of these resources come with their own set of limitations. The free sites typically do not allow students to trade bonds, options, or futures. Thus, the ability to build and assess hedge performance is severely limited. Likewise, the paid sites such as StockTrak require each student, or team of students, to pay a fee of around $25 to participate.

In this paper, we will describe a semester-long project in which student build, maintain, and assess the performance of portfolios for specific investor objectives using the Bloomberg Professional Service (Bloomberg). While expensive, Bloomberg offers a much wider array of analytical tools than the typical online simulation. Further, the author's institution, and not the students, bears the direct cost of providing the resource.

The simulation is intended to introduce students to a broad array of Bloomberg tools and functions that are applicable to portfolio management, including PRTU for creating portfolios and adding position, and PORT for asset allocation, VaR, tracking error, and performance attribution analysis. The end result is that students learn both the concepts of portfolio management and how to use the related Bloomberg functions at the same time.

PORTFOLIO MANAGEMENT

In Managing Investment Portfolios, the CFA Institute's handbook on the subject, the portfolio management process is defined as "… an integrated set of steps undertaken in a consistent manner to create and maintain an appropriate portfolio (combination of assets) to meet clients' stated goals (Maginn et. al., 2007, p. 2). In this semester-long project, students will implement this process using the following steps, based on the outline provided in Maginn et. al., page 2:

- Planning

  o   Define the investment objective and identify constraints.

  o   Develop a strategy to achieve the objective, i.e. determine the appropriate asset allocation.

- Execution

  o   Select the specific securities to be used.

  o   Implement the strategy, i.e. purchase the securities.

- Feedback

  o   Measure and evaluate the portfolio performance.

  o   Rebalance the portfolio as needed.

LEARNING OBJECTIVES

There are several learning objectives for this project. Some are Bloomberg specific, while others focus on investing concepts. Students are given two sample clients with different objectives: 1) income and 2) capital appreciation. In addition, students will be introduced to options and futures during the course, and will build additional portfolios that have either 3) speculation or 4) hedging as the objective. The students' task is to build a portfolio for each of the four objectives listed above and then to monitor the performance of each over a period of time, making adjustments as necessary to asset allocation and security selection.

Investing concept objectives:

1. Learn the overall process of portfolio management.

2. Learn the principles of asset allocation and security selection as they relate to the investor's objective.

3. Learn the performance measures appropriate for each portfolio and how to interpret them.

4. Learn the principles of hedging using options and futures.

Bloomberg specific objectives:

1. Learn how to screen stocks and bonds using tools in Bloomberg.

2. Learn how to build and update portfolio positions.

3. Learn how to build custom benchmarks for assessing portfolio performance.

4. Learn how to use various tools in Bloomberg for measuring portfolio attributes and performance.

THE INVESTMENT OBJECTIVE

The investor's objective is the starting point of the portfolio management process. In this exercise, clients will give statement such as "I need to pay some expenses on a recurring basis" or "I want to retire in 30 years." This, along with information about income, expenses, assets and liabilities in the investor profile will be used to generate formal return objectives and risk objectives.

CONSTRAINTS

Constraints are typically related to circumstances unique to the investor. Each investor profile will introduce one or more constraints related to 1) liquidity needs, 2) the investment horizon, 3) tax considerations and 4) ethical or social considerations. Students will need to take these constraints into account in the asset allocation and security selection portion of the exercise.

ASSET ALLOCATION

Asset allocation is the process of apportioning the investor's funds across various asset classes such as 1) money market instruments, 2) fixed income securities, 3) stocks, 4) real estate and 5) others. Academic research has shown that asset allocation is a primary determinant of the actual investment results over time. Brinson, Hood, and Beebower (1986), Brinson, Singer, and Beebower (1991), and Ibbotson and Kaplan (2000) show that somewhere between 40% (cross-sectional) and 91.5% (over time) of returns are driven by asset allocation. An excellent source of historical asset performance data is the Asset Allocation Calculator (XAAC.xls) spreadsheet template available on Bloomberg. It allows students to input indexes to represent asset classes and their respective weights. The spreadsheet then calculates historical risk and return data for each asset class, as well as overall portfolio performance.

Students will use the capital market expectations (typically based on long-term historical averages with adjustments based on current market conditions) along with investors' risk objective, risk tolerance, and constraints to determine appropriate asset allocations. For example, one sample investor will have a short-to-intermediate investment horizon and a need for periodic income. For this investor, students are likely to allocate a higher proportion of funds to money market instruments and fixed income securities, and a lower proportion to stocks. A second sample investor will have no need for periodic income, be in a higher tax bracket, and prefer capital gains over periodic income to avoid immediate taxation. For this investor, students are likely to allocate a lower proportion of funds to

money market instruments and fixed income securities and a higher proportion to stocks, real estate, and other less liquid assets.

SECURITY SELECTION

Once the asset allocation decision is made, the individual securities used to implement it must be selected. For this part of the exercise, students will use two tools in Bloomberg that allow screens: 1) <SRCH> for bond screening and 2) <EQS> for equity screening.

Exhibit 1 shows how the student could screen bonds for the income portfolio using the <SRCH> command. A variety of screening variables are used to narrow the sample to a manageable number of bonds.

Exhibit 1. Sample bond screen using <SRCH>.

To see the bonds that pass the screen, click the **Results** button. After identifying the bonds of interest, students can right-click on the bond and then paste it into the portfolio using the <PRTU> command.

Equity screening is done is a similar manner using the <EQS> command. Exhibit 2 shows an example of an equity screen.

Exhibit 2. Sample equity screen using <EQS>.

PORTRFOLIO CREATION

After the asset allocation and security selection processes are completed, the student will build the actual portfolios. The <PRTU> command is used both to create the portfolio structure and to enter the positions held as of a given date. Exhibits 3 and 4 show sample portfolios for the income and capital appreciation portfolios.

Exhibit 3. Sample income portfolio created using <PRTU>.

Exhibit 4. Sample capital appreciation portfolio created using <PRTU>.

PERFORMANCE EVALUATION

Benchmarks are created using the <PRTU> command as seen in Exhibit 5. Benchmarks may

contain individual securities or indexes. In addition, composite benchmarks can be created in which the

user specifies either the number of shares held (or par value for bonds), or fixed weights (or floating

weights). Exhibit 5 shows an example of a custom benchmark for a blended portfolio of 80% stocks and

20% bonds.

Exhibit 5. Sample composite benchmark created using <PRTU>.

The sample income portfolio shown in Exhibit 3 would likely have a bond market index as its

benchmark. Since the sample portfolio itself holds investment grade U.S. corporate bonds, an index

with a similar composition is appropriate. In this case, the benchmark is a single index, rather than a

composite as was the case in Exhibit 5. An example of an appropriate benchmark for the income

portfolio is the Dow Jones Corporate Bond Total Return Index, seen in Exhibit 6.

Exhibit 6. Sample bond portfolio benchmark.

Once the benchmark is created, it can be used with the <PORT> command to assess the portfolio's performance over time. Exhibit 7 shows the performance of the income portfolio and its benchmark in the upper half, with the relative performance in the lower half.

Exhibit 7. Income portfolio performance versus its benchmark, using the <PORT> command.

The Bloomberg service has a number of additional tools to measure portfolio performance and identify sources of risk within the <PORT> command. For example, the **Holdings** tab (see Exhibit 8) shows the weights, by market sector, for the portfolio and its benchmark. This allows the student to identify potential sources of differences in risk and return for the portfolio versus its benchmark.

Exhibit 8. Portfolio weights relative to benchmark weights.

The VaR tab shows the results of a Value at Risk analysis of the portfolio relative to the

benchmark. Students can view the VaR for the portfolio as a whole, by sector, and even by individual

security, as seen in Exhibit 9.

Exhibit 9. Value at Risk analysis of the portfolio relative to its benchmark.

The <PORT> command also allows the students to perform an attribution analysis on portfolio returns to identify why it differs from the benchmark. Exhibit 10 shows that the portfolio return was 3.20% versus its benchmark return of 3.45%, for a active return of -0.26%. This active return has two components: an allocation (i.e. sector weighting) return of -0.44% and a security selection (i.e. security weighting) return of +0.18%.

Name	Avg % Wgt			CTR			Tot Rtn			Tot Attr	Alloc	Selec	Curr
	Port	Bmrk	+/-	Port	Bmrk	+/-	Port	Bmrk	+/-				
CAPITAL APPRE...	100.00	100.00	0.00	3.20	3.45	-0.26	3.20	3.45	-0.26	-0.26	-0.44	0.18	0.00
Cash	0.00	0.26	-0.26		0.00	0.00		0.00	0.00	0.01	0.01	0.00	0.00
Cash	0.00	0.26	-0.26		0.00	0.00		0.00	0.00	0.01	0.01	0.00	0.00
Equity	100.00	99.74	0.26	3.20	3.45	-0.26	3.20	3.46	-0.27	-0.27	-0.45	0.18	0.00
Consumer ...	19.25	11.91	7.34	-0.06	0.49	-0.55	-0.29	4.14	-4.43	-0.83	0.06	-0.89	0.00
HONDA MOT...	19.25		19.25	-0.06		-0.06	-0.29		-0.29	-0.89		-0.89	0.00
Consumer S...	19.01	9.42	9.59	1.05	0.35	0.70	5.59	3.74	1.85	0.38	0.03	0.35	0.00
Energy	0.00	10.36	-10.36		-0.23	0.23		-2.32	2.32	0.61	0.61	0.00	0.00
Financials	0.00	16.05	-16.05		0.84	-0.84		5.27	-5.27	-0.29	-0.29	0.00	0.00
Health Care	20.77	13.56	7.21	1.65	0.65	1.00	8.06	4.85	3.21	0.78	0.10	0.68	0.00
Industrials	22.47	10.27	12.20	1.10	0.43	0.67	4.92	4.20	0.72	0.25	0.10	0.15	0.00
Information...	0.00	19.31	-19.31		0.85	-0.85		4.42	-4.42	-0.19	-0.19	0.00	0.00
Materials	0.00	3.50	-3.50		0.07	-0.07		2.01	-2.01	0.05	0.05	0.00	0.00
Telecommu...	18.51	2.39	16.11	-0.55	-0.06	-0.49	-2.87	-2.31	-0.56	-1.06	-0.95	-0.11	0.00
Utilities	0.00	2.96	-2.96		0.06	-0.06		2.08	-2.08	0.04	0.04	0.00	0.00

Exhibit 10. Attribution analysis of portfolio return relative to its benchmark.

HEDGING WITH OPTIONS

As a part of this exercise, students will hedge a stock portfolio using call and put options in order to learn the associated concepts and to gain an understanding about how these hedging techniques work in various market conditions. The students' capital appreciation portfolios will be copied to new portfolios ("Equity – Call Option Hedge" and "Equity – Put Option Hedge") and then an appropriate quantity of either calls or puts added to create the hedge. The hedge ratio equation is given by:

$$HR = \left[\frac{portfolio\ value}{(option\ strike\ price)(option\ multiplier)} \right] \times [portfolio\ beta] \times \left[\frac{1}{option\ delta} \right] \qquad (1)$$

For the initial example, we will use near-the-money options on the SPDR S&P 500 ETF (SPY) with an

expiration date of 11/22/14.   On 8/1/14 the following were observed:

Equity portfolio value = $26,390.25

Equity portfolio beta = .92   (from Bloomberg <PORT>)

Closing price for the SPY EFT was $192.50

Call option strike: $194.00

Call option delta: 0.4564 (from Bloomberg <OVME>)

Put option strike: $194.00

Put option delta: -0.5513

Using the appropriate inputs, we get the following hedge ratios:

Call option HR = (26,390.25 / (194)(100)) x (.92)(1/.4564) = 2.75 contracts, which we will round to 3.

Put option HR = (26,390.25 / (194)(100)) x (.92)(1/.5513) = 2.27 contracts, which we will round to 2.

The results of the unhedged portfolio, along with the call hedge and put hedge portfolios are shown in

Exhibit 11, 12 and 13. In general, stock prices rose over the sample period as seen in Exhibit 11. For the

call hedge, as stock prices rose, the short calls went in the money, creating a loss that offset the

investor's gains on the stocks. Because the hedge ratio was rounded up to the nearest integer, the

investor lost more on the calls than he made on the stocks, as seen in Exhibit 12. Finally, for the put

hedge, as stock prices rose, the long puts go out of the money, so the investor has a small loss on the

put that only partially offsets the profits on the stocks. This example shows students two types of risk

they face when hedging: 1) quantity risk (from rounding the number of option contracts) and 2) cross

hedge risk (due to imperfect correlation between the equity portfolio and the S&P 500 index options

used to hedge.

Exhibit 11. Performance of unhedged equity portfolio.

Exhibit 12. Equity portfolio with call option hedge performance.

Exhibit 13. Performance of equity portfolio with put option hedge.

HEDGING WITH FUTURES

Students will also hedge an equity portfolio using, for example, e-mini futures on the S&P 500 index. The hedge ratio is given by:

$$\text{HR} = \left[\frac{\text{portfolio value}}{(\text{futures contract price}) \times (\text{multiplier})}\right] \times [\text{portfolio beta}] \tag{2}$$

Futures contracts are larger in size than typical option contracts, so small portfolios cannot be hedged effectively using futures. For this example, we created a new equity portfolio that holds the same assets as in the option hedging examples, except each position is ten times as large. Using the appropriate inputs for the December 2014 E-mini S&P 500 futures, we get the following hedge ratio:

HR = 263,902.50 / (1910.50)(50)) x (.92) = 2.54 contracts to be sold, which we will round to 3.

| Intraday | Holdings | Characteristics | VaR | Scenarios | Tracking Error | Performance | Attribution |

Main View | Total Return | Period Analysis | Seasonal Analysis | Statistical Summary

Port EQUITY - FUTU ▼ vs Default (None) ▼ by GICS Sectors ▼ in USD ▼ Time Custo ▼ 08/01/14 ▦ - 09/12/14 ▦

Unit Percentage   Freq Daily ▼

○ Total Return %   ● Value

☐ EQUITY - FUTURES HEDGE -0.6591   ✛ Track ∠ Annotate 🔍 Zoom

Exhibit 14. Performance of equity portfolio with futures hedge.

LIMITATIONS OF BLOOMBERG IN PORTFOLIO SIMULATIONS

The Bloomberg service, while a powerful resource, does impose some limitations when used as a simulation tool. First, it is relatively expensive. An annual subscription to the service costs about $25,000 per year, with significant discounts available for multiple subscriptions. For example, if a university buys three licenses, it receives an additional nine without charge, bringing the per-unit cost down substantially. Second, the method used to input portfolio positions, the <PRTU> command, is not robust from a control perspective. Students could easily go back and edit any trades to their advantage. This issue can be overcome by requiring students to submit records of all trades to the instructor as they are made in order to allow verification. In addition, as installed at the author's institution, it does not provide a simple way to enter closing trades such as a sell order. Third, there are no features that allow the instructor to set parameters such as initial wealth, volume limits on trades, and broker commissions. Finally, it does not allow students to see their standings relative to other

students in the same competition, a key feature of its online competitors such as

www.marketwatch.com/game/.

On the plus side, the Bloomberg service has an unequaled array of tools and information available to its users. It provides students with hands on experience is using the very tools they are likely to encounter once on the job and thus provides them with a competitive advantage when performing their job search.

SUMMARY AND CONCLUSION

The Bloomberg Professional Service provides users with a powerful set of tools for building portfolios and assessing their performance over time. While not a dedicating trading platform as installed at the author's institution, it does allow students to enter positions as of a particular date, track them over time, and perform ex-post performance evaluation. This paper demonstrates how to perform these tasks in a manner consistent with modern portfolio management processes. In addition, we show how students can hedge portfolios using options and futures, and then compare the results with those of an unhedged portfolio.

References

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