



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

By: Alec Gizzie, Patrick Burns, and Julia Reinker

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 markets

## Portfolio Characteristics:

1. Sector : Healthcare (XLV)
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 (RS):

### 1st Iteration

- 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: OP/S and OM follow same process

**Table 1 – Cumulative Returns**

Time Period	Revenue per Share	SPY	Alpha
2009-2019	773%	288%	485%
2009-2020	966%	347%	619%
2009-2021	1390%	443%	947%

**Table 2 – Cumulative Returns**

Time Period	Gross Profit per Share	SPY	Alpha
2009-2019	622%	288%	334%
2009-2020	820%	347%	473%
2009-2021	1155%	443%	712%

**Table 3 – Cumulative Returns**

Time Period	Operating Margin	SPY	Alpha
2009-2019	409%	288%	121%
2009-2020	517%	347%	170%
2009-2021	717%	443%	274%

## Conclusion:

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