Completion Portfolios

G. Michael Phillips, Ph.D. George Arzumanyan, CFA, CIMA® James Chong, Ph.D. William Jennings, Ph.D.

California State University, Northridge Center for Financial Planning & Investment and

MacroRisk Analytics

Completion Portfolio

- Used to manage the risk of a concentrated investment position.
- Takes into account the risk exposures of the concentrated position including non-marketed assets to build a completion portfolio such that the combination of two portfolios tracks the benchmark as close as possible.
- Tax-optimized equity strategies seek to combine investment and tax considerations in making
 investment decisions. They start with the generic concept of tax efficiency and quantitatively
 incorporate dimensions of risk and return in the investment decision-making process. In the
 context of managing the risk of a concentrated stock position, these strategies are used in two
 primary ways: (1) as an index-tracking strategy with active tax management and (2) in the
 construction of completeness portfolios.(Institute 354)

Source:

Institute, CFA. 2016 CFA Level III Volume 2 Behavioral Finance, Individual Investors, and Institutional Investors. Reading 11. Concentrated Single-Asset Positions. Page 354. CFA Institute, 07/2015. VitalBook file.

Completion Portfolio

 Is a portfolio that when added to the active manager's holdings creates an overall portfolio with exposures similar to the investor's benchmark.

Active holding(s), concentrated position

High exposure to technology sector



The overall portfolio's exposures would be more aligned with those of the benchmark (e.g., S&P 500 Index) than those of the active portfolio which has an overconcentrated risk in the technology sector.

Why is a Completion Portfolio Needed?

- It is used to diversify existing concentrated holdings to align the overall portfolio to the benchmark.
- Consider the following examples:
 - Concentrated position in a publicly traded stock such as Apple
 - Ownership of a private business or commercial/investment real estate
 - Large, Restricted, Position in IBM that can't be sold because of trust or tax reasons
 - Employee stock options or ESOP position
- From a fiduciary standpoint, it allows us to diversify existing portfolio of a client which might be concentrated in one or a few securities. Having one's wealth concentrated in a few positions may not be prudent.

Source:

Institute, CFA. 2016 CFA Level III Volume 2 Behavioral Finance, Individual Investors, and Institutional Investors. Reading 11. Concentrated Single-Asset Positions. Page 340. CFA Institute, 07/2015. VitalBook file.

Completion Portfolio Creation

- Often, when the completion portfolio is first created, it is small in size relative to the value of the concentrated positions (assuming most wealth is in the concentrated positions)
- Over time, the value would be moved from the concentrated positions into the completion portfolio which would be tracking the benchmark. How fast or slow the value is moved into the completion portfolio would depend on the unique circumstances of the case (e.g., constraints of selling stock owned by an executive of a company).

Source:

Institute, CFA. 2016 CFA Level III Volume 2 Behavioral Finance, Individual Investors, and Institutional Investors. Reading 11. Concentrated Single-Asset Positions. Page 354. CFA Institute, 07/2015. VitalBook file.



Standard Approach to Creating a Completion Portfolio

- The first step is to compare sector weights of the concentrated portfolio to sector weights of the S&P 500 Index or another benchmark. Then, create a completion portfolio that would align the overall sector weights/exposures to that of the benchmark.
- The second step is to create the completion portion of the portfolio to have low or negative correlation with the existing portfolio by selecting assets within each sector that have low or negative correlation with the existing portfolio. The returns correlation matrix provided by MacroRisk Analytics assists with this task.
 - Next slides show how this can be done with the help of MacroRisk Analytics.
- The completion portfolio would reduce correlation with the concentrated portfolio by excluding similar industry and sector investments.

Hypothetical Example

- Assume an executive, Jane Williams, at Apple who earns 30% (\$300,000) of her total compensation as salary and 70% (\$700,000) as restricted stock which can't be sold for five years. So far, she has accumulated \$1.5 million in restricted Apple Stock. She has \$500,000 in cash that she wants to invest.
- Jane has a large portion of her total wealth in Apple stocks (i.e., technology sector) which she can't sell at the moment.
- Her benchmark is the S&P 500 Index.
- The completion portfolio would need to have holdings that have low correlation to Apple stock (or the technology sector).

• The goal is to invest \$500,000 in assets that have low correlation to Apple so that the overall portfolio would have similar exposures as the S&P 500 Index.

	S&P 500 Index	Concentrated	
Sector	Weight as of 2/28/18	Portfolio	Completion Portfolio Weight
Information Technology	25.2%	100.0%	?
Financials	15.0%	0.0%	?
Health Care	13.8%	0.0%	?
Consumer Discretionary	12.7%	0.0%	?
Industrials	10.2%	0.0%	?
Consumer Staples	7.5%	0.0%	?
Energy	5.5%	0.0%	?
Materials	2.9%	0.0%	?
Utilities	2.7%	0.0%	?
Real Estate	2.6%	0.0%	?
Telecommunications	1.9%	0.0%	?

Step 1 Figure out the sector weight in the completion portfolio so that the overall portfolio sector weight would be closer to the S&P 500 Index.

• Determine the sector weights of the benchmark by excluding the sector in which the concentrated position is held (in this case, it's the information technology sector)

	S&P 500 Index	Concentrated	S&P 500 Index Sector
Sector	Weight as of 2/28/18	Portfolio	Weight excl. IT sector
Information Technology	25.2%	100.0%	Excluded
Financials	15.0%	0.0%	20.1%
Health Care	13.8%	0.0%	18.4%
Consumer Discretionary	12.7%	0.0%	17.0%
Industrials	10.2%	0.0%	13.6%
Consumer Staples	7.5%	0.0%	10.0%
Energy	5.5%	0.0%	7.4%
Materials	2.9%	0.0%	3.9%
Utilities	2.7%	0.0%	3.6%
Real Estate	2.6%	0.0%	3.5%
Telecommunications	1.9%	0.0%	2.5%
Total	100.0%	100.0%	100.0%

Formula:

Sector weight divided by the sum of sector weights excluding the IT sector.

This shows how much of the \$500,000 cash should be invested in each sector.

Sector	S&P 500 Index Weight as of 2/28/18	Concentrated Portfolio	S&P 500 Index Sector Weight excl. IT sector	Con	pletion Portfolio \$ Value	Completion Portfolio Weight	Ove	erall Portfolio \$ Value	Overall Portfolio Weight
Information Technology	25.2%	100.0%	Excluded	\$	-	0.0%	\$	1,500,000	75.0%
Financials	15.0%	0.0%	20.1%	\$	100,267	20.1%	\$	100,267	5.0%
Health Care	13.8%	0.0%	18.4%	\$	92,246	18.4%	\$	92,246	4.6%
Consumer Discretionary	12.7%	0.0%	17.0%	\$	84,893	17.0%	\$	84,893	4.2%
Industrials	10.2%	0.0%	13.6%	\$	68,182	13.6%	\$	68,182	3.4%
Consumer Staples	7.5%	0.0%	10.0%	\$	50,134	10.0%	\$	50,134	2.5%
Energy	5.5%	0.0%	7.4%	\$	36,765	7.4%	\$	36,765	1.8%
Materials	2.9%	0.0%	3.9%	\$	19,385	3.9%	\$	19,385	1.0%
Utilities	2.7%	0.0%	3.6%	\$	18,048	3.6%	\$	18,048	0.9%
Real Estate	2.6%	0.0%	3.5%	\$	17,380	3.5%	\$	17,380	0.9%
Telecommunications	1.9%	0.0%	2.5%	\$	12,701	2.5%	\$	12,701	0.6%
Total	100.0%	100.0%	100.0%	\$	500,000	100.0%	\$	2,000,000	100.0%

\$500,000 cash is invested in the completion portfolio. The overall portfolio is not as concentrated in the IT sector as the client's original portfolio.

- Assume, we want to create an overall portfolio of 35 stocks (with Apple being in the portfolio).
- What 34 stocks do we need to purchase in the completion portfolio and how much to put in each stock?
- \$500,000 / 34 = \$14,706 in each stock

Sector	Com	pletion Portfolio \$ Value	Completion Portfolio Weight	Overall Portfolio \$ Value		Overall Portfolio \$ Value		Overall Portfolio Weight	# of stocks to purchase in the completion portfolio
Information Technology	\$	-	0.0%	\$	1,500,000	75.0%	0		
Financials	\$	100,267	20.1%	\$	100,267	5.0%	7		
Health Care	\$	92,246	18.4%	\$	92,246	4.6%	6		
Consumer Discretionary	\$	84 <i>,</i> 893	17.0%	\$	84,893	4.2%	6		
Industrials	\$	68,182	13.6%	\$	68,182	3.4%	5		
Consumer Staples	\$	50,134	10.0%	\$	50,134	2.5%	3		
Energy	\$	36,765	7.4%	\$	36,765	1.8%	3		
Materials	\$	19,385	3.9%	\$	19,385	1.0%	1		
Utilities	\$	18,048	3.6%	\$	18,048	0.9%	1		
Real Estate	\$	17,380	3.5%	\$	17,380	0.9%	1		
Telecommunications	\$	12,701	2.5%	\$	12,701	0.6%	1		
Total	\$	500,000	100.0%	\$	2,000,000	100.0%	34		

\$100,267 / \$14,706 = 7

	# of stocks to purchase in the
Sector	completion portfolio
Information Technology	0
Financials	7
Health Care	6
Consumer Discretionary	6
Industrials	5
Consumer Staples	3
Energy	3
Materials	1
Utilities	1
Real Estate	1
Telecommunications	1
Total	34

Now, which stocks should be purchased in each sector?

• We can select stocks that have the lowest correlation to Apple stock.

	Name	Symbol	Alpha	Up- Market Alpha	Down- Market Alpha	Beta 🕜	Up- Market Beta	Down- Market @ Beta	CAPM R ²	Up- Market CAPM R ²	Down- Market CAPM R ²	Correlation	Up-Market Correlation	Down- Market Correlation
1	Cboe Global Markets Inc	CBOE	0.3078	0.6323	0.4438	-0.0079	-0.2783	0.2242	0.0001	0.0395	0.0214	-0.0093	-0.1987	0.1463
	Brighthouse Financial Inc	BHF										-		
	Citizens Financial Group Inc	CFG		-		-	-			-		-		
	Navient Corp	NAVI												
	Synchrony Financial	SYF												
2	Regions Financial Corp	RF	0.2695	0.4585	0.0312	0.0041	-0.1256	-0.2181	0.0000	0.0043	0.0098	0.0034	-0.0655	-0.0992
3	Willis Towers Watson Public Ltd Company	WLTW	0.1189	0.2369	-0.1825	0.0397	-0.0299	-0.3368	0.0036	0.0010	0.0617	0.0598	-0.0318	-0.2483
(4)	KeyCorp	KEY	0.2122	0.2597	0.2537	0.0813	0.0327	0.1437	0.0058	0.0004	0.0051	0.0760	0.0195	0.0712
5	CME Group Inc	CME	0.2794	0.3825	0.4217	0.0737	-0.0304	0.2519	0.0103	0.0009	0.0273	0.1017	-0.0301	0.1652
6	J P Morgan Chase & Co	JPM	0.2099	0.4658	0.2668	0.0964	-0.1301	0.2415	0.0121	0.0082	0.0249	0.1102	-0.0906	0.1577
$\overline{7}$	M&T Bank Corp	MTB	0.1506	0.1156	0.2127	0.0882	0.1155	0.1466	0.0127	0.0085	0.0104	0.1127	0.0922	0.1019
	Discover Financial Services	DFS	0.1515	0.4341	0.3040	0.1009	-0.1679	0.3645	0.0132	0.0130	0.0591	0.1147	-0.1142	0.2431
	Cincinnati Financial Corp	CINF	0.1364	0.0152	0.1967	0.0821	0.2017	0.1047	0.0139	0.0291	0.0078	0.1178	0.1705	0.0886
	Chubb Limited	СВ	0.1177	0.0427	0.0697	0.0694	0.1540	-0.0193	0.0157	0.0298	0.0004	0.1255	0.1726	-0.0192
	Huntington Bancshares	HBAN	0.1960	0.3676	0.2465	0.1436	-0.0156	0.2574	0.0179	0.0001	0.0148	0.1338	-0.0097	0.1215

This is a report provided by MacroRisk Analytics for a Financials sector buylist.

This report can be used to analyze the correlation of Apple with the Financials sector stocks and select those stocks that have low correlation with Apple.

One can customize the report by selecting the returns period and the frequency of returns information (e.g., daily or monthly).

The screenshot shows the correlation for the past five years using monthly returns.

We need 7 stocks in the Financials sector.

- Same process would be performed for other sectors.
- At the end, we would have 34 stocks in the completion portfolio that would bring the portfolio closer to the benchmark.
- As time progresses, the completion portfolio would grow in size as capital is moved from the concentration portfolio into the completion portfolio.



Performance of Completion Portfolio vs the S&P 500 Index over one year

- Let's say we created a completion portfolio, on March 1, 2017, using the approach discussed earlier.
- Here's the performance of the completion portfolio (from 3/1/2017 to 3/1/2018)
 - Completion portfolio vs S&P 500 Total Return Index vs Apple Inc.



Completion v1 2017-03-01

Compare: S&P 500 Total Return

Type: Portfolio | Notes

Historic Returns Measures	Completion v1 2017-03-01	@GU6	Apple 2017-03-01
Total Return	3.26%	13.98%	26.65%
Annualized Ret.	3.27%	13.99%	26.67%
TT Month Ret.	3.26%	13.98%	26.65%
Avg. Daily Ret.	0.01%	0.05%	0.10%
Annualized Mean Ret.	3.81%	13.54%	25.42%
Std. Dev of Returns	0.1101	0.1003	0.1941
Upper SemiDev of Returns	0.1009	0.0855	0.2076
Lower SemiDev of Returns	0.1194	0.1139	0.1831

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Performance Report Dates: 03/01/2017 — 03/01/2018 using dividend & split adjusted series

Performance of Overall Portfolio vs the S&P 500 Index over one year

• Here's the performance of the overall portfolio (which contains the completion portfolio and Apple stock) versus the S&P 500 Total Return Index (from 3/1/2017 to 3/1/2018):

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Mar '18

Feb '18



Oct '17

Sep '17

Nov '17

Dec '17

lan '18

Jun[']'17

Mar '17

Apr '17

May '17

Jul '17

Aug '17

Historic Returns Measures	Overall v1 2017-03-01	@GU6
Total Return	19.20%	13.98%
Annualized Ret.	19.21%	13.99%
TT Month Ret.	19.20%	13.98%
Avg. Daily Ret.	0.07%	0.05%
Annualized Mean Ret.	18.65%	13.54%
Std. Dev of Returns	0.1521	0.1003
Upper SemiDev of Returns	0.1598	0.0855
Lower SemiDev of Returns	0.1459	0.1139

Alternative (and we believe better) Way to Create A Completion Portfolio: Using MacroRisk Analytics

- The MacroRisk model calculates each security's and portfolio's exposure to the economy using 18 pre-specified economics factors.
- Each economic factor represents a type of risk or exposure.
- Each portfolio has its own exposure to the economy (18 factors).
- Each benchmark has its own exposure to the economy (18 factors).
- We can use MacroRisk Analytics tools to create a completion portfolio that when combined with an active portfolio would create an overall portfolio with characteristics like the benchmark.

• Let's continue with the previous example of an executive with \$1.5 million in Apple restricted stock and \$500,000 in cash she wants to invest.

- What is the sensitivity exposure of the benchmark, the S&P 500 Index, to the economy?
- According to the MacroRisk Report as of 3/2/2018:





- It can be seen that the S&P 500 Index has high positive exposure to the intermediate government bond yield.
- If the intermediate yields increase by 1 standard deviation, the S&P 500 Index is expected to rise by more than 10%.
- Whereas, if the long term yields increase by 1 standard deviation, the Index is expected to drop by almost 10%.



- As can be seen, Apple has different exposures (grey bars) to the economy than the S&P 500 Index (blue bars).
- The goal of the completion portfolio is to contain securities so that the final overall portfolio has the same exposures as the S&P 500 Index (blue bars).

- MacroRisk Analytics optimization tool can be used to create such a completion portfolio.
- First, create the concentration portfolio consisting of Apple stock:

R & D

Research -



MacroRisk Optimization Settings

Next, select optimization goal. In this case, we want to match the Eta[®] profile, or the exposures, of the S&P 500 Index:

Goa	al & Date Se	ettings							
Date:	118								
Optimiz	ation Goal:								
	num MacroRisk Exposure	•							
Curr	ent Economic Status	✓ with MacroRisk Level 𝒜 0							
••••			Ō	100	200	300	400	500	600
	mize Sharpe Ratio								
◯ Maxii	mize Sortino Ratio								
Matc	h same 🖂 Eta Profile	e: Ticker/ Index Symbol 🗸 @GU6 -	S&P 500	Total Return					

• Under selling settings, we would select that we don't want to sell Apple stock:

Selling Settings
 O not sell anything.
O Dollar amount: \$ (total portfolio value is \$1,483,554.28, Split Adjusted)
○ Percent of portfolio value: %
○ Forced sales only.
○ Forced sales plus additional dollar amount: \$
○ Sell all not 'Protected'.

- Under purchasing settings, we want to purchase \$500,000 worth of securities.
- We'll put a maximum holding constraint of 2.85% (100/35), so that the final optimized portfolio would contain at least 35 stocks.
- Finally, we'll put in our buylist which would contain the S&P 500 buylist (note it will include the IT sector stocks as well).



• Review our settings/inputs before creating the completion portfolio:

Confirm Settings					
Please review the settings for this Macrol	Risk Optimization.	. If everything is cr	orrect, click	the STAF	RT OPTIMIZATION button at the botto
Optimization Name					
Cancel					
Starting Portfolio					
Temporary Portfolio Client:					
	Asset Name	Ticker Symbol	Market	Shares	Has Eta Data as of 03/07/2018?
	Apple Inc	AAPL	NASDAQ	8476.0	Yes
Optimization Date: 03/07/2018 MacroRisk Optimization Goal: Eta back to Goal & Date Selling Settings	Profile for S&P 50	0 Total Return			
 No selling. 					
+ back to Selling Settings					
Purchasing Settings					
 Purchase fixed dollar amount: \$500, Purchase in lots any size. Maximum holding size(percentage of Select new purchases from these sa)00.00 f portfolio value): 2 ved buylists:	2.9%			

- Results of the optimization process.
- Stocks to purchase are shown on the right.

Net Optimization Transactions

Purchase

Amount to Purchase: \$500,000.00

Asset Name	Symbol	Market	Shares	Value
Acuity Brands inc	AYI	NYSE	340.0	\$49,912.00
Advance Auto Parts Inc	AAP	NYSE	425.0	\$49,627.25
Advanced Micro Devices Inc	AMD	NASDAQ	4080.0	\$49,939.20
Dollar General Corp	DG	NYSE	555.0	\$49,611.45
GGP Inc	GGP	NYSE	1.0	\$21.25
Kimco Realty Corp	KIM	NYSE	3285.0	\$49,964.85
MacroRisk Cash Equivalent Series	MR\$CASH	Index	1.03	\$1.03
Newfield Exploration Co	NFX	NYSE	2175.0	\$49,894.50
O'Reilly Automotive Inc	ORLY	NASDAQ	205.0	\$49,769.90
Target Corp	TGT	NYSE	695.0	\$49,643.85
Tractor Supply Co	TSCO	NASDAQ	780.0	\$49,748.40
Under Armour Inc	UAA	NYSE	2875.0	\$49,967.50
W.W. Grainger Inc	GWW	NYSE	7.0	\$1,898.82



- The dark blue bars represent the exposures of the Apple stock (concentration portfolio).
- The grey bars represent the exposures of the S&P 500 Index which we want to recreate in our overall portfolio.
- The light blue bars represent the exposures of the optimized overall portfolio with exposures more aligned to the S&P 500 Index.

Performance of Completion Portfolio vs the S&P 500 Index over one year

- Let's say we created a completion portfolio, on March 1, 2017, using MacroRisk Analytics.
- Here's the performance of the completion portfolio (from 3/1/2017 to 3/1/2018)
 - Completion portfolio vs S&P 500 Total Return Index vs Apple Inc.



Apple

26.65%

26.67%

26.65%

0.10%

25.42%

0.1941

0.2076

0.1831

2017-03-01

@GU6

13.98%

13.99%

13.98%

0.05%

13.54%

0.1003

0.0855

0.1139

Performance of Overall Portfolio vs the S&P 500 Index over one year

• Here's the performance of the overall portfolio (which contains the completion portfolio and Apple stock) versus the S&P 500 Total Return Index (from 3/1/2017 to 3/1/2018):



Comparing the Regular Approach vs. the MacroRisk Approach

 Here's the performance of the overall portfolio using the regular approach (overall v1 2017-03-01, 35 holdings) vs. the overall portfolio using the MacroRisk approach (overall 2017-03-01, 15 holdings) vs. the S&P 500 Total Return Index



Historic Returns Measures	Overall v1 2017-03-01	Overall 2017-03-01	@GU6
Total Return	19.20%	17.90%	13.98%
Annualized Ret.	19.21%	17.91%	13.99%
TT Month Ret.	19.20%	17.90%	13.98%
Avg. Daily Ret.	0.07%	0.07%	0.05%
Annualized Mean Ret.	18.65%	17.55%	13.54%
Std. Dev of Returns	0.1521	0.1515	0.1003
Upper SemiDev of Returns	0.1598	0.1571	0.0855
Lower SemiDev of Returns	0.1459	0.1472	0.1139

Conclusion

- The completion portfolio is used to diversify existing concentrated holdings which cannot be liquidated for some reason (be it tax related, time period restrictions, or illiquid assets such as a personal business).
- It creates a diversified overall portfolio and thus helps meet the fiduciary duty of having a diversified client portfolio.