



Multi-Factor Portfolio Weighting Models for the Consumer Discretionary Sector: An Empirical Analysis of Portfolio Returns 2009-2021

By: Daniel Montgomery and Paul Waweru

Davis Center for Portfolio Management

Advisors: Dr. Bob Dean and Dr. Tony Caporale

Study Objective:

Determine if Revenue per share, Operating profits per share, and Operating Margin are priced-in risk factors in the equity market

Portfolio Characteristics:

1. Sector : Consumer Discretionary (XLY)
2. # of Stocks: 10
3. State Economic Variable: Consumer Spending (PCE)
4. Loading Factors:
 - (1) Revenue per share (R/S)
 - (2) Operating Profit per share (OP/S)
 - (3) Operating Margin (OM)
5. Large Cap
6. Style: Growth
7. Strategy: Buy and Hold
8. Regression Period: 2009-2019
9. Period Returns
 - (1) 2009-2019
 - (2) 2009-2020
 - (3) 2009-2021

Portfolio Weighting Model (R/S):

1st Iteration: Regression Model

- Step 1. $RS_i(t) = A_i + B_i (PCE_t)$
- Step 2. $W_{li}(t) = B_i / \sum B_i$
- Step 3. $D_{li}(t) = W_{li}(t) * 1,000,000$
- Step 4. $SHRS_i(t) = D_{li}(t) / P_i(t)$
- Step 5. $MV_i(t+1) = SHRS_i(t) * P_i(t+1)$
- Step 6. $PV(t+1) = \sum MV_i(t+1)$

2nd Iteration

- Step 7. $MV_i(t+2) = SHRS_i(t) * P_i(t+2)$
- Step 8. $MV_i(t+3) = SHRS_i(t) * P_i(t+3)$

Total Iterations: 11

Note: the same model can be used for both OP/S and OM

Table 1

R/S Model - Cumulative Returns			
Time Period	Revenue Per Share	SPY	Alpha
2009-2019	2276%	288%	1988%
2009-2020	3504%	347%	3157%
2009-2021	3834%	443%	3391%

Table 2

OP/S Model - Cumulative Returns			
Time Period	Gross Operating Profit Per Share	SPY	Alpha
2009-2019	2331%	288%	2043%
2009-2020	3378%	347%	3031%
2009-2021	3711%	443%	3268%

Table 3

OM Model - Cumulative Returns			
Time Period	Operating Margin Per Share	SPY	Alpha
2009-2019	2566%	288%	2278%
2009-2020	3416%	347%	3069%
2009-2021	3625%	443%	3182%

Conclusion:

1. R/S, OP/S, and OM are priced in risk factors
2. All models have persistent long term alpha
3. Returns/alpha increased in COVID-19 impact periods, 2009-2020, 2009-2021
4. RS had highest alpha for COVID-19 impact periods
5. Determinant variable PCE is a latent priced-in risk factor