

STUDENT INVESTMENT FUND

SPRING 2021

WRAP-UP

SUMMARY OF SEMESTER-LONG PROCESS

Clarify MOU/Prospectus

Fund Accounting

Performance Measurement / Assessment

Individual Security Research

Optimizer Training & Setup

Review Optimizer Results

Forward Trades to UEI

Robot Coexistence

Tasks for next semester



MOU/PROSPECTUS CLARIFICATION

MEMORANDUM OF UNDERSTANDING (MOU) BASICS

PURPOSE

1. **ANALYZE** AND MANAGE AN INVESTMENT PORTFOLIO.
2. **RESEARCH** AND RECOMMEND PORTFOLIO HOLDINGS.
3. **ANALYZE** ECONOMIC CONDITIONS.
4. **MAINTAIN** ACCOUNTS AND RECORDS NECESSARY FOR AN INVESTMENT PORTFOLIO.
5. **PERFORM** THESE FUNCTIONS IN THE CONTEXT OF A UNIQUE EDUCATIONAL OPPORTUNITY THAT WILL HELP STUDENTS BETTER UNDERSTAND FINANCIAL MARKETS



ADDITIONAL MOU INFO

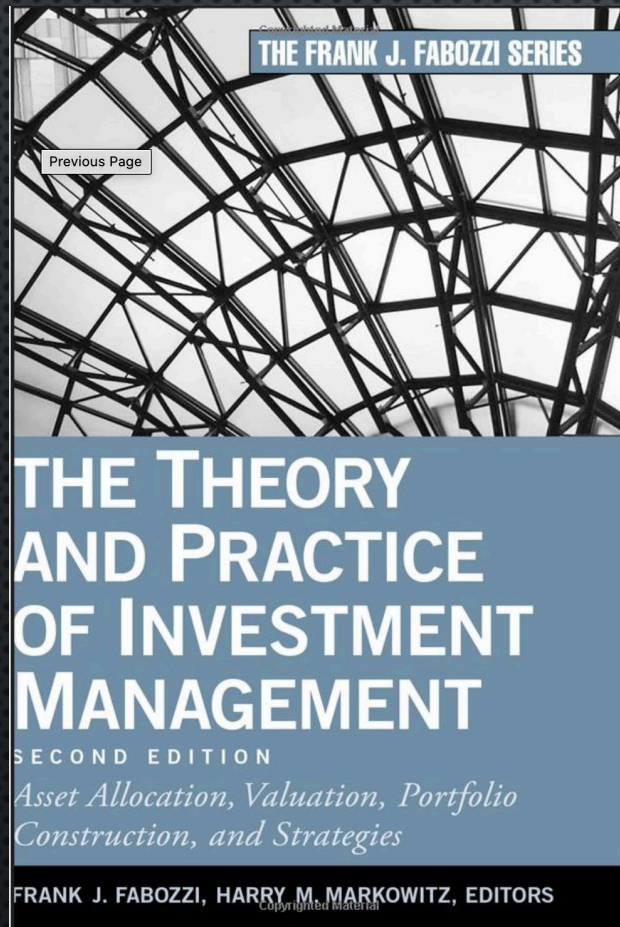
IT'S NOT OUR MONEY. "THE ACCOUNT AND ALL RELATED EARNINGS ARE THE PROPERTY OF UEI." FEES PAID TO CBA.

MOU / PROSPECTUS HIGHLIGHTS



- **RETURN TARGET:** "THE RETURN TARGET IS TO PROVIDE A TOTAL RETURN IN ACCESS [SIC] OF 0.5% ABOVE THE S&P 500." (P. 5)
- **RISK TARGET:** "THE RISK IS TO STAY IN LINE WITH THAT OF THE S&P500 WHEN MEASURED BY STANDARD DEVIATION FORMULA." (P. 6)
- **ACTIVE AND PASSIVE (WITH CONSTRAINTS):** "...BOTH ACTIVE AND PASSIVE STRATEGIES WHEN SELECTING INVESTMENTS. THE OVERALL OBJECTIVE IS TO MAXIMIZE RATES OF RETURN WITHIN REASONABLE AND PRUDENT LEVELS OF RISK THROUGH EXTENSIVE DIVERSIFICATION."
- **SECTOR NEUTRAL:** "OUR INVESTMENT IN EACH SECTOR WILL CORRESPOND DIRECTLY WITH EACH SECTOR'S RELATIVE WEIGHT IN THE S&P 500." (P. 5)
- **S&P500 IS THE BENCHMARK:** "THE FUNDS' BENCHMARK WILL BE THE S&P500. " (P.5)
- **ETF-FOCUSED:** "EACH SECTOR'S INVESTMENT WILL BE PRIMARILY HELD IN THE ETF AS A WAY TO MITIGATE RISK." (P. 5)
- **OTHER INVESTMENTS ALLOWED (WITH CONSTRAINTS):** SEE "FIXED INCOME INVESTMENTS," "OTHER INVESTMENTS," AND "PROHIBITED TRANSACTIONS." (P. 5-6)

MOU & "THE THEORY AND PRACTICE OF INVESTMENT MANAGEMENT"



diversification at reasonable levels to ensure prudence and care in the execution of the investment program. The funds' benchmark will be the S&P 500. The return target is to provide a total return in excess of 0.5% above the S&P 500.

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EQUITY ANALYSIS AND PORTFOLIO MANAGEMENT

EXHIBIT 8.3 Measures of Management Categories

	Indexing	Active Management	Enhanced Indexing
Expected alpha	0%	2.0% or higher	0.5% to 2.0%
Tracking error	0% to 0.2%	4% or higher	0.5% to 2.0%

Source: Exhibit 2 in John S. Loftus, "Enhanced Equity Indexing," Chapter 4 in *Perspectives on Equity Indexing*, ed. Frank J. Fabozzi (Hoboken, N.J.: John Wiley & Sons, 2000), 84.

minimizing the risk of large losses through extensive and prudent diversification. The risk is to stay in line with that of the S&P 500 when measured by standard deviation formula.

FIDELITY'S LARGE CAP CORE ENHANCED INDEX FUND & SOME SIF MATH

FIDELITY'S PROSPECTUS

Principal Investment Strategies

Geode normally invests at least 80% of the fund's assets in common stocks included in the S&P 500[®] Index. The S&P 500[®] Index is a

SIF MOU

sectors as each sector will have a corresponding ETF, and individual security. Each sector's investment will be primarily held in the ETF as a way to mitigate risk. No single security will exceed 5.0% of the portfolio value and no single industry sector will deviate from

TRACKING ERROR MATH (WHY WE WERE NON-COMPLIANT)

Thoughts on compliance. Over the past 12 months we averaged 36.23% in ETFs (*PassivePct*) with a portfolio tracking error of 3.26% (*PortTE*). Using the relation between portfolio tracking error, active management percentage ($ActivePct = 1 - PassivePct$), and active tracking error (*ActiveTE*), we can calculate the tracking error of the actively managed portion of the portfolio over the past year:

$$PortTE = ActivePct \times ActiveTE = TE$$

$$0.0326 = 0.6377 \times ActiveTE$$

$$ActiveTE = 0.0511$$

Given our MOU objective of 0.5% alpha (active return), and Exhibit 9.3 of TPIM, we can calculate what percent of our portfolio should be actively managed (*ActivePct**) to the same level of active tracking error during the past year (i.e., with $ActiveTE = 0.0511$) to be compliant with the MOU. I'll begin with setting the tracking error to twice the expected alpha ($2 \times 0.5\% = 1.0\%$):

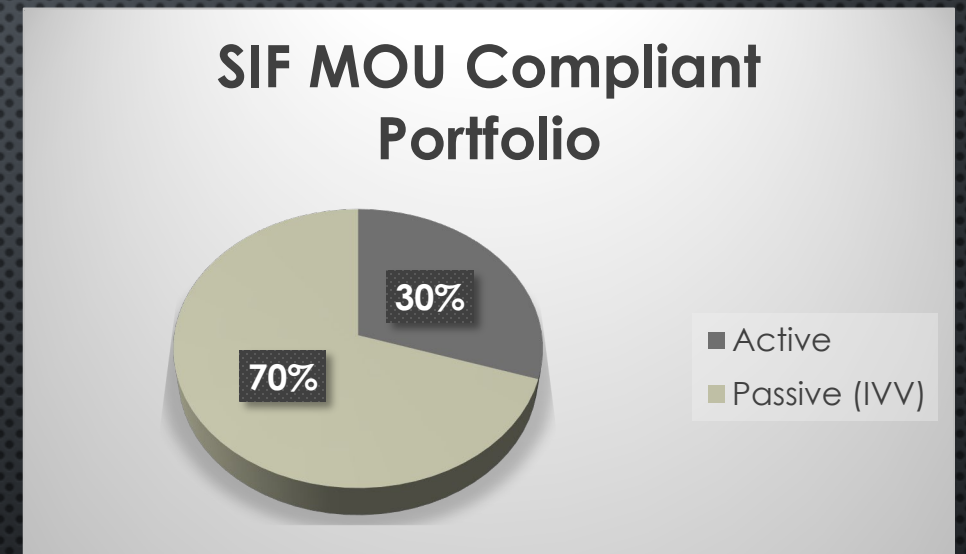
$$0.01 = ActivePct^* \times 0.0511$$

$$ActivePct^* = 0.1957 \text{ or } 19.57\%$$

There is an inherent trade-off that must not be ignored. To be compliant with the MOU we have (not an MOU we want to have), we must balance active tracking error with the actively managed percentage of the portfolio.

SOME MORE MATH: ACTIVE PERCENTAGE VS. PORTFOLIO TRACKING ERROR TRADEOFF

Active Percent	Active Tracking Error	Portfolio Tracking Error	Notes
63.37%	5.11%	3.26%	The past 12 months
63.37%	1.58%	1.00%	Compliant Active TE
19.57%	5.11%	1.00%	Compliant Active/ETF split
20%	5.00%	1.00%	Tradeoff illustration
25%	4.00%	1.00%	Tradeoff illustration
30%	3.33%	1.00%	Tradeoff illustration



Notes: The last row and associated graph above will show up as a constraint when we get to the optimization phase.

RECAP

We are an enhanced index fund.

Typical enhanced index fund S&P500/individual pick split is 80/20.

Ray Dalio uses [allegedly] 70/30.

Our client agrees with 70/30 and long-term (1yr+) holding periods.

The goal of the fund is to teach students various aspects of fund management, of which, stock picking is just one part.

Other parts include accounting, performance measurement, reporting, MIS, marketing, etc.

We have new students every semester. They all must learn all parts of the process.



FUND ACCOUNTING

CAN'T ASSESS WHERE WE ARE WITHOUT ACCURATE ACCOUNTING

FUND ACCOUNTING TASKS

Holdings file update

- Translate PDF and XLSX account statements into BBG format.
- Upload to terminal.
- Verified month end balance.
- Dealt with some missing values (DWDP) and mergers/acquisitions.

Pseudo-weekly updates

- Sector ETF/Individual split percentage.
- Overall portfolio ETF / Individual split.
- Individual pick tickers.
- Individual pick weights.



PERFORMANCE MEASUREMENT/ASSESSMENT

CURRENT PORTFOLIO ANALYSES

PORTFOLIO ANALYSES

Historical Return

- PORT, Attribution, Summary
 - Holdings vs. transactions.
 - What securities contributed (or detracted) from performance and why.
- PORT, Main View
- PORT, Performance, Statistical Summary

Historical Risk

- PORT, Performance, Statistical Summary

Forward Looking Return

- PORT, Characteristics, Main View
 - Pimped the Analysts
- Could also use the on-Terminal DDM IRR field (I couldn't get this going though).
- Could also use RIVER $E[R]$ – but a tricky task to implement in a Bloomberg formula.

Forward Looking Risk

- PORT, Tracking Error & Volatility
 - $E[TE]$
 - Risk Bets
- Trends – evolution of $E[TE]$

PORT->TRACKING ERROR/VOLATILITY ->TRENDS

	Return	Risk
Historical		✓
Forward-looking		✓

USING HISTORICAL WEIGHTS



USING CURRENT WEIGHTS





INDIVIDUAL SECURITY ANALYSIS

WHAT'S IN YOUR UNIVERSE?

THE RIVER

PAST

- Profitability (ROE, PM)
- Debt management (CR, D/E)
- Multiple (P/B growth as market signal of improving fundamentals)
- Relative Share Price Momentum (pimp the market)

PRESENT

- Multiples (P/E, P/C, P/S, etc.)
- Profitability (OPM, NPM, etc. vs. sector median)
- Debt management (DE vs sector median)

FUTURE

- BloombergSuite probability weighted upside/downside
- Analyst $E[R]$

TECHNICAL

- Skipped it (sort-of, it is buried in RSPM if. you used it).

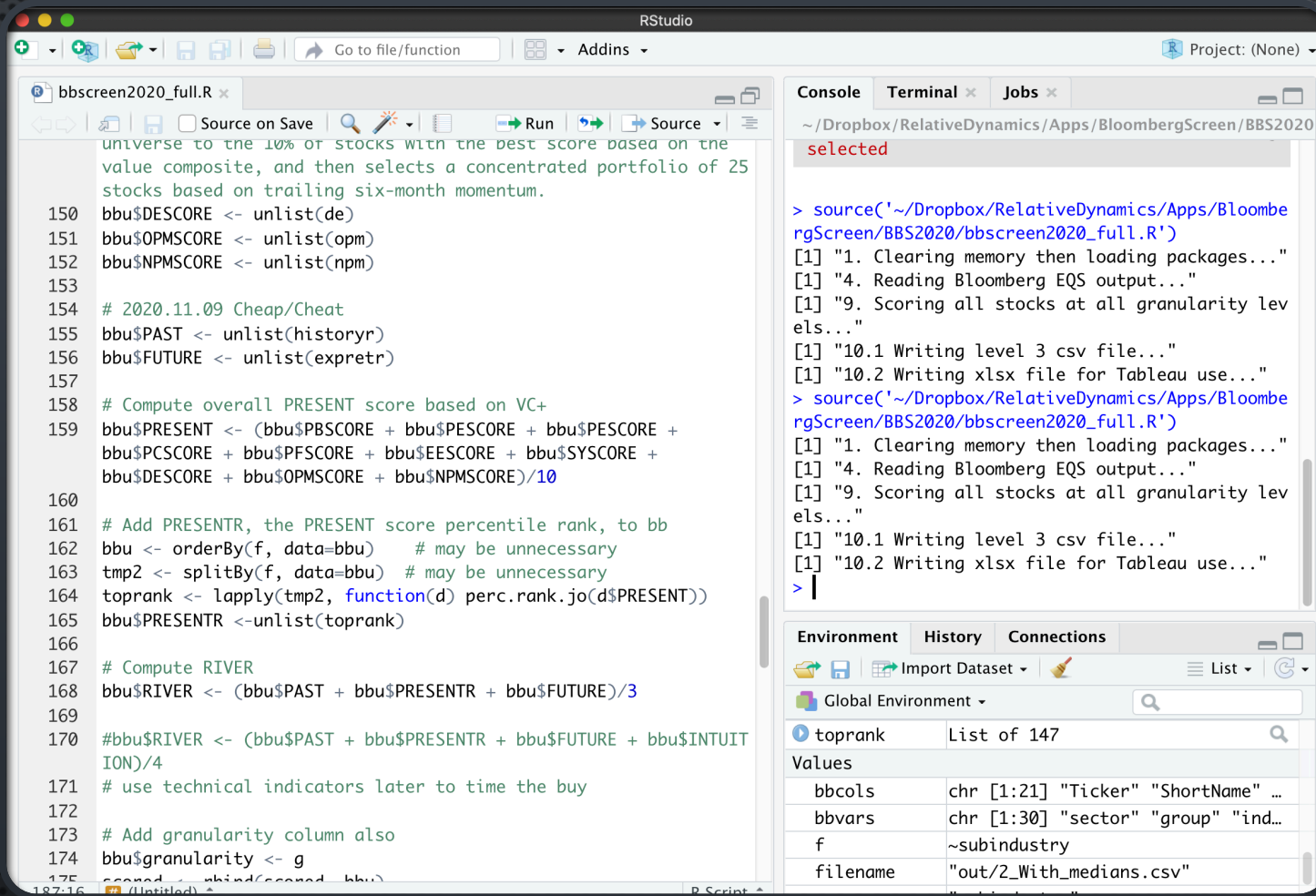
INTUITION

- Not to be ignored.
- Not to drive final decision (Kahneman - Thinking, Fast and Slow).

FISHING FOR DATA (DATA COLLECTION VIA EQS)

97) Formula	98) Actions ▾	99) Backtest	Equity Screening		
My Recent Screens	SIF_6e_20201109		As Of	11/10/2020	📅
11) SIF_6e_20201109	Screening Criteria		⌵ Expand Categories		
12) SIF6e+	31) Exchanges	32) Sectors	33) Country of Domicile		
13) Real Estate Hedge	34) Indices	35) Portfolios/Monitors	36) Equity Screens		
14) SIF6e-	Add Criteria				
15) SIF End2End			3) Fields		
16) Parasite 1H					
17) Parasite 1					
18) 00Base					
19) SIF6e					
20) All Saved Screens					
Popular Screens					
21) Global Covid-19 Imp...					
22) Global Infrastructure					
23) High CDS Spreads					
24) Insider Buyers					
25) SZSE SEHK Northbou...					
26) Value Screen					
30) More Screens					
	Selected Screening Criteria		Matches		
	Security Universe		1349677		
	51) 📊 Trading Status: Active		456245	⊗	
	52) 📊 Indices: S&P Total Market Index (TMI)		3745	⊗	
	53) 📊 Current Market Cap >= 2000 Million		1444	📘 ⊗	
	Display Only Fields		1444		
	54) GICS Sector Name		1444	📘 ⊗	
	55) GICS Industry Group Name		1444	📘 ⊗	
	56) GICS Industry Name		1444	📘 ⊗	
	57) GICS Sub-Industry Name		1444	📘 ⊗	
	58) Current Price to Book Ratio		1444	📘 ⊗	
	59) Current Price Earnings Ratio (P/E)		1444	📘 ⊗	
	60) Current Price to Sales Ratio		1444	📘 ⊗	
	61) Current Price/Cash Flow		1444	📘 ⊗	
	62) Current Price/Free Cash Flow		1444	📘 ⊗	

DATA PROCESSING (EXCEL, R, PYTHON, ON- TERMINAL, ETC.)



The screenshot displays the RStudio environment. The editor pane on the left contains R code for data processing, including variable assignments and calculations. The console pane on the right shows the execution of the code, with messages indicating the loading of packages and the writing of CSV and XLSX files. The environment pane at the bottom right shows the current environment with a list of objects, including 'toprank' and 'bbcvars'.

```
150 bbu$DESCORE <- unlist(de)
151 bbu$OPMScore <- unlist(opm)
152 bbu$NPMScore <- unlist(npm)
153
154 # 2020.11.09 Cheap/Cheat
155 bbu$PAST <- unlist(historyr)
156 bbu$FUTURE <- unlist(expretr)
157
158 # Compute overall PRESENT score based on VC+
159 bbu$PRESENT <- (bbu$PSCORE + bbu$PEScore + bbu$PEScore +
160 bbu$PCScore + bbu$PFScore + bbu$EEScore + bbu$SYScore +
161 bbu$DESCore + bbu$OPMScore + bbu$NPMScore)/10
162
163 # Add PRESENTR, the PRESENT score percentile rank, to bb
164 bbu <- orderBy(f, data=bbu) # may be unnecessary
165 tmp2 <- splitBy(f, data=bbu) # may be unnecessary
166 toprank <- lapply(tmp2, function(d) perc.rank.jo(d$PRESENT))
167 bbu$PRESENTR <- unlist(toprank)
168
169 # Compute RIVER
170 bbu$RIVER <- (bbu$PAST + bbu$PRESENTR + bbu$FUTURE)/3
171
172 #bbu$RIVER <- (bbu$PAST + bbu$PRESENTR + bbu$FUTURE + bbu$INTUIT
173 ION)/4
174 # use technical indicators later to time the buy
175
176 # Add granularity column also
177 bbu$granularity <- g
178 second <- as.numeric(second, bbu)
179
```

Console output:

```
> source('~/.Dropbox/RelativeDynamics/Apps/Bloombe
rgScreen/BBS2020/bbscreen2020_full.R')
[1] "1. Clearing memory then loading packages..."
[1] "4. Reading Bloomberg EQS output..."
[1] "9. Scoring all stocks at all granularity lev
els..."
[1] "10.1 Writing level 3 csv file..."
[1] "10.2 Writing xlsx file for Tableau use..."
> source('~/.Dropbox/RelativeDynamics/Apps/Bloombe
rgScreen/BBS2020/bbscreen2020_full.R')
[1] "1. Clearing memory then loading packages..."
[1] "4. Reading Bloomberg EQS output..."
[1] "9. Scoring all stocks at all granularity lev
els..."
[1] "10.1 Writing level 3 csv file..."
[1] "10.2 Writing xlsx file for Tableau use..."
> |
```

Environment pane:

Object	Value
toprank	List of 147
bbcvars	chr [1:21] "Ticker" "ShortName" ...
bbvars	chr [1:30] "sector" "group" "ind..."
f	~subindustry
filename	"out/2_With_medians.csv"

DATA VISUALIZATION (TABLEAU, PYTHON, R, EXCEL, ETC.)

Communication Services LUMN CENTURYLINK INC 0.1935 1.0000 0.3065 0.5000 6.42	Communication Services FOXA FOX CORP - A 0.0968 0.9355 0.5323 0.5215 14.49	Communication Services VIACA VIACOMCBS INC-A 0.7419 0.8710 0.5000 0.7043	Communication Services LSXMA LIBERTY MEDIA- A 0.4032 0.8387 0.8387 0.5000 0.6935 35.31	Communication Services LSXMK LIBERTY MEDIA-C 0.4355 0.8387 0.5000 0.5914 13.25
Communication Services DISCA DISCOVERY INC - 0.2097 0.9677 0.3710 0.5161 8.85	Communication Services T AT&T INC 0.3226 0.9194 0.3548 0.5323 8.30			
Communication Services DISCK DISCOVERY INC-C 0.2419 0.9677 0.2097 0.4731 2.01	Communication Services NXST NEXSTAR MEDIA-A 0.9839 0.9032 0.8065 0.8978 33.38	Communication Services TGNA TEGNA INC 0.0323 0.8387 0.2419 0.3710 2.97		Communication Services DISH DISH NETWORK-A 0.4516 0.7903 0.8710 0.7043 40.85
Communication Services FOX FOX CORP - B 0.0645 0.9355 0.7903 0.5968	Communication Services VIAC VIACOMCBS INC-B 0.7742 0.8710 0.1452 0.5968	Communication Services USM US CELLULAR CORP 0.2258 0.8065 0.8871 0.6398 42.25		Communication Services VZ VERIZON COMMUNIC 0.1129 0.7742 0.1613 0.3495 1.66

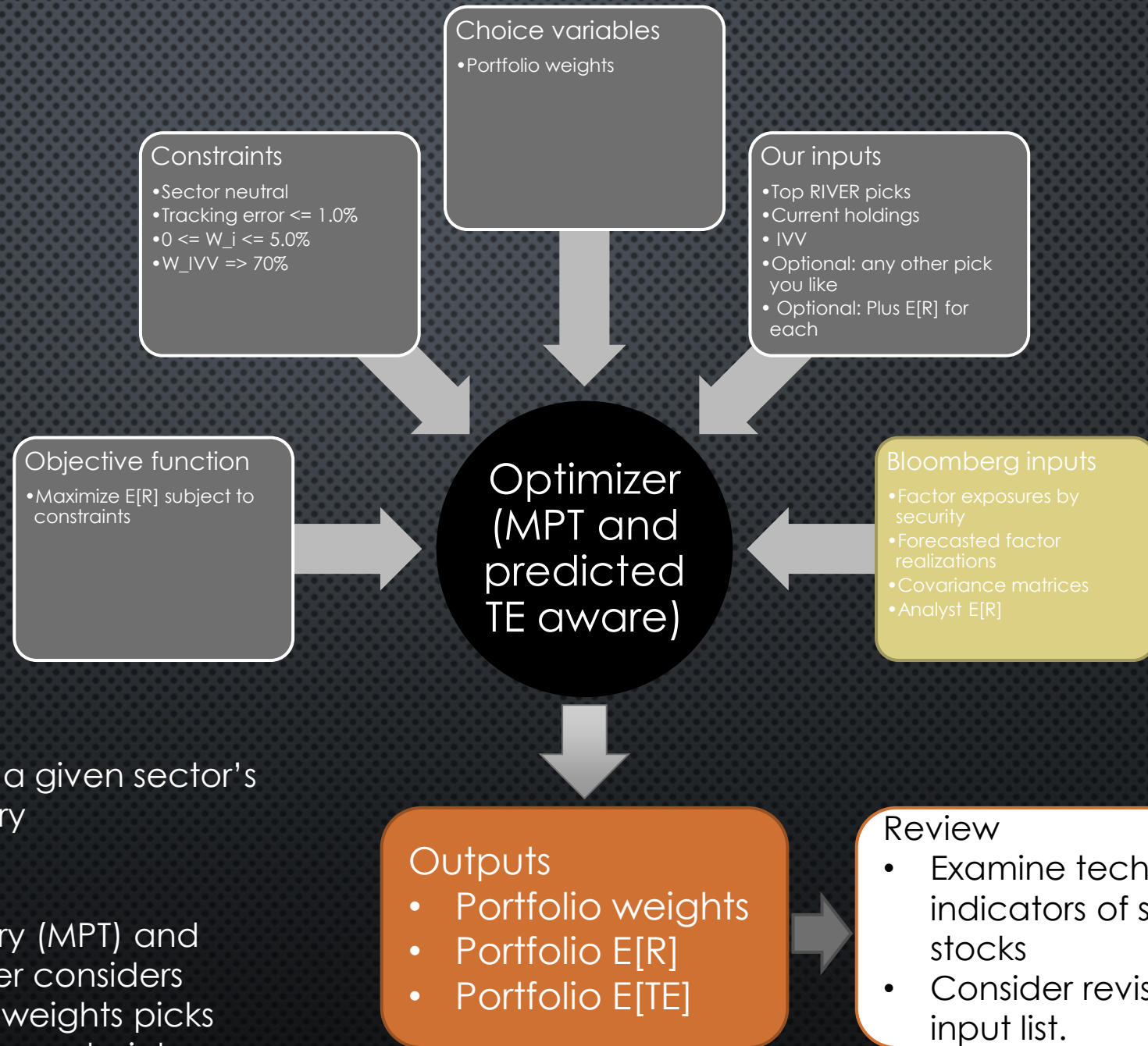
Sector	Ticker	Short Name	ER	Future	Past	Pres..	River
Communication Services	LUMN	CENTURYLINK INC	6.42	0.31	0.19	1.00	0.50
	DISCK	DISCOVERY INC-C	2.01	0.21	0.24	0.97	0.47
	DISCA	DISCOVERY INC -	8.85	0.37	0.21	0.97	0.52
	FOXA	FOX CORP - A	14.49	0.53	0.10	0.94	0.52
	FOX	FOX CORP - B	33.18	0.79	0.06	0.94	0.60
	T	AT&T INC	8.30	0.35	0.32	0.92	0.53
	NXST	NEXSTAR MEDIA-A	33.38	0.81	0.98	0.90	0.90
	VIACA	VIACOMCBS INC-A		0.50	0.74	0.87	0.70
	VIAC	VIACOMCBS INC-B	0.80	0.15	0.77	0.87	0.60
	TGNA	TEGNA INC	2.97	0.24	0.03	0.84	0.37
	LSXMK	LIBERTY MEDIA-C	13.25	0.50	0.44	0.84	0.59
	LSXMA	LIBERTY MEDIA- A	35.31	0.84	0.40	0.84	0.69
	USM	US CELLULAR CORP	42.25	0.89	0.23	0.81	0.64
	DISH	DISH NETWORK-A	40.85	0.87	0.45	0.79	0.70
	VZ	VERIZON COMMUNIC	1.66	0.16	0.11	0.77	0.35



OPTIMIZER TRAINING AND SETUP

WHAT IS THIS OPTIMIZER THING?

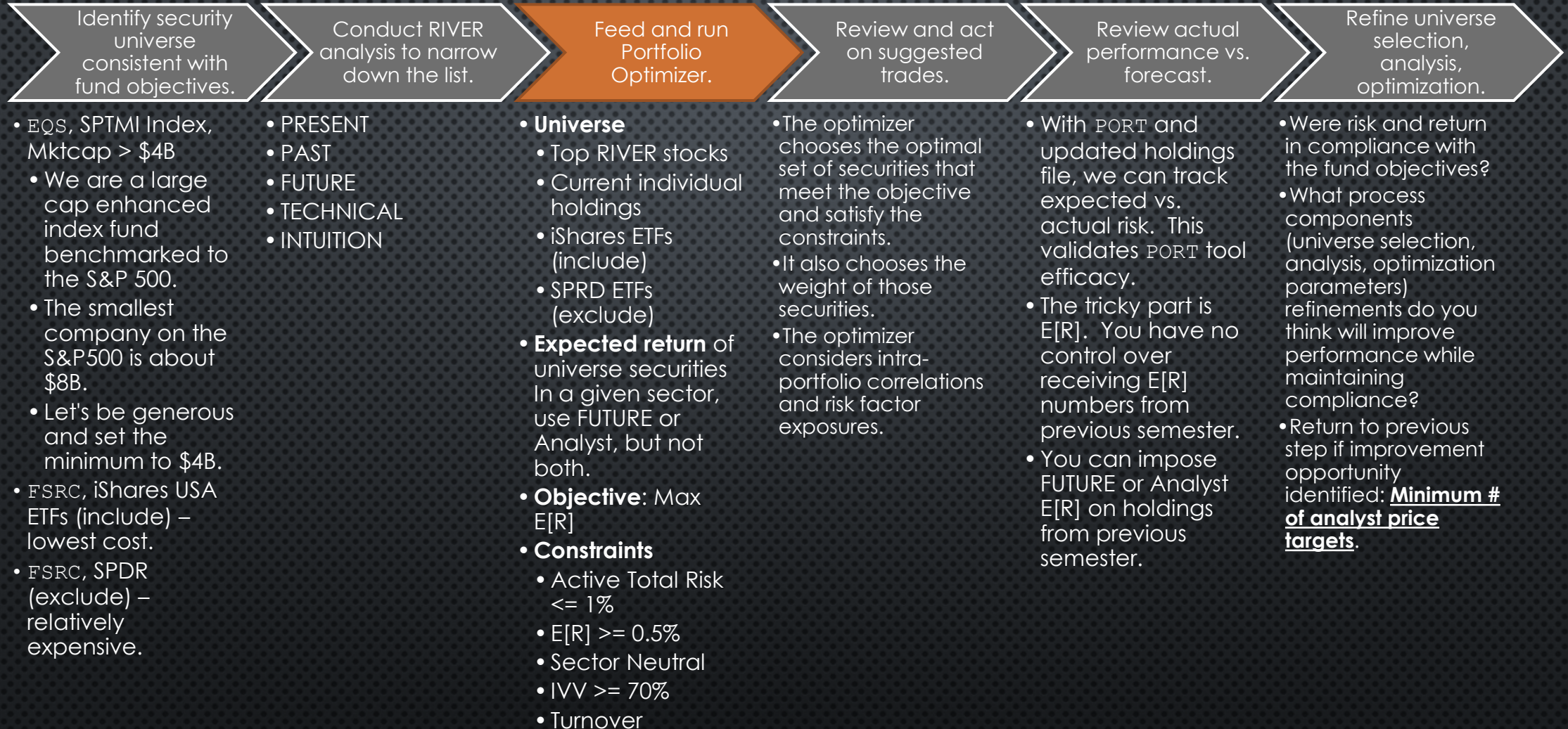
GENERAL OPTIMIZATION BASICS



Before Fall 2020: No consideration of a given sector's picks on the overall portfolio. Arbitrary big/medium/small buy/sell amounts.

After: Through modern portfolio theory (MPT) and predicted tracking error (TE), optimizer considers interaction with overall portfolio and weights picks according to objective function and constraints.

WHERE THE OPTIMIZER SITS IN THE PROCESS



Portfolio: SIFPORT2020	1. Goals (Objective)	2. Trade Universe	3. Constraints	4. Security Properties
• Current holdings • SPDRs • Cash	• Maximize $E[R]$ • Analyst 12mo ER	• Worksheet • Current holdings • Top picks • IVV • Anything you like • SPDR Liquidate • No-buy tobacco	• 3. Constraints • Active total risk (TE) ≤ 1 • Sector weights ± 1.0 • Analyst 12 mo ER ≥ 0.5 • Holding size (%) ≥ 0.5	• $70 \leq w_{IVV} \leq 100$ • Min cash 0.25 • Use "Ticker" not "Security"!

OPTIMIZER SETUP WITH BENCHMARK = IVV, RISK MODEL = BLOOMBERG RISK MODEL (REGIONAL)

OPTIMIZER SETUP

(OUR PROSPECTUS/MOU "IN THE FLESH")

1) Run		2) Tasks		3) Settings		99) Analyze in PORT		Portfolio Optimization			
Port SIFPORT2020		Bmrk ISHARES CORE S&P 500 ...		Risk Model		Bloomberg Risk Mc		12/04/20		Backtest	
51) Setup		52) Frontier		53) Backtest		54) Trades					
Task Name SIF20201206											
1. Goals											
Action		Field		Unit							
Maximize		Analyst 12mo ER									
2. Trade Universes											
Source		Security List		Rule							
Security Worksheets		SIF_NoBuy [18]		No Buy List							
Fund Screen (FSRC)		SPDR		Liquidate (No Hold)							
Security Worksheets		SIF_Universe_Fronzen_20201205		Trade List							
3. Constraints											
Constraint Field		Constraint Group		Relative		Unit		Min		Max Trade-Off	
Active Total Risk		Portfolio		Benchmark		%				1	
Analyst 12mo ER		Portfolio		Benchmark		%		0.5			
Holding Size (%)		Portfolio		None		%		0.5			
Weight		GICS Sector/Communication Serv		Benchmark		%		-1		1	
Weight		GICS Sector/Consumer Discretior		Benchmark		%		-1		1	
Weight		GICS Sector/Consumer Staples		Benchmark		%		-1		1	
Weight		GICS Sector/Energy		Benchmark		%		-1		1	
Weight		GICS Sector/Financials		Benchmark		%		-1		1	
Weight		GICS Sector/Health Care		Benchmark		%		-1		1	
Weight		GICS Sector/Industrials		Benchmark		%		-1		1	
Weight		GICS Sector/Information Technol		Benchmark		%		-1		1	
Weight		GICS Sector/Materials		Benchmark		%		-1		1	
Weight		GICS Sector/Real Estate		Benchmark		%		-1		1	
Weight		GICS Sector/Utilities		Benchmark		%		-1		1	
4. Security Properties											
Security		Relative		Unit		Min		Max		MinHld MinTrd MaxTrd Lot	
USD		Infuse		None		Wgt%		.25		5	
S Default for all		None		Wgt%		0		100		1	
T IVV US Equity		None		Wgt%		70		100			
T AAPL US Equity		Benchmark		Wgt%		0		0			
T AMZN US Equity		Benchmark		Wgt%		0		0			
T MSFT US Equity		Benchmark		Wgt%		0		0			
<Type or drag values>		None		Wgt%							



REVIEW OPTIMIZER OUTPUT

(YOUR PRESENTATION 2)

A	B	C	D	E	F
Item	2020.12.06 Portfolio	After 2020.12.07 trades (expectations)	Actual results as of 2021.05.14 (158 days)	2021.05.14 Portfolio	After 2021.05.17 trades (expectations)
Number of positions	55	29	28	28	29
Expected one-year return (E[R])*	5.52%	8.55%	13.79%	11.64%	14.38%
Expected excess return (E[α])*	-0.65%	2.38%	0.63% (annualized)	0.25%	2.90%
Expected tracking error (E[TE])**	3.44%	0.99%	1.27% (annualized)	1.09%	1.00%
% of E[TE] in Top 3 Risk Bets	71.54%	25.66%	23.79%	23.79%	28.26%
Price / Earnings Ratio	30.58	26.60	27.32	27.32	26.74
Dividend Yield	1.45%	1.65%	1.79%	1.79%	1.82%
ETF %	35%	78%	77%	77%	78%
Individual %	65%	22%	23%	23%	22%
ETF Expense ratio	0.095% to 0.13%	0.03%	0.03%	0.03%	0.03%
ETFs (\$)	\$289,351	\$639,560	\$720,507	\$720,507	\$728,034
PORT (\$)	\$821,002	\$821,002	\$934,312	\$934,312	\$934,312
Cash	\$8,434	\$2,075	\$16,376	\$16,376	\$4,044

SIF PORTFOLIO ANALYTICS BEFORE AND AFTER RECOMMENDED TRADES

- * Based on Bloomberg's BEst weighted-average analyst estimates of 1 year returns for all portfolio and benchmark holdings
- ** Based on Bloomberg's forward-looking factor risk model.
- More details on next slide

ANALYTICS HIGHLIGHTS

- ACTUAL VS. EXPECTED RESULTS FROM 12/07/2020 TRADES TO 05/14/2021, COLUMN C -> D
 - ACTUAL RETURN OF 13.79% EXCEED EXPECTATIONS OF 8.55% AT TIME OF TRADES LAST YEAR.
 - ACTUAL ALPHA OF 0.63% LOWER THAN EXPECTED 2.38% (MARKET PERFORMED BETTER THAN EXPECTED).
 - ACTUAL TRACKING ERROR OF 1.27% WAS HIGHER THAN EXPECTATIONS OF 0.99%. WE ANTICIPATED SOME DEVIATION HERE WITH THE TSLA INCLUSION IN S&P500 BENCHMARK.
 - [NOT SHOWN] ANNUALIZED STANDARD DEVIATION OF SIF PORTFOLIO WAS 13.47% VS. THE S&P 500 (IVV) AT 14.08%.
 - **PORTFOLIO VALUE INCREASED FROM \$821,002 TO \$934,312.**
- IMPROVEMENTS AFTER RECOMMENDED TRADES (ART) OF 5/17/2021, COLUMN E -> F
 - EXPECTED RETURN ART INCREASES FROM 11.64% TO 14.38%.
 - EXPECTED ALPHA ART INCREASES FROM 0.25% TO 2.90%..
 - TRACKING ERROR ART DECLINES FROM 1.09% TO 1.00%.
 - P/E DECLINES FROM 27.32 TO 26.74.
 - DIVIDEND YIELD INCREASES FROM 1.79% TO 1.82%.
 - CASH FROM EGOV (NIC INC) ACQUISITION PUT TO WORK. CASH BALANCE DECLINES FROM \$16,376 TO \$4,044.

PORTFOLIO HOLDINGS

BEFORE AND AFTER
RECOMMENDED TRADES

Before			After		
Name	Ticker	Pos (P)	Name	Ticker	Pos (P)
ACTIVISION BLIZZ	ATVI US	87	ACTIVISION BLIZZ	ATVI US	54
ALPHABET INC-A	GOOGL US	2	ADOBE INC	ADBE US	22
AMAZON.COM INC	AMZN US	2	ALARM.COM HOLDIN	ALRM US	57
AMDOCS LTD	DOX US	92	ALPHABET INC-A	GOOGL US	7
APPLE INC	AAPL US	95	AMAZON.COM INC	AMZN US	2
ASSURED GUARANTY	AGO US	225	AMBARELLA INC	AMBA US	52
BERKSHIRE HATH-B	BRK/B US	21	APPLE INC	AAPL US	91
CISCO SYSTEMS	CSCO US	267	APTIV PLC	APTIV US	34
DANAHER CORP	DHR US	52	CUMMINS INC	CMI US	18
DEERE & CO	DE US	18	DANAHER CORP	DHR US	19
DOMINION ENERGY	D US	62	FISERV INC	FISV US	64
ELECTRONIC ARTS	EA US	34	GENERAL MOTORS C	GM US	84
EXXON MOBIL CORP	XOM US	123	HOLOGIC INC	HOLX US	74
IBM	IBM US	41	LIBERTY MEDIA- A	LSXMA US	252
LIBERTY MEDIA- A	LSXMA US	148	LOCKHEED MARTIN	LMT US	15
LOCKHEED MARTIN	LMT US	19	MERCK & CO	MRK US	121
MAXIMUS INC	MMS US	90	MKS INSTRUMENTS	MKSI US	27
MERCK & CO	MRK US	98	NEXTERA ENERGY	NEE US	200
MERITAGE HOMES C	MTH US	58	NY COMM BANCORP	NYCB US	639
NETFLIX INC	NFLX US	10	ONEMAIN HOLDINGS	OMF US	86
NEXTERA ENERGY	NEE US	75	PENNYMAC FINanci	PFSI US	78
NORTHROP GRUMMAN	NOC US	26	PROCTER & GAMBLE	PG US	97
PROCTER & GAMBLE	PG US	70	SKYWORKS Solutio	SWKS US	30
PULTEGROUP INC	PHM US	122	SYNOPSYS INC	SNPS US	40
QUIDEL CORP	QDEL US	22	TECHNIPFMC PLC	FTI US	597
VERTEX PHARM	VRTX US	22	TELADOC HEALTH I	TDOC US	48
WASTE MANAGEMENT	WM US	35	THERMO FISHER	TMO US	12
ISHARES-C S&P500	IVV US	1723	VERTEX PHARM	VRTX US	22
US Dollar Spot	USD	16376	ISHARES-C S&P500	IVV US	1741
			US Dollar Spot	USD	4044

RECOMMENDED TRADES

43 trades this semester vs. 70 last semester. This is indicative of process refinement.

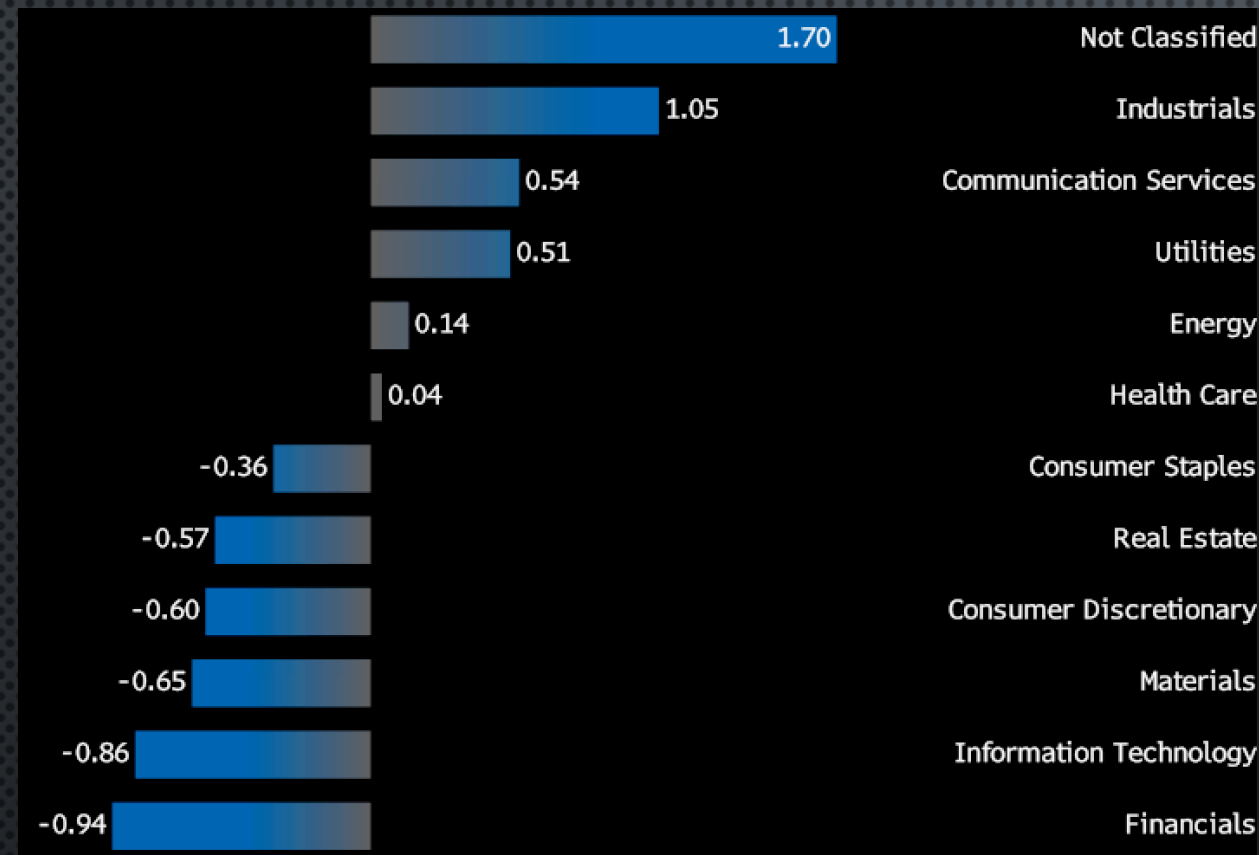
Sells				Buys		
Name	Ticker	Quantity		Name	Ticker	Quantity
ACTIVISION BLIZZ	ATVI US	-33		ADOBE INC	ADBE US	22
AMDOCS LTD	DOX US	-92		ALARM.COM HOLDIN	ALRM US	57
APPLE INC	AAPL US	-4		ALPHABET INC-A	GOOGL US	5
ASSURED GUARANTY	AGO US	-225		AMBARELLA INC	AMBA US	52
BERKSHIRE HATH-B	BRK/B US	-21		APTIV PLC	APTV US	34
CISCO SYSTEMS	CSCO US	-267		CUMMINS INC	CMI US	18
DANAHER CORP	DHR US	-33		FISERV INC	FISV US	64
DEERE & CO	DE US	-18		GENERAL MOTORS C	GM US	84
DOMINION ENERGY	D US	-62		HOLOGIC INC	HOLX US	74
ELECTRONIC ARTS	EA US	-34		ISHARES-C S&P500	IVV US	18
EXXON MOBIL CORP	XOM US	-123		LIBERTY MEDIA- A	LSXMA US	104
IBM	IBM US	-41		MERCK & CO	MRK US	23
LOCKHEED MARTIN	LMT US	-4		MKS INSTRUMENTS	MKSI US	27
MAXIMUS INC	MMS US	-90		NEXTERA ENERGY	NEE US	125
MERITAGE HOMES C	MTH US	-58		NY COMM BANCORP	NYCB US	639
NETFLIX INC	NFLX US	-10		ONEMAIN HOLDINGS	OMF US	86
NORTHROP GRUMMAN	NOC US	-26		PENNYMAC FINANCI	PFSI US	78
PULTEGROUP INC	PHM US	-122		PROCTER & GAMBLE	PG US	27
QUIDEL CORP	QDEL US	-22		SKYWORKS SOLUTIO	SWKS US	30
WASTE MANAGEMENT	WM US	-35		SYNOPSYS INC	SNPS US	40
				TECHNIPFMC PLC	FTI US	597
				TELADOC HEALTH I	TDOC US	48
				THERMO FISHER	TMO US	12

TRADE HIGHLIGHTS OF TOP/BOTTOM 5 RETURNERS.

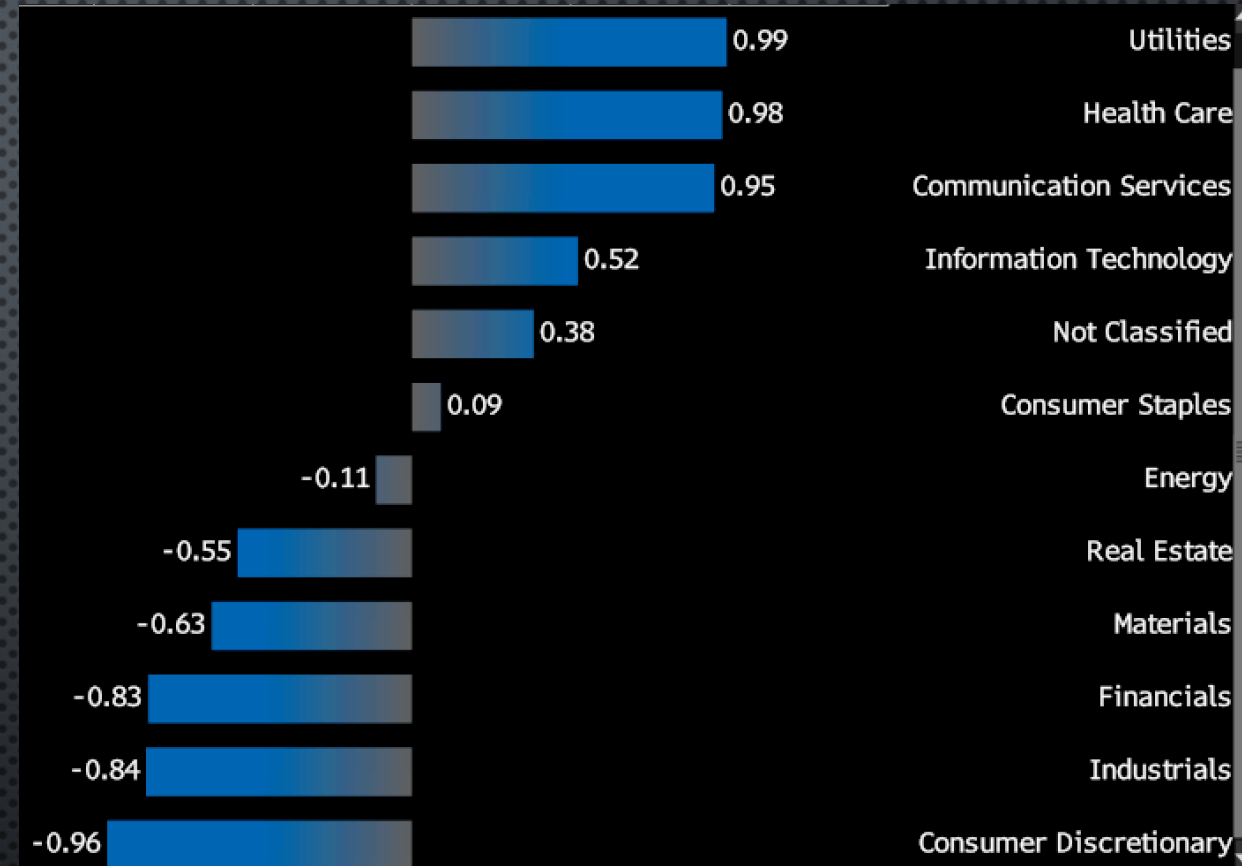
- Table represents total return (Tot Rtn) and Contribution to Total Return (CTR) from 12/07/2020 to 05/14/2021.
- Note: Ultimate buy/sell decisions and quantities based on Bloomberg's Portfolio Optimizer tool as was the case last semester.

Name	Ticker	Avg % Wgt (P)	Tot Rtn (P)	CTR (P)	Notes
ASSURED GUARANTY	AGO US	1.03	57.51	0.48	Sell all (capture gains)
EXXON MOBIL CORP	XOM US	0.73	53.33	0.33	Sell all (capture gains)
DEERE & CO	DE US	0.68	53.18	0.30	Sell all (capture gains)
NIC INC	EGOV US	0.76	40.98	0.32	Acquired 4/22 in all cash transaction
PULTEGROUP INC	PHM US	0.68	34.85	0.22	Sell all (capture gains)
LIBERTY MEDIA- A	LSXMA US	0.74	-2.07	-0.01	Buy more (good value w/ favorable forward return/risk)
MERCK & CO	MRK US	0.88	-3.51	-0.04	Buy more (good value w/ favorable forward return/risk)
NETFLIX INC	NFLX US	0.60	-4.34	-0.03	Sell all (cut losses)
VERTEX PHARM	VRTX US	0.56	-4.39	-0.03	Hold (favorable forward return/risk)
QUIDEL CORP	QDEL US	0.43	-39.04	-0.20	Sell all (cut losses)

Before



After Recommended Trades (ART)



FYI: BEFORE AND AFTER SECTOR
WEIGHTINGS

NOT CLASSIFIED = CASH



ROBOT COEXISTENCE

"MAKE DECISIONS IN PARALLEL WITH THE ALGORITHMS" –RAY DALIO

(Fidelity FLC EX prospectus)

Generally using computer-aided, quantitative analysis to select stocks to



The approach employed by SIF is consistent with:

1. Fidelity's Large Cap Core Enhanced Index Fund prospectus: "using computer-aided, quantitative analysis to select stocks."
2. Ray Dalio's Ted Talk (radical transparency) where he says "we make decisions in parallel with the algorithms."
3. Comments from BlackRock Portfolio Managers:
 - a. "SIF historically over-emphasized stock picking."
 - b. "Humans won't be picking stocks in 5 to 10 years."
 - c. "Students will not be Portfolio Managers immediately after graduation."
 - d. "There are many non-stock picking jobs students will do first."
4. Dalio's team "spent five years researching equities and testing strategies before making its first investment" – Financial News 2006.09.11

A GENERAL PORTFOLIO MANAGEMENT PROCESS...



Identify security universe consistent with fund objectives.



Conduct analysis to narrow down the list.



Feed and Run Portfolio Optimizer.



Review and act on suggested trades.



Review actual performance vs. forecast.



Refine universe selection, analysis, optimization.

PROCESS IMPROVEMENT THIS SEMESTER

- ADDED FEEDBACK LOOP FROM OPTIMIZER OUTPUT TO OPTIMIZER SETUP.
 - THIS RESULTED IN REFINED SCREENING TO FILTER OUT STOCKS WITH < 4 RECENT (PAST 3 MONTH) ANALYST TARGET PRICE ESTIMATES.
 - THIS [THEORETICALLY] IMPROVES THE RELIABILITY OF THE BEST ANALYST EXPECTED RETURN $E[R]$ WEIGHTED AVERAGE FROM BLOOMBERG.
 - THE OPTIMIZER RELIES HEAVILY ON $E[R]$ AND IT IS GOOD TO HAVE SOME REFINEMENT THIS SEMESTER.
- ALTHOUGH WE HAVEN'T MEASURED ESG, ONE STUDENT, WHOSE LAST NAME IS GREEN, IS HAPPY TO SEE XOM SOLD BY THE OPTIMIZER.
 - FOR NEXT SEMESTER OR NEXT MOU: CAPTURE ESG METRICS AND PERHAPS INTEGRATE INTO PROCESS.
- IMPROVED PRESENT SCORE TO EQUALLY WEIGHT JO (GOOD VALUE) AND WB (GOOD BUSINESS) CRITERIA.



TASKS FOR NEXT SEMESTER

SOME IMPORTANT TASKS FOR NEXT SEMESTER

- ACCOUNTING RELATED
 - TRANSACTIONS FILES SINCE INCEPTION.
 - STATEMENT TO HOLDING FILE UPDATES FROM MAY, JUNE, JULY.
- PERFORMANCE MEASUREMENT / COMPLIANCE
 - TRACK EVOLUTION OF $E[\text{ALPHA}]$ AND $E[\text{TE}]$.
 - UPDATE TABLE IN THE ANALYTICS [SLIDE](#).
- MARKETING / MIS
 - ESTABLISH PROCESS TO PUBLISH PORTFOLIO METRICS ON WEBSITE.
- PROFESSOR
 - IDENTIFY PAPER-BASED TRAINING PLATFORM.
 - DECIDE HOW TO INTEGRATE IT INTO THE COURSE.
 - CONSIDER 20% STOP LOSS ON ALL STOCKS
- ALL
 - THINK ABOUT REFINEMENTS TO $E[R]$ MEASURE.
 - AUTOMATIC ANR FULL DATA EXTRACTION.

SPECIAL THANKS

Fiorella, Jarnail, Jovani, Kris, Lucas: support and insights from last semester.

Ryan: arithmetic mean vs. geometric mean.

John: TDOC pain leading to process refinement.

Michael: PAST automation, constant reminders of unknowable future.

Jaclisha: for trying to be the professor, green encouragement.

Tara, Fabian: grading watchdogs.

Eric: for the ½ off discount for my bike tune-ups!

Tou: Looking into free (or lower cost) Bloomberg alternatives.

William: Keeping the MBA in your sector in check.

Miguel: Uber-professional presentations.

Rami: getting up at odd hours overseas to attend class and present.

The background is a pixelated image of a sunset or moon over the ocean. A bright, circular light source is in the upper center, casting a long, horizontal glow across the water. In the lower-left foreground, there is a dark, pixelated shape that looks like the bow of a small boat. The overall color palette is dominated by dark blues and greys, with the bright light source providing a focal point.

I'M DONE

DON'T FORGET THE GUIDEBOOK UPDATE!

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