

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
 - Define the investment objective and identify constraints.
 - Develop a strategy to achieve the objective, i.e. determine the appropriate asset allocation.
- Execution
 - Select the specific securities to be used.
 - Implement the strategy, i.e. purchase the securities.
- Feedback
 - Measure and evaluate the portfolio performance.
 - 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.

The screenshot shows the Bloomberg terminal interface for a Fixed Income Search. The top bar includes navigation buttons like GO, F1, F2, F3, F4, PRINT, HELP, MEMO, SURVE, QUOTE, MONIT, NEWS, MSG, MENU, PG BA, PG FW, CORP, EQUIT, INDEX, and CRNCY. Below this is a menu bar with 'Securities & Help Menu', 'No Security Loaded', and 'SRCH'. The main window is titled 'Fixed Income Search' and contains a search criteria table.

Field	Boundaries	Selected Criteria	Matches
11) Asset Classes	Corporates, Governments		1,756,449 securities
12) Sources	All Securities		
31) Security Status	Include	Bonds: Active	340,318
32) And S&P Rating	In the range of	AAA To A-	45,051
33) And Country of Incorp	Include	(United States of America)	20,230
34) And Maturity Date	In the range of	1 Years from now to 5 Years from now	8,321
35) And Coupon	Greater than	0%	8,203
36) And Call Frequency	Exclude	(Continuous or Annual or Semi-Annually or Quart...	4,173
37) And Is Convertible	--	No	4,171
38) And % Women on Board	>=	20	629
39) And ESG Disclosure Score	>=	50	317
40) And Currency	Include	(United States Dollar)	237
And		99) All Fields	

At the bottom of the screen, it shows '237 securities' and a 'Results' button.

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 in a similar manner using the <EQS> command. Exhibit 2 shows an example of an equity screen.



Exhibit 2. Sample equity screen using <EQS>.

PORTFOLIO 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.

1-BLOOMBERG

GO F1 F2 F3 F4 PRINT HELP MEMO SURVE QUOTE QUOTE MONIT NEWS MSG MENU PG BA PG FW CORP EQUIT INDEX CRNCY

Portfolio Management & Risk Menu BAX 4 1/2 08/15/19 Corp PRTU Message ☆ 📄 ⚙️ ?

<HELP> for explanation.
Positions Saved

1) Save 2) Actions 3) Settings 4) Analyze Portfolio Display

Portfolio Name INCOME ID U9662430-12 CCY USD

Date 08/01/14 Display Currency USD

Rebalanced 08/01/14 Short Margin 0 Futures Margin 0

	Security	ID	Position	Price	PCS	FX Rate	Current Principal	Accrued	Market Val	Cost Price	FX Rate
	<Search>										
Totals							53,376.60	505.54	53,882.14		
Cash			0.0000								
11)	GE 0.85 10/09/15	369604BE	10.0000	100.12	TRAC	1.00000	10,012.00	26.44	10,038.44	100.12	1.00000
12)	MMM 1 3/8 09/29/16	88579YAD	10.0000	101.61	TRAC	1.00000	10,161.00	46.60	10,207.60	101.61	1.00000
13)	UPS 1 3/8 10/01/17	911312AP	10.0000	99.64	TRAC	1.00000	9,964.00	37.50	10,001.50	99.64	1.00000
14)	KMB 7 1/2 11/01/18	494368BD	10.0000	122.54	TRAC	1.00000	12,253.60	187.50	12,441.10	122.54	1.00000
15)	BAX 4 1/2 08/15/19	071813BA	10.0000	109.86	TRAC	1.00000	10,986.00	207.50	11,193.50	109.86	1.00000
16)											

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

2-BLOOMBERG

GO F1 F2 F3 F4 PRINT HELP MEMO SURVE QUOTE QUOTE MONIT NEWS MSG MENU PG BA PG FW CORP EQUIT INDEX CRNCY

Portfolio Management & Risk Menu ACTAVIS PLC Equity PRTU Message ☆ 📄 ⚙️ ?

<HELP> for explanation.
Positions Saved

1) Save 2) Actions 3) Settings 4) Analyze Portfolio Display

Portfolio Name CAPITAL APPRECIATION ID U9662430-13 CCY USD

Date 08/01/14 Display Currency USD

Rebalanced 08/01/14 Short Margin 0 Futures Margin 0

	Security	ID	Position	Price	Principal	Accrued	Market Val	Cost Price	Principal	Accrued
	<Search>									
Totals					26,390.25	0.00	26,390.25		26,390.25	0.00
Cash			0.0000							
11)	VZ US	VZ	100.0000	49.83	4,983.00		4,983.00	49.83	4,983.00	
12)	ACT US	ACT	25.0000	216.89	5,422.25		5,422.25	216.89	5,422.25	
13)	FDX US	FDX	40.0000	146.75	5,870.00		5,870.00	146.75	5,870.00	
14)	HMC US	US43812...	150.0000	34.60	5,190.00		5,190.00	34.60	5,190.00	
15)	KR US	KR	100.0000	49.25	4,925.00		4,925.00	49.25	4,925.00	
16)										

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.

The screenshot shows the Bloomberg PRTU interface for a blended benchmark. The top menu bar includes buttons for GO, F1, F2, F3, F4, PRINT, HELP, MEMO, SURVE, QUOTE, MONIT, NEWS, MSG, MENU, PG BA, PG FW, CORP, EQUIT, INDEX, and CRNCY. The main display area shows the SPXT index at 3614.0601, down 21.5999. Below this, the benchmark is labeled 'BLENDED BENCHMARK' with a date of 08/01/14 and a portfolio value of 100,000,000. A table lists the components of the benchmark:

Security	ID	Weight	Current Price	Cost Price
1) SPXT	SPXT	80.0000	3493.18	
2) DJCBT	DJCBT	20.0000	334.08	
Totals		100.0000		

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.

The screenshot shows the Bloomberg PRTU interface for a bond portfolio benchmark. The top menu bar is the same as in Exhibit 5. The main display area shows the DJ CorporateBdTR Index. Below this, the benchmark is labeled 'INCOME PORTFOLIO BEN...' with a date of 08/01/14 and a display currency of USD. A table lists the components of the benchmark:

Security	ID	Position	Price	Principal	Accrued	Market Val
1) DJCBT	DJCBT	1.0000	334.08	334.08	0.00	334.08
2)						
Totals				334.08	0.00	334.08

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.

PORT 1-BLOOMBERG

GO F1 F2 F3 F4 PRINT HELP MEMO SURVE QUOTE QUOTE MONIT NEWS MSG MENU PG BA PG FW CORP EQUIT INDEX CRNCY

Portfolio Management & Risk Menu DJ CorporateBd Index PORT Message ☆ 📄 ⚙️ ?

<HELP> for explanation.

1) View 12) Actions 13) Settings 14) Trade Simulation 99) Feedback Portfolio & Risk Analytics

Characteristics Holdings VaR Scenarios Tracking Error Performance Attribution ⚙️

Main View Allocation

Port CAPITAL APPRE vs SPDR S&P 500 by Asset Type > \$ in USD As Of 09/12/14 Date Trend

Name	Port	% Wgt	Bmrk	+/-	Mkt Val	Pos	Px Close	Crncy
						Port	Port	Bmrk
CAPITAL APPRE...	100.00	100.00	0.00	27,208				
Cash		0.38	-0.38					
Equity	100.00	99.62	0.38	27,208				
Consumer D...	19.02	11.90	7.12	5,175				
Consumer St...	19.05	9.41	9.64	5,183				
Energy		9.91	-9.91					
Financials		16.21	-16.21					
Health Care	21.54	13.71	7.82	5,860				
Industrials	22.61	10.28	12.32	6,151				
Information T...		19.46	-19.46					
Materials		3.45	-3.45					
Telecommu...	17.79	2.34	15.45	4,840				
Utilities		2.93	-2.93					

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.

PORT 1-BLOOMBERG

GOF1F2F3F4PRINTHELPMEMOSURVEQUOTEQUOTEMONITNEWSMSGMENUPG BAPG FWCORPEQUITINDEXCRNCY

Portfolio Management & Risk MenuDJ CorporateBd IndexPORTMessage☆📄⚙️?

<HELP> for explanation.

1) View12) Actions13) Settings14) Trade Simulation99) FeedbackPortfolio & Risk Analytics

CharacteristicsHoldingsVaRScenariosTracking ErrorPerformanceAttribution⚙️

Main ViewVaR ComparisonDistributionVaR SimulationsFactor Breakdown

PortCAPITAL APPRE vsSPDR S&P 500byAsset Type > \$inUSDAs of09/12/14

ModelBloomberg RiskUnitP&LCLvl95%Horizon1 day

Name	VaR (MC)			CvaR (MC)	Mkt Val	Pos	% Wgt			Partial VaR (MC)		Marginal VaR (MC)
	Port	Bmrk	+/-				Port	Port	Port	Bmrk	+/-	
CAPITAL APPRE...	291.64	277.47	219.67	393.60	27,208		100.00	100.00	0.00			
Cash		0.00	0.00					0.38	-0.38			
Equity	291.64	277.47	219.67	393.60	27,208		100.00	99.62	0.38	-291.64	1.07	
Consumer ...	119.75	36.53	125.24	164.45	5,175			11.90	7.12	-27.28	0.36	
HONDA MOT...	119.75		119.75	164.45	5,175	150.00		19.02	19.02	-27.28	0.36	
Consumer S...	82.48	21.85	72.22	111.38	5,183			19.05	9.64	-36.83	0.91	
Energy		42.71	43.57						9.91	-9.91		
Financials		58.51	57.64						16.21	-16.21		
Health Care	135.81	42.70	113.41	184.99	5,860			21.54	13.71	-69.48	1.45	
Industrials	112.71	34.97	91.68	149.44	6,151			22.61	10.28	-54.15	1.62	
Information...		66.72	65.72						19.46	-19.46		
Materials		12.97	12.94						3.45	-3.45		
Telecommu...	75.04	8.17	67.90	100.81	4,840			17.79	2.34	-21.16	0.85	
Utilities		9.36	9.00						2.93	-2.93		

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	Model	Total Return	Unit	Percentage	Curve	Swap	CTR	Tot Rtn	Tot Attr	Alloc	Selec	Curr
CAPITAL APPRE...	100.00	100.00	0.00	3.20	3.45	-0.26	3.20	3.45	-0.26	-0.44	0.18	0.00
Cash	0.00	0.26	-0.26	0.00	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	-0.45	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
HONDA MOT...	19.25		19.25	-0.06		-0.06	-0.29		-0.29	-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
Energy	0.00	10.36	-10.36		-0.23	0.23		-2.32	2.32	0.61	0.61	0.00
Financials	0.00	16.05	-16.05		0.84	-0.84		5.27	-5.27	-0.29	-0.29	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
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
Information...	0.00	19.31	-19.31		0.85	-0.85		4.42	-4.42	-0.19	-0.19	0.00
Materials	0.00	3.50	-3.50		0.07	-0.07		2.01	-2.01	0.05	0.05	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
Utilities	0.00	2.96	-2.96		0.06	-0.06		2.08	-2.08	0.04	0.04	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:

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

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 = $(26,390.25 / (194)(100)) \times (.92)(1/.4564) = 2.75$ contracts, which we will round to 3.

Put option HR = $(26,390.25 / (194)(100)) \times (.92)(1/-.5513) = 2.27$ 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:

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

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:

$$HR = 263,902.50 / (1910.50)(50)) \times (.92) = 2.54 \text{ contracts to be sold, which we will round to 3.}$$



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.

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