Portfolio Management Using the Bloomberg Professional Service

David S. Allen
Associate Professor of Finance
The W. A. Franke College of Business
Northern Arizona University

P.O. Box 15066
Flagstaff, AZ 86011
david.allen@nau.edu
(928) 523-7378

ABSTRACT

- Portfolio simulations are a popular tool used to teach students how to build, maintain, and assess security portfolios.
  Free sites:
  - www.marketwatch.com/game/
  - www.howthemarketworks.com
  - www.google.com/finance
- Paid site:
  - www.stocktrak.com

- 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.

ABSTRACT

- Today, I describe a semester-long project in which students build, maintain, and assess the performance of portfolios for specific investor objectives using the Bloomberg Professional Service (Bloomberg).

- Bloomberg offers a much wider array of analytical tools than the typical online simulation.

ABSTRACT

- Introduce students to a broad array of Bloomberg tools and functions that are applicable to portfolio management:
  - PRTU for creating portfolios and adding position
  - PORT for asset allocation
  - VaR
  - tracking error
  - 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"

PORTFOLIO MANAGEMENT

- Students will implement this process:

- 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.

- Sample client objectives:
  1. Income
  2. Capital appreciation

- Students' task:
  - build a portfolio for each of the objectives
    - Build separate capital appreciation portfolios hedged with 1) call options, 2) put options, 3) futures
  - monitor performance over time
  - make adjustments as necessary to asset allocation and security selection

LEARNING OBJECTIVES

- Investing concept objectives:

1. Process of portfolio management
2. Principles of asset allocation and security selection as they relate to the investor’s objective
3. Performance measurement
4. Principles of hedging using options and futures

LEARNING OBJECTIVES

- Bloomberg specific objectives:

1. Screen stocks and bonds using tools in Bloomberg.
2. Build and update portfolio positions.
3. Build custom benchmarks for assessing portfolio performance.
4. Tools in Bloomberg for measuring portfolio attributes and performance.

THE INVESTMENT OBJECTIVE

Starting point of the portfolio management process.

- 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

Typically related to circumstances unique to the investor.

1. Liquidity needs
2. Investment horizon
3. Tax considerations
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

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
5. others

ASSET ALLOCATION

- Primary determinant of the actual investment results over time.
- 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.

ASSET ALLOCATION

- 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.

Asset Class	Total Return (%)	Std Dev (%)
Cash	3.29%	2.35%
S&P 500	10.18%	18.39%
REIT	12.52%	19.03%
Russell 1000	10.45%	18.59%
Small Stocks	11.17%	19.39%
Commodities	1.18%	25.69%
EAFE	6.05%	19.92%
Bonds - Agg	6.39%	4.97%
Munis	6.04%	5.59%
High Yield	9.60%	16.66%
USTreasuries	8.54%	12.49%
Emerging Mkts	19.78%	48.93%

ASSET ALLOCATION

- One sample investor will have a short-to-intermediate investment horizon and a need for periodic income.

- Students are likely to allocate a higher proportion of funds to money market instruments and fixed income securities, and a lower proportion to stocks.

ASSET ALLOCATION

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.

- 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.

- Students will use two tools in Bloomberg that allow screens:

1. <SRCH> for bond screening
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>.

SECURITY SELECTION

- 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>.

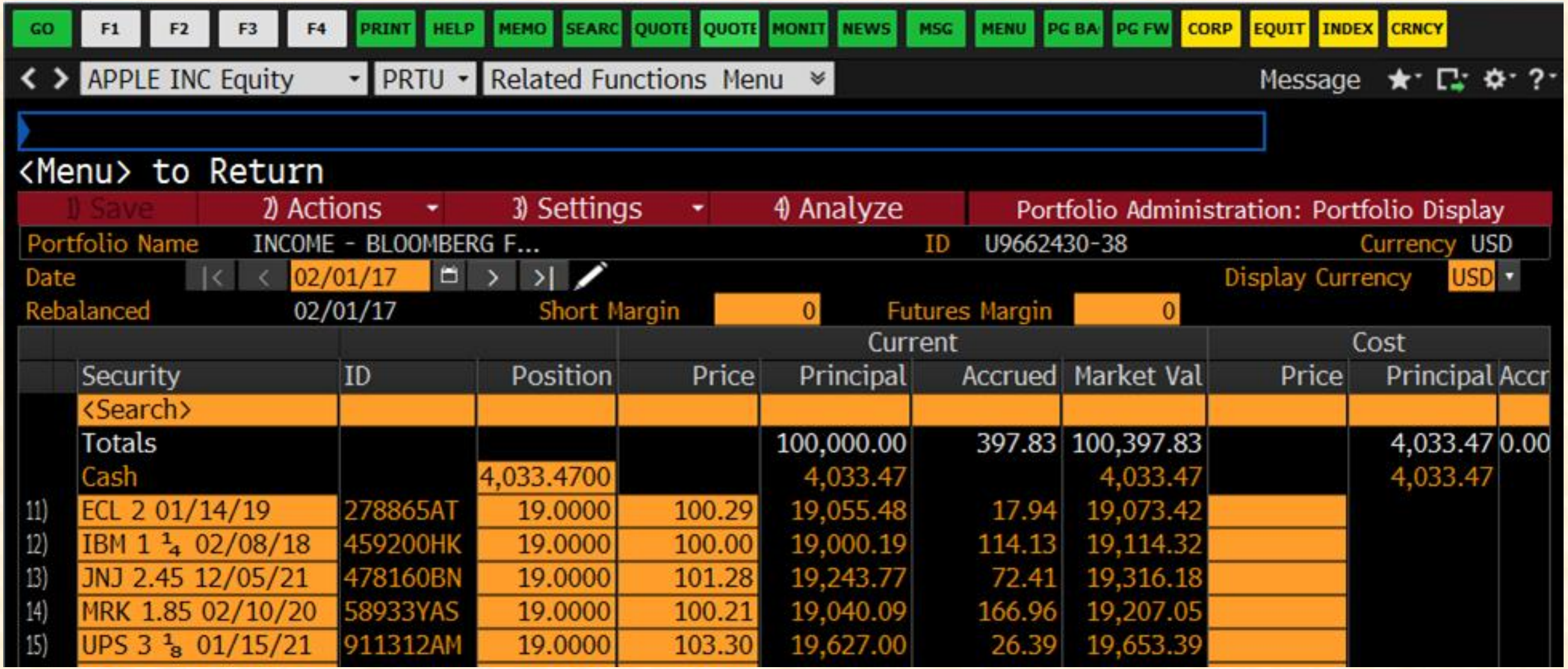
PORTRFOLIO CREATION

- 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.

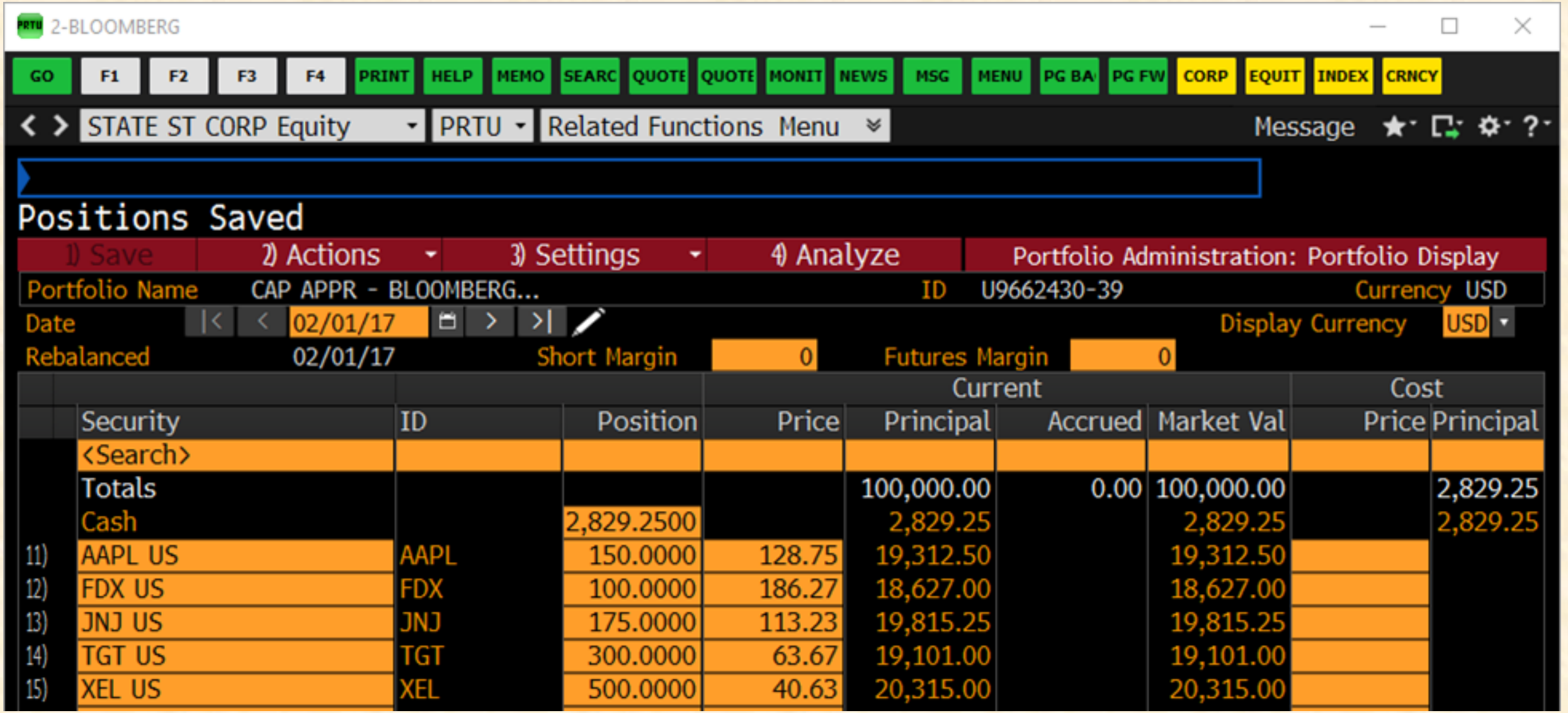
- Exhibits 3 and 4 show sample portfolios for the income and capital appreciation portfolios.

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



				Current			Cost		
	Security	ID	Position	Price	Principal	Accrued	Market Val	Price	Principal	Accr
	<Search>									
	Totals				100,000.00	397.83	100,397.83		4,033.47	0.00
	Cash		4,033.4700		4,033.47		4,033.47		4,033.47	
11)	ECL 2 01/14/19	278865AT	19.0000	100.29	19,055.48	17.94	19,073.42			
12)	IBM 1 ¼ 02/08/18	459200HK	19.0000	100.00	19,000.19	114.13	19,114.32			
13)	JNJ 2.45 12/05/21	478160BN	19.0000	101.28	19,243.77	72.41	19,316.18			
14)	MRK 1.85 02/10/20	58933YAS	19.0000	100.21	19,040.09	166.96	19,207.05			
15)	UPS 3 ⅛ 01/15/21	911312AM	19.0000	103.30	19,627.00	26.39	19,653.39			

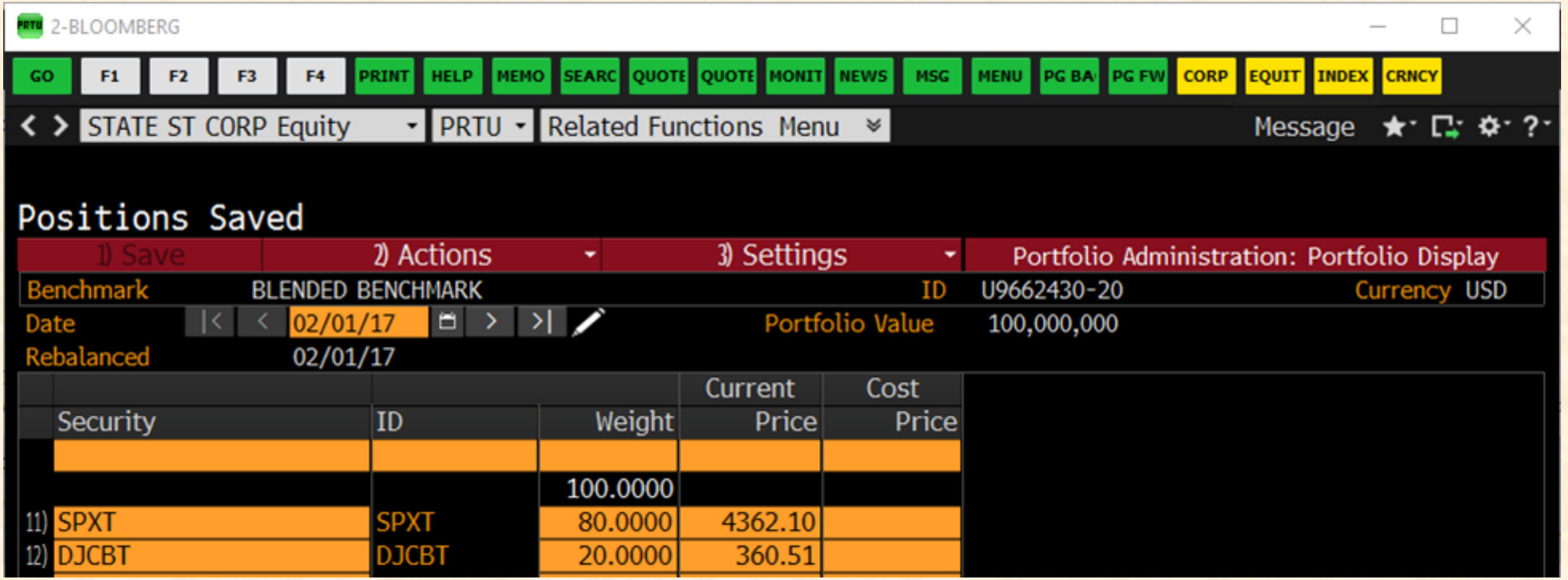
Exhibit 4. Sample capital appreciation portfolio created using <PRTU>.



PERFORMANCE EVALUATION

- Benchmarks are created using the <PRTU> command as seen in Exhibit 5.
- May contain individual securities or indexes.
- Composite benchmarks can be created specifying:
  - 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.

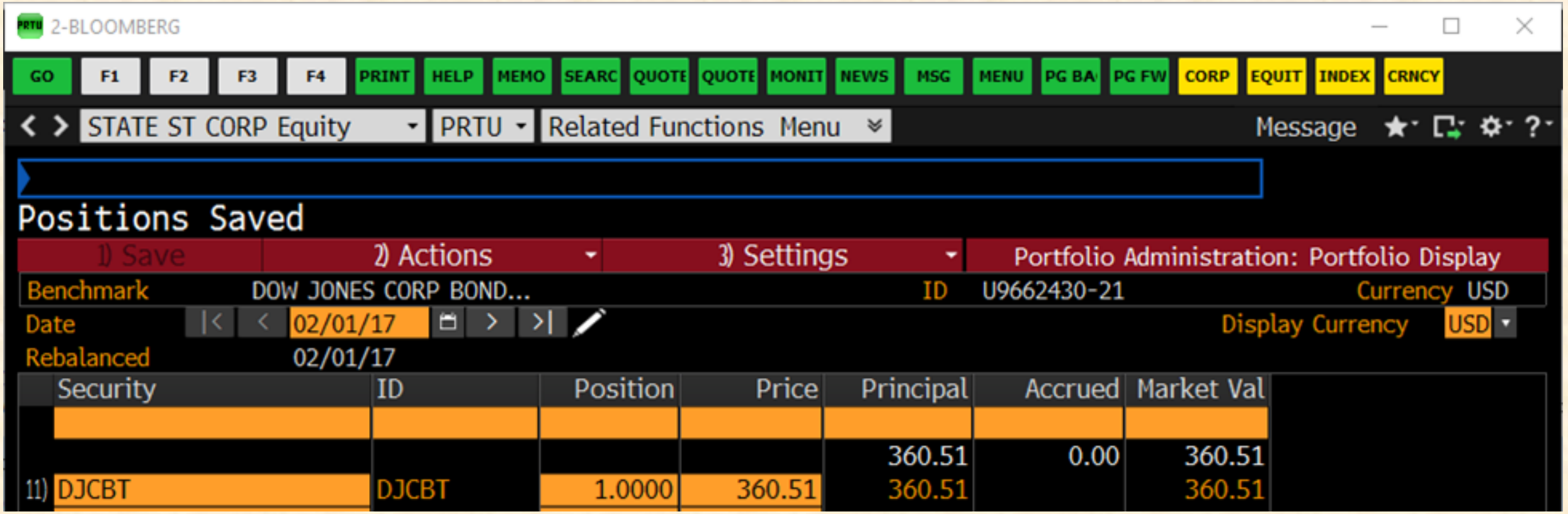
Exhibit 5. Sample composite benchmark created using <PRTU>.



PERFORMANCE EVALUATION

- 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.



PERFORMANCE EVALUATION

- 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.

PERFORMANCE EVALUATION

- 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

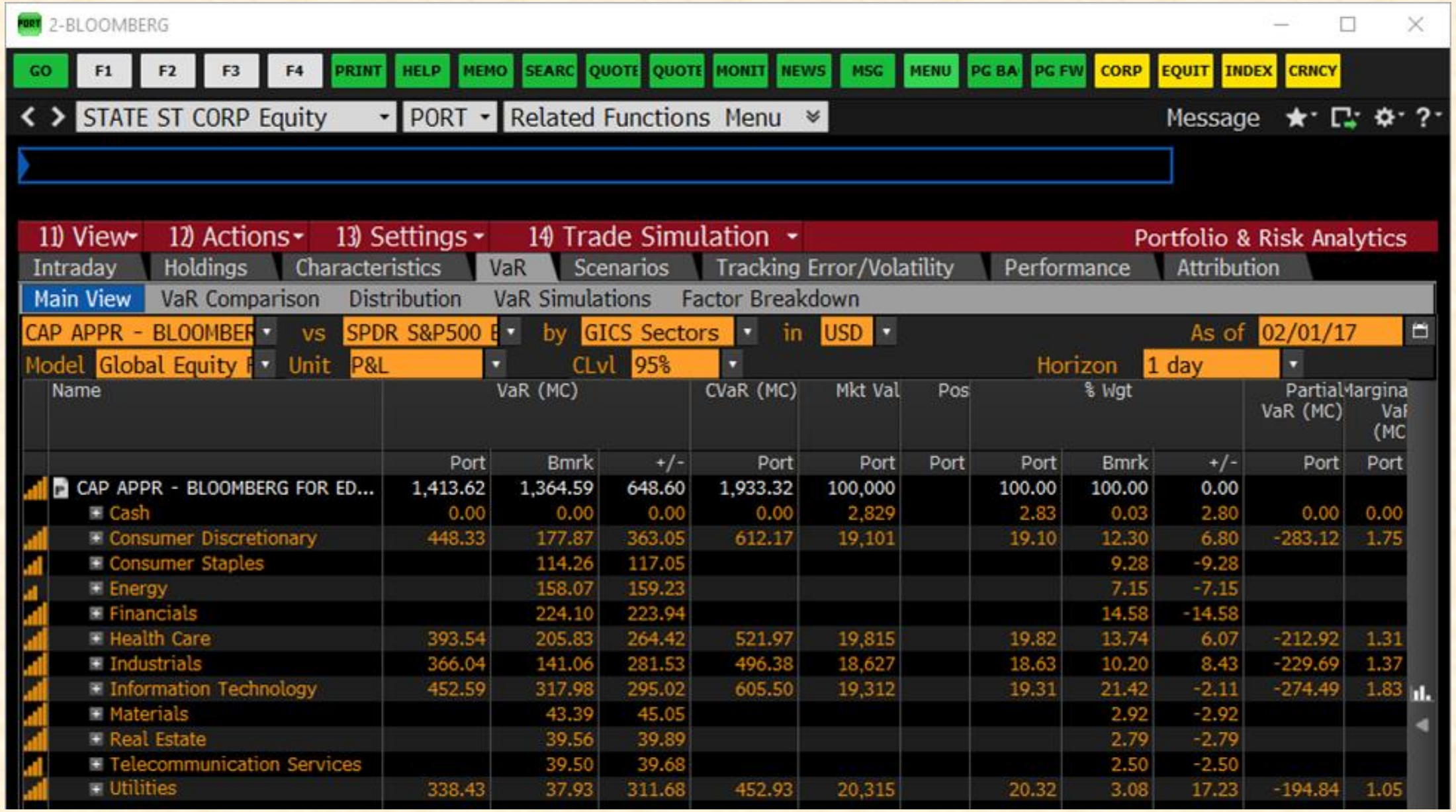
Name	% Wgt			Mkt Val	Pos	Px Close	Crncy	
	Port	Bmrk	+/-	Port	Port	Port	Port	Bmrk
CAP APPR - BLOOMBERG FOR ED...	100.00	100.00	0.00	100,000				
Cash	2.83	0.03	2.80	2,829				
Consumer Discretionary	19.10	12.30	6.80	19,101				
Consumer Staples		9.28	-9.28					
Energy		7.15	-7.15					
Financials		14.58	-14.58					
Health Care	19.82	13.74	6.07	19,815				
Industrials	18.63	10.20	8.43	18,627				
Information Technology	19.31	21.42	-2.11	19,313				
Materials		2.92	-2.92					
Real Estate		2.79	-2.79					
Telecommunication Services		2.50	-2.50					
Utilities	20.32	3.08	17.23	20,315				

PERFORMANCE EVALUATION

- 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.



Name	VaR (MC)			CVaR (MC)	Mkt Val	Pos	% Wgt			Partial VaR (MC)	Margina Val (MC
	Port	Bmrk	+/-	Port	Port	Port	Port	Bmrk	+/-	Port	Port
CAP APPR - BLOOMBERG FOR ED...	1,413.62	1,364.59	648.60	1,933.32	100,000		100.00	100.00	0.00		
Cash	0.00	0.00	0.00	0.00	2,829		2.83	0.03	2.80	0.00	0.00
Consumer Discretionary	448.33	177.87	363.05	612.17	19,101		19.10	12.30	6.80	-283.12	1.75
Consumer Staples		114.26	117.05					9.28	-9.28		
Energy		158.07	159.23					7.15	-7.15		
Financials		224.10	223.94					14.58	-14.58		
Health Care	393.54	205.83	264.42	521.97	19,815		19.82	13.74	6.07	-212.92	1.31
Industrials	366.04	141.06	281.53	496.38	18,627		18.63	10.20	8.43	-229.69	1.37
Information Technology	452.59	317.98	295.02	605.50	19,312		19.31	21.42	-2.11	-274.49	1.83
Materials		43.39	45.05					2.92	-2.92		
Real Estate		39.56	39.89					2.79	-2.79		
Telecommunication Services		39.50	39.68					2.50	-2.50		
Utilities	338.43	37.93	311.68	452.93	20,315		20.32	3.08	17.23	-194.84	1.05

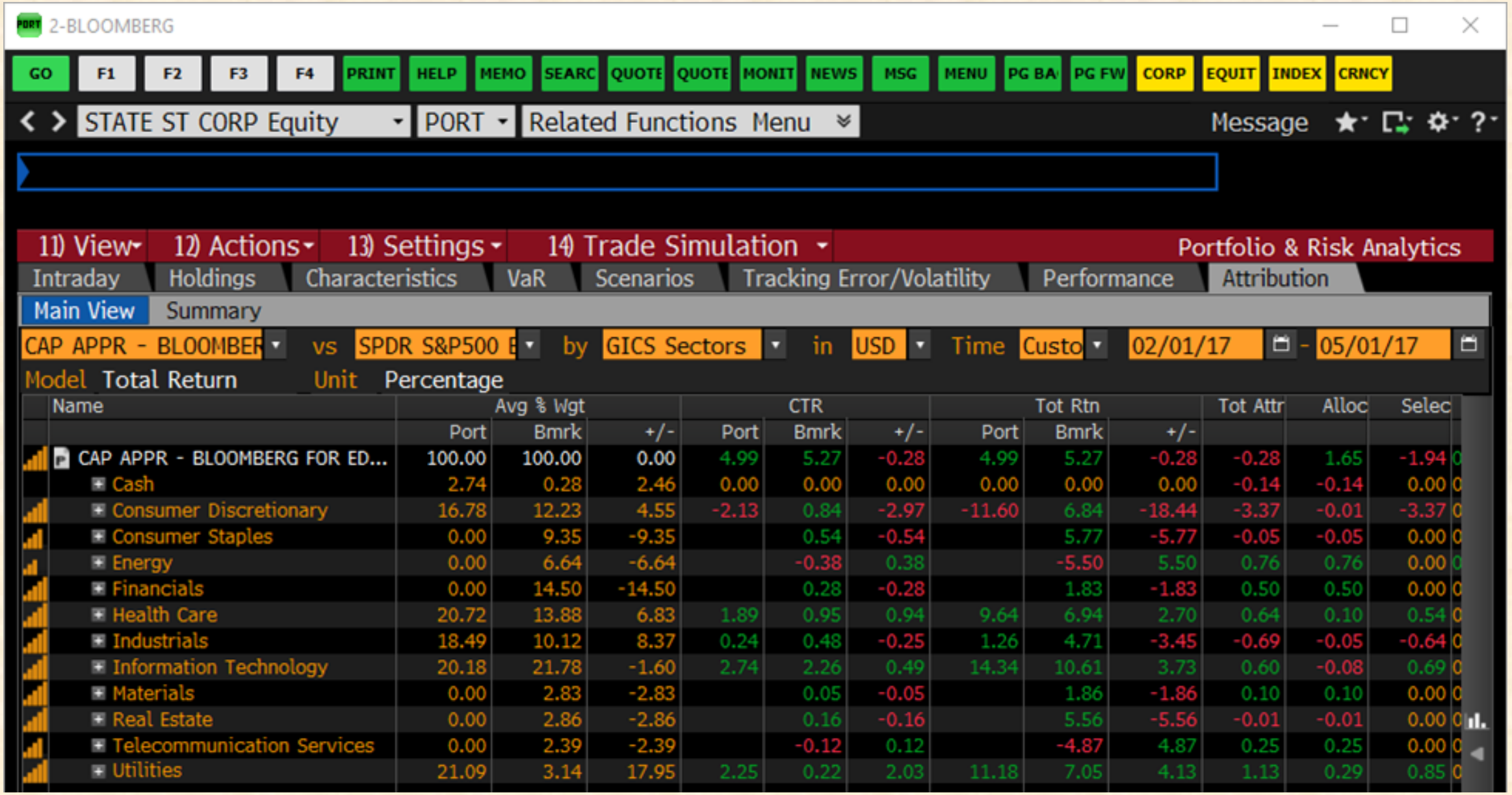
PERFORMANCE EVALUATION

- 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%.

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



Name	Avg % Wgt			CTR			Tot Rtn			Tot Attr	Alloc	Selec
	Port	Bmrk	+/-	Port	Bmrk	+/-	Port	Bmrk	+/-			
CAP APPR - BLOOMBERG FOR ED...	100.00	100.00	0.00	4.99	5.27	-0.28	4.99	5.27	-0.28	-0.28	1.65	-1.94
Cash	2.74	0.28	2.46	0.00	0.00	0.00	0.00	0.00	0.00	-0.14	-0.14	0.00
Consumer Discretionary	16.78	12.23	4.55	-2.13	0.84	-2.97	-11.60	6.84	-18.44	-3.37	-0.01	-3.37
Consumer Staples	0.00	9.35	-9.35		0.54	-0.54		5.77	-5.77	-0.05	-0.05	0.00
Energy	0.00	6.64	-6.64		-0.38	0.38		-5.50	5.50	0.76	0.76	0.00
Financials	0.00	14.50	-14.50		0.28	-0.28		1.83	-1.83	0.50	0.50	0.00
Health Care	20.72	13.88	6.83	1.89	0.95	0.94	9.64	6.94	2.70	0.64	0.10	0.54
Industrials	18.49	10.12	8.37	0.24	0.48	-0.25	1.26	4.71	-3.45	-0.69	-0.05	-0.64
Information Technology	20.18	21.78	-1.60	2.74	2.26	0.49	14.34	10.61	3.73	0.60	-0.08	0.69
Materials	0.00	2.83	-2.83		0.05	-0.05		1.86	-1.86	0.10	0.10	0.00
Real Estate	0.00	2.86	-2.86		0.16	-0.16		5.56	-5.56	-0.01	-0.01	0.00
Telecommunication Services	0.00	2.39	-2.39		-0.12	0.12		-4.87	4.87	0.25	0.25	0.00
Utilities	21.09	3.14	17.95	2.25	0.22	2.03	11.18	7.05	4.13	1.13	0.29	0.85

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.

HEDGING WITH OPTIONS

- 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:

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

HEDGING WITH OPTIONS

- For the initial example, we will use near-the-money options on the SPDR S&P 500 ETF (SPY) with an expiration date of 05/09/17. On 02/01/17 the following were observed:
  - Equity portfolio value = $100,000
  - Equity portfolio beta = .85 (from Bloomberg <PORT>)
  - Closing price for the SPY EFT was $227.545
  - Call option strike: $230.00
  - Call option delta: 0.445 (from Bloomberg <OVME>)
  - Put option strike: $230.00
  - Put option delta: -0.555

HEDGING WITH OPTIONS

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

- Call option HR = (100,000.00 / (230)(100)) x (.85)(1/.445) = 8.3 contracts, which we will round to 8.

- Put option HR = (100,000.00 / (230)(100)) x (.85)(1/.555) = 6.7 contracts, which we will round to 7.

HEDGING WITH OPTIONS

- 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, as seen in Exhibit 12.

HEDGING WITH OPTIONS

- Finally, for the put hedge, as stock prices rose, the long puts go out of the money, so the investor has a loss on the put that 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)

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:

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

HEDGING WITH FUTURES

- 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 June 2017 E-mini S&P 500 futures, we get the following hedge ratio:

- HR = (100,000.00 / (2269.25)(50)) x (.85) = 0.74 contracts to be sold, which we will round to 1.

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.

LIMITATIONS OF BLOOMBERG IN PORTFOLIO SIMULATIONS

- 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.

LIMITATIONS OF BLOOMBERG IN PORTFOLIO SIMULATIONS

- 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/.

LIMITATIONS OF BLOOMBERG IN PORTFOLIO SIMULATIONS

- 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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