

Problem Set 3: Value of Intangibles

California Institute of Technology
BEM 114: Hedge Funds
Spring 2025

Due: April 25, 2025

Introduction

In this homework assignment, you are asked to replicate and back test a hedge fund trading strategy. The strategy was first described in Edmans (2011) “Does the stock market fully value intangibles? Employee satisfaction and equity prices.” The basic question is, does it matter if a firm’s employees are happy? And if so, does the stock market realize and value this?

Edmans (2011) takes a list of the “Best Companies to Work For” and shows that historically, if you were to buy these companies, then you would earn positive risk-adjusted returns. These are companies that have high-levels of employee satisfaction and where employees have many benefits. His results provide evidence that employee happiness matters, and furthermore, that the market does not fully realize the value of happiness. That is, companies with happier employees perform better than those with sad employees.

The 100 Best Companies to Work for in America data has been uploaded to the class website (bcwlist.xls). The data is listed in two sets of columns, and we will use only the first set of data. Monthly stock data is available on Canvas (“crsp_1926_2020.csv”).

Submission Instructions

I recommend you complete the assignment using Python, but you are free to answer the questions in the programming language of your choice. Please submit your assignments on Canvas before 11:59 p.m. on the due date. Please upload a PDF file with your answers, as well as your code. For example, if you complete the assignment in an iPython notebook, please submit a PDF of the notebook and the notebook itself.

Questions

1. **Build Portfolios:** The lists are published at different times. The first list is published in 1984, the second in 1993, the third in 1998, and then every year afterwards. In the paper, Professor Edmans mentions “On April 1, 1984, I form a portfolio containing the 74 publicly traded [Best Companies] in that year, and measure the returns to this portfolio from April 1984 to February 1993. ... The portfolio is reformed on March 1, 1993 to contain the 65 firms included in the new list, and returns are calculated through January 1998. This process is repeated until December 2009.” The lists are available through 2020. Assume that all lists from 1998 through 2020 are released in January, and that we form portfolios using data in January. We form our portfolios on February 1, and we hold this position until January 31 of the next year, and then we rebalance.

We are not rebalancing monthly, as in previous problem sets, so we have to consider how weights might change over time (particularly for the equal-weighted portfolio).

We also need to deal with stocks that might IPO (become listed) or delist during the year. Professor Edmans covers this in his paper, but he is not clear about how he handles the reweighting. For newly listed stocks, add them to the portfolio one month after they appear in the stock return database. For delistings, assume a return of zero when the stock disappears. For simplicity, rebalance the entire portfolio after these events.

- (a) (50 points) Build the equal- and value-weighted long-only portfolios. Describe how you calculate weights over time, how you rebalance and when, and how you calculate the monthly returns.

Total for Question 1: 50

2. Quantitative Analysis

- (a) (5 points) Calculate the average monthly return, volatility, and Sharpe ratio for the two portfolios.
- (b) (5 points) Estimate the CAPM, FF3, Carhart, and FF5 models for both equal- and value-weighted portfolios. Does this strategy produce positive and significant alpha?
- (c) (5 points) Plot cumulative returns for (1) the value-weighted portfolio, and (2) the CAPM-implied expected portfolio returns. Comment on the performance of our strategy relative to its benchmark over time.
- (d) (10 points) Does the strategy (still) work? Divide the portfolio into pre- and post- January 1st, 2010 subsamples. Estimate the Carhart model in the pre- and post-periods. In the pre-period you should have a similar result (but not necessarily exactly the same) to Edmans (2011) Table 3. Does the strategy work in the pre-period, does it work in the post period? How does this relate to Table 4 in Edmans (2011)?
- (e) (5 points) Divide the value-weighted return series into pre- and post-1999 samples. Estimate the loadings on the 12 industry portfolios. Has the composition of the best companies to work for changed over time?

Total for Question 2: 30

3. Further Analysis

- (a) (5 points) You should find that the beta of this strategy is close to 1. Why is this the case? Suppose you create a long-short by shorting the overall market. Why might this be more attractive to institutional investors? Why might it be less attractive to retail investors?
- (b) (5 points) Explain why these results show that financial markets do not fully price the value of employee satisfaction.
- (c) (5 points) Why do you think the alpha has disappeared over time?
- (d) (5 points) The Best Companies to Work For list is valuable information. BCW surveys employees and produces information about employee satisfaction. In a sense, this is a somewhat antiquated way of producing information, and it is provided with a considerable time lag. We live in a world where each of us leaves a digital footprint, and the company Bombora purchases and aggregates cookie data from large media companies, and through email data stored in cookies they identify unique company employees. They can track what employees are reading about in real time. How might the employee satisfaction strategy be improved for the modern world?

Total for Question 3: 20