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Can an ESG Weighted Momentum Strategy Add Alpha ?

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I. Introduction

The increasing concerns related to climate change and the emergence of worldwide summits, such as COP26, to address critical challenges the world we live in is facing has drastically shifted people's attention to corporate social responsibility. Investors have a key role to play in the transition to a cleaner and more responsible economy. As a matter of fact, it is already clear across market participants that investors demand high sustainability disclosure standards when making their investment decisions (Bermejo Climent et al., 2021). Although these standards, which include TCFD, SASB, CDP and many others, are not standardized and governments have yet to vote on regulations to enforce them, the need for shareholder accountability was addressed with the introduction of the 2005 UN defined Principles of Responsible Investment (UNPRI) (Bermejo Climent et al., 2021). The UN defines ratings for corporate Environmental, Social and Governance (ESG) characteristics (Bermejo Climent et al., 2021). As of today the protocol has been signed by over 4,300 investors worldwide representing over \$120 trillion of assets under management (PRI, 2021).

These events have led fund flows and assets under management in socially responsible vehicles to reach unprecedented levels in recent years (Lioui & Tarelli, 2021). Retail and institutional investors are starting to express a preference for firms with a high rating on their ESG signature making ESG signatures to become a central stage in financial markets (Lioui & Tarelli, 2021). As a consequence, many studies have started to investigate the relationship between a firm's corporate social responsibility and its return on investment. Overall, studies have shown that the outcomes vary and that the evidence is mixed between studies who show a weak return predictability of the overall ESG rating (Pedersen et al., 2021) and others who find a positive relationship between corporate social responsibility and market outcomes such as firm

value (Albuquerque et al., 2019), systemic risk (Albuquerque et al., 2019), cost of capital (El Ghoul et al., 2018), and R & D premium (Lioui & Sharma, 2012) (Lioui, 2018).

Individuals who support the investment in ESG by companies and the increasing ESG integration by asset managers believe that, in the long run, such a strategy will increase performance and lead to greater returns. As such, in the short term, the integration will not necessarily promote performance. In fact, when considering the point of view of Lioui, A. (2018), the negative screening of irresponsible firms or positive screening of responsible firms will be beneficial only to the extent that the loss in terms of diversification is more than offset by the gains from investing in high ESG firms. Given the characteristic of the stock market being forward looking, the increase in performance should happen in the long run. The pricing of stocks will eventually reflect the beneficial impacts of ESG scores. Academic literature suggests that a long-short strategy, long responsible firms (high ESG score) and short irresponsible firms (low ESG score), will deliver a good performance as measured by standard metrics (Lioui, 2018).

To become familiar with the topic and the current findings, we considered the extensive research on the topic and the various investment strategies which are built around the relationship between the ESG score of a firm and its financial performance. Based on the above, we decided to investigate the various characteristics of our ESG Momentum factor to lead us to the most favorable performance and outcome in terms of investment strategies. **Our research question explores the degree to which an ESG Momentum Strategy is able to generate alpha and under which combination of formation period and holding period for ESG Momentum strategies produce optimal results.**

II. Methodology

Our methodology consists of comparing an ESG-weighted momentum strategy and a value-weighted momentum strategy to discover if an ESG-weighted momentum strategy can generate alpha. First, we obtained monthly data from the research paper “ESG Factor Momentum Strategy” that specifies the ESG rating percentiles of the securities in the MSCI World Index from March 2009 to October 2019 (QuantPedia, 2020). In this dataset, each security is given a number between zero and one in which the magnitude depends on its ESG rating relative to others in the Index. Then, we obtained monthly data from the Center for Research and Security Prices (CRSP) of each security in the MSCI World Index over the same 116 month-period. This CRSP data provided us with other important metrics such as price, return, and market equity to use in the construction of the momentum strategies.

When constructing our ESG-weighted momentum strategy, we split the stocks into deciles based on the average of their ESG percentile over the formation period. Using deciles as opposed to fewer portfolios provided us with a larger spread of ESG ratings between the first and last portfolio. We then calculated the weights given to each stock based on their average ESG percentile, and generated monthly returns of the ten portfolios using these ESG weights. By doing this, we aimed to give higher weights to companies that are in a high ESG rating percentile and give lower weights to companies that are in low ESG rating percentiles. When constructing our valued-weighted momentum strategy, we instead split the stock into deciles based on their price ratio from the start to the end of the formation period, and assigned value weights to each stock based on their market equity. This standard momentum strategy serves as a means of comparison when assessing the results of our ESG-weighted momentum strategy.

Each momentum strategy was run using 20 different combinations of portfolio formation period (J) and holding period (K) length; portfolio formation consisted of periods that were 3, 6, 9 and 12 months while our holding period consisted of 1, 3, 6, 9 and 12 months. We did not include a one-month portfolio formation period as this defeats the purpose of conducting a momentum based strategy. Additionally, the skip period (S) remained constant at zero months as the microstructure effects that impact value-weighted momentum strategies do not apply for that of ESG.

For each of the 40 momentum strategies, we calculated descriptive statistics such as mean, volatility, sharpe ratio, skewness, maximum, minimum, and quartiles on the monthly returns of three major portfolios; The Portfolio of Losers (securities that are in the 10th percentile of ESG rating) (Figure 1), The Portfolio of Winners (securities that are in the 90th percentile of ESG rating) (Figure 1), and The Portfolio of Winner minus Losers (long position in The Portfolio of Winners and short position in The Portfolio of Losers) (Figure 1). We also retrieved relevant metrics from CAPM and FF3 regressions in order to assess the statistical significance of alpha and beta of each of these three portfolios of focus (Table 1).

III. Data

Given our limited access to reliable ESG databases, this paper uses an ESG dataset that was originally constructed for the use of another research paper evaluating an “ESG Factor Momentum Strategy” (QuantPedia, 2020).

This source paper uses the MSCI ESG Ratings as the ESG database used to construct its ESG momentum strategy (QuantPedia, 2020). This strategy is implemented in a global setting using the MSCI World Index as the investment universe, which in turn restricts the dataset to firms in the large and mid-capitalisation segments of publicly traded companies (MSCI World

Index, 2021). The final dataset used in our thesis is further restricted to firms that are traded on the NYSE/AMEX/Nasdaq exchanges and which returns, and other metrics are also available from CRSP. Our sample thus captures data for 691 companies covered by the ESG database constructed by the source paper. Our observations are also limited to historical data from the current available dataset that studies the period between March 2009 and October 2019.

The original dataset supplied by MSCI provides ratings that evaluate firms' level of corporate social responsibility related to the three pillars of ESG: environment, social, and governance. The ESG ratings calculate individual companies' exposure to key risks identified by MSCI based on an analysis of each company's business (i.e., its core product or business segment, location of operations, and other pertinent measures) (Nagy *et al.*, 2016). The analysis then considers the time horizon of each risk and how well these issues are managed and mitigated by a company. Risk exposure and management is applied to each of the three pillars and given a score ranging from 0 to 10, with 0 representing no exposure and 10 representing very high levels of exposure. The individual scores on each ESG pillar are subsequently aggregated to the final ESG score that is adjusted by industry (MSCI ESG Research, 2020).

The dataset used for our thesis was originally modified by the authors of the “ESG Factor Momentum Strategy” research paper. For each monthly observation, the authors created percentile ranks of the raw ESG ratings provided by MSCI. The ranking system was thus created by extracting data from the MSCI ESG Ratings and allocating each company based on its ESG score and rank within the investment universe. As companies are monitored on an ongoing basis, new information that could impact ESG scores is reflected in reports and significant changes can trigger re-ratings (Nagy *et al.*, 2016). The ESG dataset used in this paper is rebalanced monthly

to reflect such changes. Given this ranking system, if one company in the investment universe is re-rated, the whole distribution would shift to reflect the new rank of the affected company.

The financial data, including various accounting and stock market metrics, is obtained from CRSP between March 2009 and October 2019. The use of data from CRSP allows us to build the momentum characteristics. For the purpose of this analysis, we also consider the 30-day Treasury Bill return, which is used as risk-free return to calculate excess returns, and the returns on the three Fama-French factors (FF3), consisting of the excess return on the market (R_m), the size factor (SMB), and the book-to-market factor (HML) (Blanco, 2012).

As the integration of ESG data in investment strategies represents a relatively new field of study, there are many limitations that impact the use of ESG data in investment decisions. In line with the findings of Lund, F.J., & Pohl, C. (2020), the biggest challenge with the use of ESG data for investing relates to the lack of comparability of rating procedures across data providers. The lack of reporting standards can lead to substantial variations across data sources and eventually lead to very different investment strategies (Lund & Pohl, 2020).

IV. Results

In our analysis, we constructed ten ESG-weighted portfolios and ten value-weighted portfolios for all combinations of J and K. For the ESG weighted portfolios, each portfolio was constructed by splitting portfolios into deciles. The Portfolio of Winners was composed of the stocks in the MSCI World Index whose ESG rating had increased the most over the formation period, and The Portfolio of Losers are the stocks whose ESG ratings decreased the most over the formation period. For Winner and Losers, the raw mean returns were calculated from 2009 to 2019 for each of the combinations of J and K. Moreover, the Winners minus Losers strategy

returns were computed over the same period. The raw mean annualized returns of the analysis are in Figure 1.

For both the ESG-weighted and value-weighted momentum strategies, all combinations of J and K produced positive annual mean returns. While only 15% of the value-weighted Winners minus Losers portfolios resulted in a negative mean annual return, 30% of the ESG-weighted Winner minus Losers portfolios produced a negative mean annual return. Moreover, for both types of strategies, the monthly returns of the Winners minus Losers portfolios were significantly lower than The Portfolios of Winners and The Portfolio of Losers respectively (Figure 1). These findings go contrary to those of Lesmond et al. (2003.), which state that longing The Portfolio of Winners and shorting The Portfolio of Losers would increase mean returns.

Figure 1: Mean Returns of ESG-Weighted and Value-Weighted Winners, Losers, and WML

MSCI World Index - ESG Rated											
J	K					J	K				
	1	3	6	9	12		1	3	6	9	12
Mean Return: Value-Weighted Strategies										Mean Return: ESG-Weighted Strategies	
	Losers						Losers				
3	12.74%	13.08%	14.70%	17.39%	16.37%	3	20.05%	19.64%	19.09%	18.52%	18.84%
6	15.53%	13.67%	14.26%	11.18%	8.83%	6	17.43%	17.42%	17.06%	15.80%	16.35%
9	13.34%	12.56%	11.67%	10.92%	9.67%	9	16.50%	17.05%	16.05%	16.28%	16.62%
12	13.01%	10.88%	8.86%	13.64%	8.92%	12	16.67%	16.09%	15.45%	15.59%	16.88%
	Winners						Winners				
3	13.61%	19.36%	17.13%	19.15%	18.00%	3	18.86%	18.30%	18.21%	19.41%	17.61%
6	13.26%	15.29%	13.09%	17.28%	14.37%	6	17.34%	17.53%	17.44%	16.61%	17.81%
9	15.86%	17.72%	16.68%	17.24%	14.26%	9	17.29%	16.93%	16.60%	17.35%	16.82%
12	17.68%	16.80%	13.54%	11.67%	17.04%	12	16.72%	16.89%	17.27%	17.51%	17.17%
	Winners-Losers						Winners-Losers				
3	0.86%	6.28%	2.43%	1.76%	1.63%	3	-1.19%	-1.34%	-0.88%	0.89%	-1.23%
6	-2.27%	1.63%	-1.17%	6.10%	5.54%	6	-0.10%	0.11%	0.37%	0.81%	1.46%
9	2.52%	5.16%	5.02%	6.32%	4.59%	9	0.79%	-0.12%	0.55%	1.07%	0.21%
12	4.67%	5.92%	4.68%	-1.98%	8.12%	12	0.05%	0.80%	1.83%	1.92%	0.29%

This interesting result required further exploration. Therefore, a CAPM regression was performed on the monthly returns of the previously mentioned strategies and their combinations of J and K. The results of the CAPM regression in Figure 2 depict the mean excess return on the market of the given trading strategy and, below, its p-value. Contrary to the results of Lesmond et al. (2003.), none of the Winners minus Losers Portfolios produced statistically significant alphas. However, at 95% confidence level, the ESG-weighted Portfolio of Winners generated a positive alpha at a statistically significant level, while none of the value-weighted Portfolio of Winners generated significant alphas. These findings suggest that a long position in ESG-weighted Portfolio of Winners is able to outperform the market.

Figure 2: Alphas of ESG-Weighted and Value-Weighted Winners, Losers, and WML

MSCI World Index - ESG Rated						MSCI World Index - ESG Rated					
J	K					J	K				
	1	3	6	9	12		1	3	6	9	12
Annualized Alpha: Value-Weighted Strategies						Annualized Alpha: ESG-Weighted Strategies					
Losers						Losers					
3	-5.10% 0.1030	-3.19% 0.2992	-0.97% 0.7493	0.86% 0.8095	0.96% 0.7341	3	3.45% 0.0937	3.18% 0.1256	2.85% 0.1882	2.13% 0.3160	3.32% 0.1213
6	-1.09% 0.7269	-2.68% 0.4032	-1.65% 0.6322	-3.27% 0.3384	-7.63% 0.0142	6	2.52% 0.2082	2.53% 0.1932	2.30% 0.2306	1.28% 0.5285	1.62% 0.4342
9	-2.46% 0.4276	-3.90% 0.2601	-3.60% 0.2557	-4.47% 0.1801	-4.11% 0.1659	9	1.93% 0.3406	2.25% 0.2807	2.02% 0.3307	2.27% 0.3191	1.99% 0.3710
12	-3.43% 0.2614	-5.09% 0.1082	-7.17% 0.0231	-1.16% 0.7187	-4.89% 0.0810	12	1.58% 0.4359	1.21% 0.5460	1.03% 0.6451	0.65% 0.7622	1.78% 0.4150
Winners						Winners					
3	0.43% 0.8813	3.83% 0.2641	1.95% 0.5448	2.62% 0.4456	1.82% 0.5468	3	4.79% 0.0004	4.26% 0.0018	4.71% 0.0007	5.43% 0.0001	4.20% 0.0018
6	1.11% 0.6818	1.79% 0.5649	-0.63% 0.8387	0.18% 0.9538	-0.01% 0.9983	6	4.17% 0.0038	4.41% 0.0024	4.39% 0.0017	4.16% 0.0022	5.10% 0.0001
9	2.47% 0.4013	3.69% 0.2024	1.70% 0.6047	1.95% 0.5411	-0.23% 0.9333	9	4.53% 0.0010	4.21% 0.0025	4.41% 0.0026	5.04% 0.0005	4.38% 0.0036
12	3.69% 0.2498	1.23% 0.7162	-1.94% 0.5890	-4.23% 0.1828	-0.44% 0.8985	12	3.89% 0.0035	4.40% 0.0012	4.78% 0.0005	4.74% 0.0006	4.56% 0.0013
Winners-Losers						Winners-Losers					
3	5.05% 0.3079	6.56% 0.2282	2.50% 0.6277	1.40% 0.8066	0.43% 0.9257	3	0.86% 0.6978	0.61% 0.7900	1.43% 0.5388	2.94% 0.2112	0.46% 0.8463
6	1.71% 0.7264	4.00% 0.4481	0.55% 0.9160	3.02% 0.5578	7.16% 0.1230	6	1.17% 0.6174	1.41% 0.5488	1.62% 0.4782	2.46% 0.2920	3.01% 0.1956
9	4.44% 0.3821	7.12% 0.1731	4.86% 0.3422	5.94% 0.2317	3.55% 0.4295	9	2.11% 0.3803	1.48% 0.5437	1.95% 0.4432	2.30% 0.3867	2.07% 0.4276
12	6.62% 0.1971	5.83% 0.2863	4.75% 0.3714	-3.46% 0.4854	4.07% 0.3983	12	1.80% 0.4293	2.71% 0.2385	3.26% 0.2067	3.70% 0.1365	2.40% 0.3329

Upon further examination, it was discovered that the ESG-weighted Portfolio of Losers had systematically higher volatility (15.82%) than the ESG-weighted Portfolio of Winners (13.08%) across all combinations of J and K. A potential source of these higher standard deviations in the ESG-weighted Portfolio of Losers could be attributed to the fact that investors may have more confidence in stocks with higher ESG ratings and less confidence in stocks with lower ESG ratings. Nonetheless, this anomaly may also be a result of our portfolio construction methodology. Given that ESG Ratings exhibit less movement than stock prices, as these ratings are conducted yearly, dividing the ESG Ratings into 10 portfolios may reduce the influence of the results in the Loser portfolio and increase volatility. Further investigation should include an analysis of the variation in ESG-weighted returns where the Winners portfolio is the top 80% of ESG Ratings momentum and the Losers is the bottom 20% to understand the impact of the portfolio subdivision methodology on strategy returns.

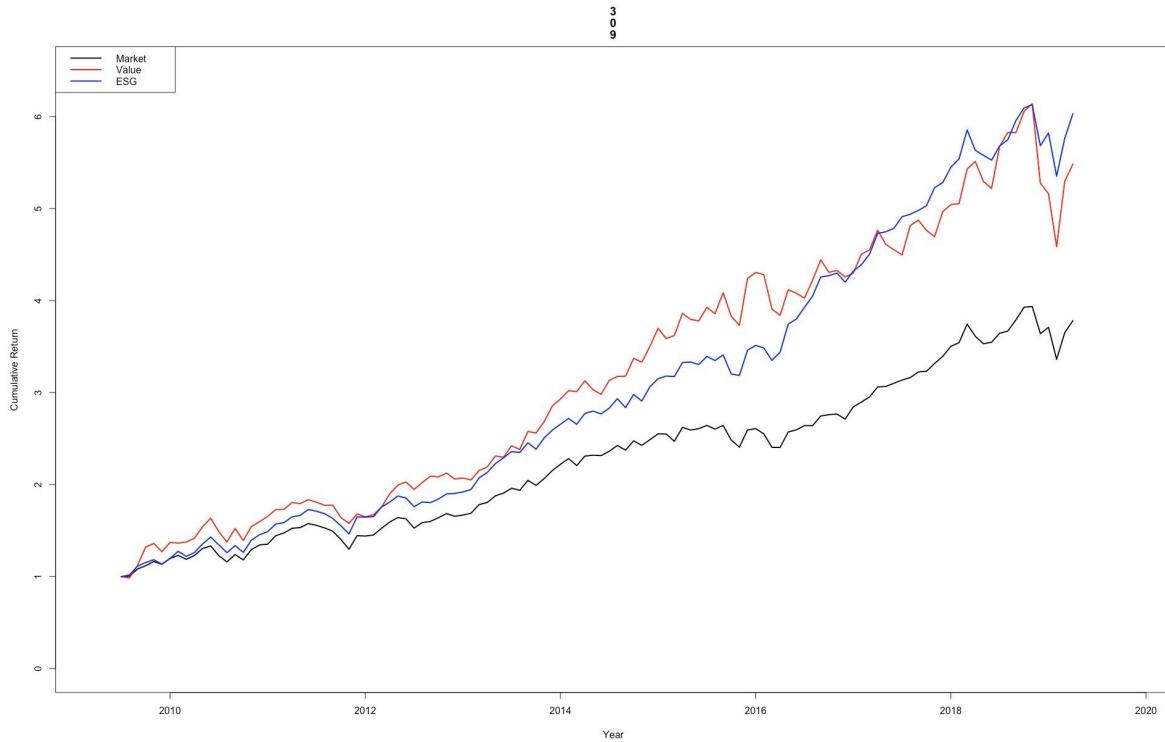
Consequently, our focus will be directed toward the ESG-weighted Portfolio of Winners that generated the highest alpha (Figure 2). A three month formation period, followed by a nine month holding period generated a mean return of 19.41% and an annualized alpha of 5.43%. As can be seen in Table 1, this portfolio outperformed the comparable portfolios across all applicable metrics.

Table 1: Investment Statistics for Portfolio Construction (J=3/S=0/K=9)

CRSP Market	Value Weighted - Winners	Value Weighted - Losers	ESG Weighted Momentum - Winners	ESG Weighted Momentum - Losers
Mean Return	16.40%	19.15%	17.39%	19.41% 18.52%
Standard Deviation	13.41%	17.93%	18.16%	13.06% 15.94%
Sharpe Ratio	1.22	1.07	0.96	1.48 1.16
intercept_CAPM (alpha)	-	2.62%	0.86%	5.43% 2.13%
r_squared_CAPM	-	0.68	0.66	0.91 0.85
p_value_intercept_CAPM	-	0.4456	0.8095	0.0001 0.3160
intercept_FF3	-	2.44%	1.58%	5.59% 3.64%
r_squared_FF3	-	0.68	0.67	0.92 0.90
p_value_intercept_FF3	-	0.4851	0.6590	0.00003 0.0420

To further explore the merits of an ESG-weighted momentum strategy, the returns of the ESG-weighted momentum strategy were regressed with respect to The Three Factor Fama-French Model. The Three Factor Fama-French Model controls for performance due to systemic risk factors in the market such as small minus big, high minus low, and the market risk premium and allows us to further identify to what extent the ESG-weighted momentum strategies generate returns in excess of these market risk factors. As shown in Table 1, the Portfolio of Winners ESG Momentum strategy generated an alpha with respect to the Three Factor Model of 5.59% at a statistically significant level. Lastly, cumulative returns were calculated for the (J=3/S=0/K=9) portfolio construction over the holding period, as seen in Graph 1. A one-dollar investment in this portfolio held from June 2009 to October 2019 would grow to \$6.03 whereas longing the same value-weighted Portfolio of Winner and in the market would result in a final value of \$5.48 and \$3.78 respectively.

Graph 1: Cumulative Return of ESG-Weighted Portfolio of Winners (J=3/S=0/K=9)



V. Conclusion and Suggestions for Future Research

Based on our above analysis and the results found, we are able to defend that in the long run the pricing of stocks eventually reflects the beneficial impact of ESG integration in a company and its operations on stock prices. This assumption is supported by the alpha-generating strategy that takes a long position in the ESG weighted portfolio of Winners that correspondingly exploits the relative outperformance of firms with strong ESG profiles. This leads us to conclude that although integrating ESG in your business strategy might seem costly at first, over the long term, this additional investment is beneficial to the company's success.

The results we have discussed and found above and the emergence of studies on this topic offer suggestions for future research. It would be interesting to further analyze how ESG Momentum translates into financial performance at an industry and geographical level. In fact, as of today, industries are not at the same level of advancement in terms of ESG integration and reporting. Therefore, looking further into our proposed strategy at an industry level, based on the stage at which the sector is at in terms of ESG integration, can be interesting to explore. This would allow us to explore if there is a correlation between industry specific ESG scores and the implied financial performance. Moreover, the adoption and integration of ESG within companies is significantly heterogeneous depending on the geographic region. Therefore, exploring markets in regions which are more advanced in terms of ESG integration, such as Europe, and their relative returns may be a critical topic for future research.

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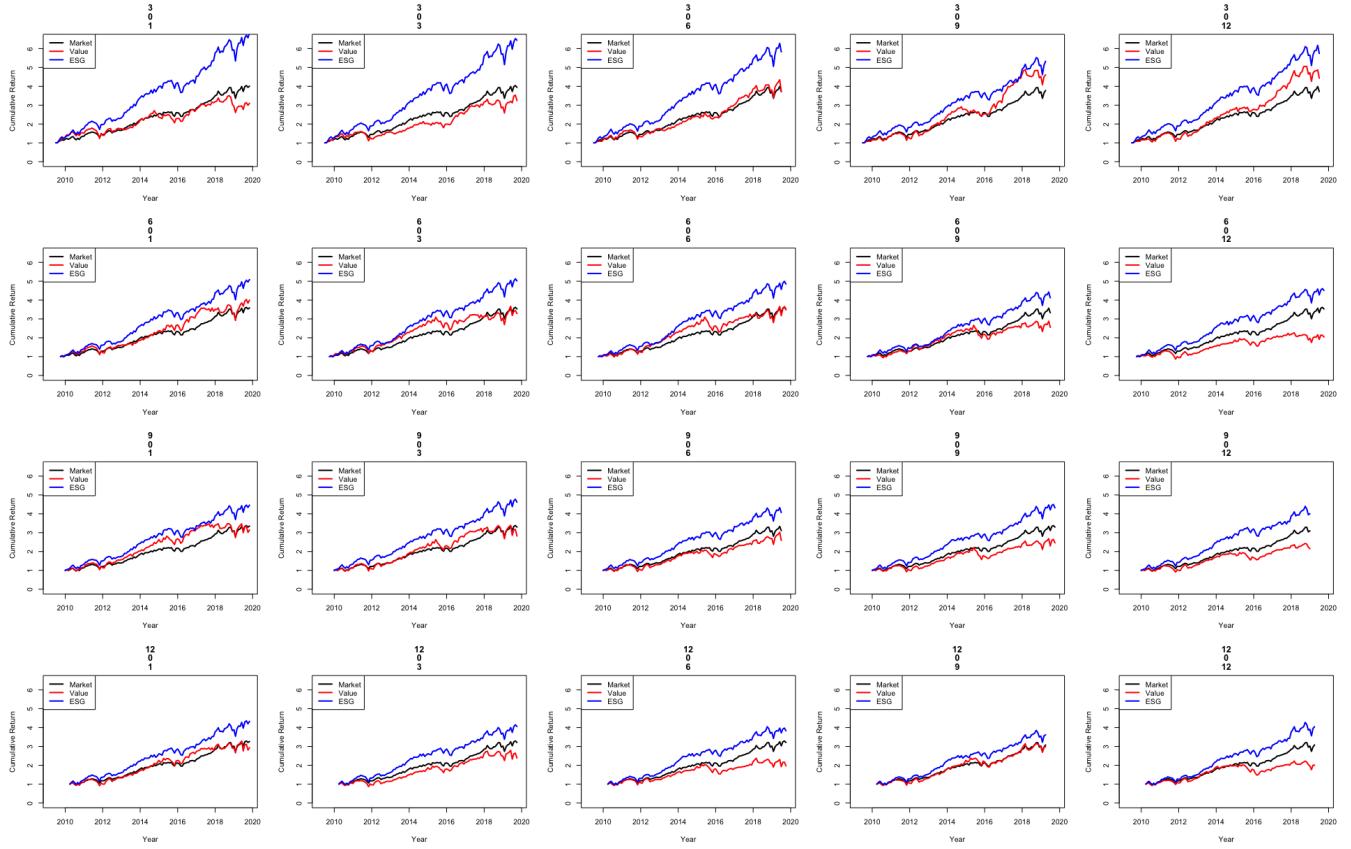
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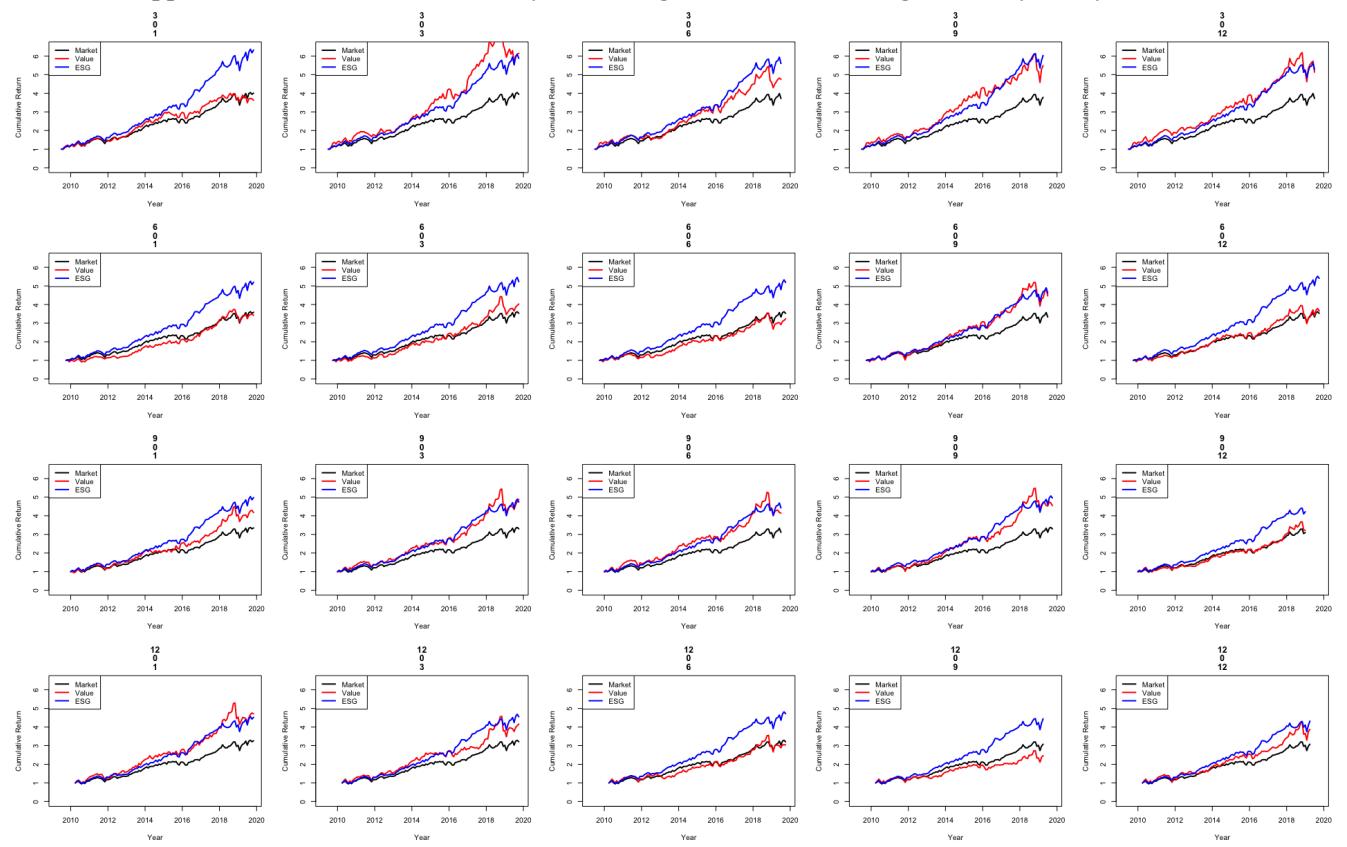
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VII. Appendix

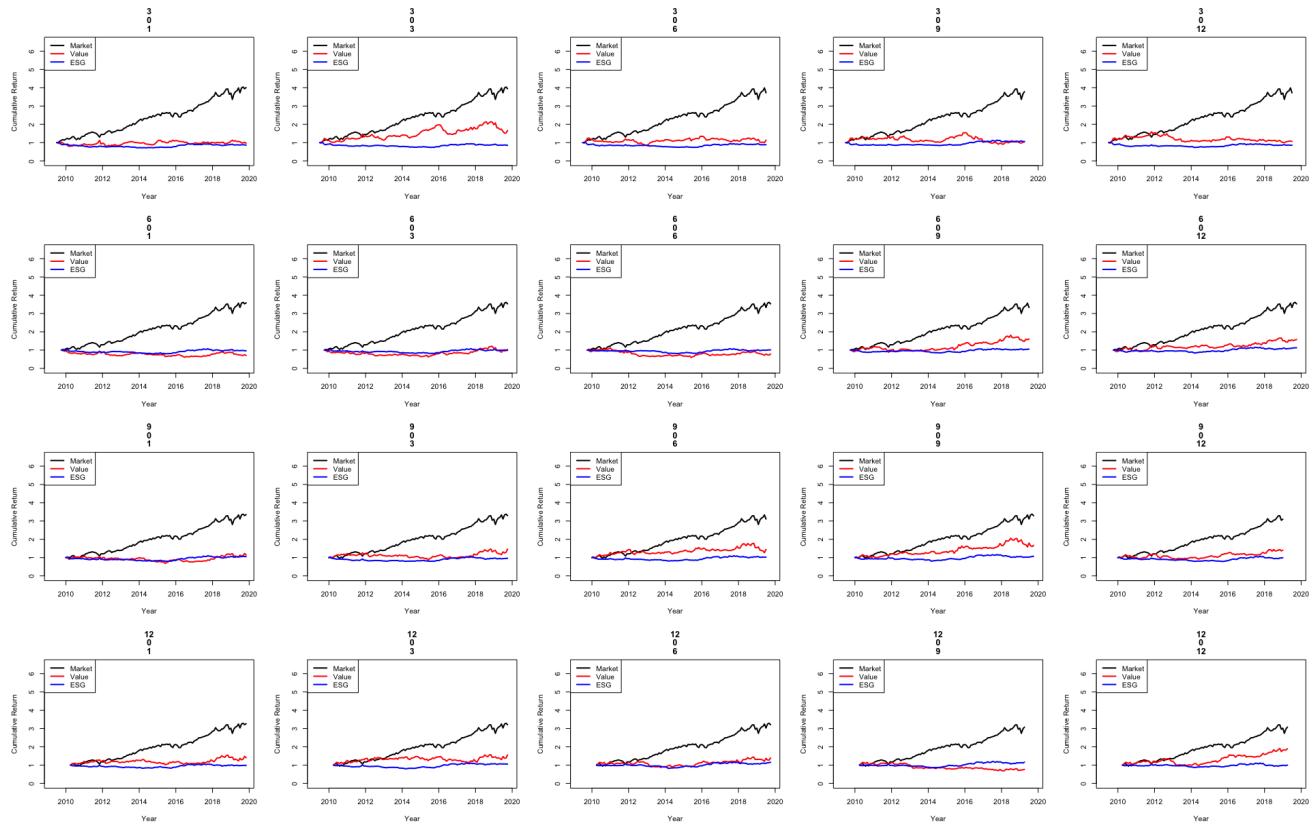
Appendix I: Cumulative Return of ESG-Weighted and Value-Weighted Portfolio of Losers



Appendix II: Cumulative Return of ESG-Weighted and Value-Weighted Portfolio of Winners



Appendix III: Cumulative Return of ESG-Weighted and Value-Weighted Winners Minus Losers



Appendix IV: Value-Weighted Winners Minus Losers Results

	(3,0,1)	(3,0,3)	(3,0,6)	(3,0,9)	(3,0,12)	(6,0,1)	(6,0,3)	(6,0,6)	(6,0,9)	(6,0,12)
mean	0.00863871133442281	0.0628015876799248	0.024322599149708	0.0175641706175151	0.0163022168404701	-0.0227129523058235	0.0162639584867429	-0.0117190994557147	0.0610498804459381	0.0553502551605002
vol	0.157067997379803	0.165073692679689	0.154744891924764	0.169055150932453	0.14024767429078	0.154760194271439	0.161612426703774	0.159544068531393	0.156175398429128	0.140943506332981
sharpe	0.0525558839002695	0.378190061316953	0.15499779415289	0.102156919965121	0.113832310740284	-0.149288139017259	0.0982894208326701	-0.0758302469891	0.388705848123043	0.390022143794000
skew	-0.34885622916503	0.143844392520804	0.24633112987483	0.350588953266607	0.450484361116646	-0.548937693653595	-0.200004669337534	-0.0333295617403148	0.017346035157767	-0.196534586837738
min	-2.19633968979265	-1.54605521046167	-1.54605521046167	-1.53326769985787	-1.396987299086981	-1.86333809086564	-1.51170555595427	-1.48646757327464	-1.32373802207793	-1.35884685051239
first_quartile	-0.311516073580929	-0.277750897907842	-0.280070713184777	-0.349922086814123	-0.28276532461065	-0.309082937488179	-0.279130688960441	-0.33702393781556	-0.224622864383014	-0.24486070999216
median	0.0286055592313972	0.079393389431781	0.0153098174541451	-0.0260826763735601	0.0398613875386948	0.00148881354357616	0.0303412573892446	-0.00461658439541426	0.0302216730092495	0.0419927172825472
third_quartile	0.298213185651926	0.432246586669431	0.2843559962903	0.366633268068223	0.230634381773173	0.323922141045888	0.407408923715635	0.375815461663198	0.416867224121924	0.364552602512305
max	1.53094282014297	1.90568176074501	1.90568176074501	1.90568176074501	1.3750387854586	1.3750387854586	1.50740802340951	1.774110845251	1.3750387854586	1.3750387854586
num_pos	65	71	64	57	68	61	63	59	65	68
num_neg	59	52	56	60	52	60	57	61	52	52
intercept_CAPM	0.00420953434720315	0.00546947806126801	0.00208027337228559	0.00116650658456556	0.000362277222346317	0.00142758162099679	0.00333483576481113	0.00046021151310043	0.00252043438752992	0.00596505527285084
slope_CAPM	-0.334574794695009	-0.0526486511058436	-0.0343413230669819	0.000266767622302509	0.0578731252091244	-0.3399086459890561	-0.216640418660894	-0.166794011579945	0.207933427389413	-0.159054023067048
r_squared_CAPM	0.0774412439009776	0.00174594597334724	0.000845170126803391	4.1975201529261e-08	0.00292101823919158	0.0820953093738203	0.0308595971146897	0.0187511545294494	0.0303122858969485	0.0218530215378257
p_value_intercept_CAPM	0.307853501559854	0.228177952811813	0.627687525461269	0.80861567754959	0.925654556147802	0.726439177928018	0.448080476890154	0.916006563223048	0.557753834711636	0.123023624973792
p_value_slope_CAPM	0.00175104528614061	0.646319206253024	0.752610565902625	0.998250794127278	0.557686723149282	0.00144002056971373	0.0549631428245882	0.1358617140815904	0.0640672992999972	0.107117184788554
intercept_FF3	0.00384133430429707	0.0053302165184036	0.00189866239629798	0.000419519505698251	-0.000240183280845472	0.000818573970847159	0.0023919040940401	-0.0003877258890893	0.00266155569035403	0.049907194279417
slope_FF3	-0.310650403629499	-0.0287374230499851	-0.0184758037520624	0.0469949362382585	0.100814986000212	-0.338342931274478	-0.204392378606845	-0.17581272857878	0.146035096850627	-0.138886530436775
r_squared_FF3	0.0802095239026927	0.00621227724464017	0.001820756760968	0.0162879146187367	0.0130930780923856	0.105674017952655	0.0513926303933982	0.0525633909971462	0.0632610340311917	0.0447598115473008
p_value_intercept_FF3	0.360548188517399	0.249463984005629	0.6633754170872739	0.930386881466377	0.951329442068296	0.842511709146057	0.591992836974012	0.92982326598439	0.538088665719108	0.202807518799356
p_value_slope_FF3	0.0077498674383206	0.819277344975533	0.877175009480693	0.723116166310279	0.350357445928227	0.0031943344338049	0.0933641953672254	0.143108319145304	0.217072920377999	0.191422012500187
	(9,0,1)	(9,0,3)	(9,0,6)	(9,0,9)	(9,0,12)	(12,0,1)	(12,0,3)	(12,0,6)	(12,0,9)	(12,0,12)
0.025245390370643	0.0516018456155433	0.050159256362124	0.0632433017919159	0.0459352280737862	0.0467115335112026	0.0592040187850016	0.046825789775883	-0.0197804911377303	0.0812490815721576	
0.154270912295456	0.157553155774631	0.150724997470787	0.147802636278789	0.120869405697961	0.15337486449962	0.160842042666507	0.156385161631279	0.142254811392102	0.142421005982895	
0.161050388572667	0.325057350807793	0.330452830067639	0.4252648612121	0.3566336559498514	0.301887590544057	0.365617405679682	0.2968850808512	-0.141256241739567	0.568281287754624	
0.000694250320409617	0.0957265136936126	-0.16221175818521	0.112106208274785	-0.111307011509677	-0.060378719164374	0.266137027522117	0.033096189360268	-0.163245206885503	-0.41207682904605	
-1.37069109388405	-1.4630839284944	-0.159468549209988	-1.2028262840773	-1.4630839284944	-1.3908267279052	-1.52037525712158	-1.3530961893602253	-1.4130725957094	-1.19773497602778	
-0.270235131769956	-0.280687971931914	-0.275180647508774	-0.263546689842067	-0.2445979869602556	-0.29234055909883	-0.337808929362245	-0.301335026039517	-0.3322024660712	-0.137471049838156	
0.0367523706002528	0.063714459639873	0.041964734572287	0.0885896347135868	0.0630489938029404	0.0997788894605999	0.0602641994748548	0.0420639814796214	0.0174446033545805	0.107719627618026	
0.318493482335034	0.366464248148807	0.3631748558443951	0.35322974829574	0.299381954089945	0.36929904673039	0.407005217856821	0.364621473784197	0.288567367532014	0.370332435467507	
1.42902914736393	1.64397655490855	1.65934665112645	1.65934665112645	1.20124726344093	1.40657487052469	1.74709960107708	1.56138104166924	1.33683664239942	1.33429706627662	
64	61	62	63	63	64	61	61	55	67	
54	56	52	54	45	51	53	53	53	41	
0.00370121784131748	0.0059311068516261	0.00405335190544363	0.00495351323889987	0.00295851869871357	0.00551426022596099	0.0048562981656355	0.00395418714402613	-0.00288379056616831	0.00338840616797793	
-0.18851265026858	-0.191117724019989	-0.0217424883791251	-0.00674664763762575	0.0558288467054806	-0.191089438675137	-0.0301960253544648	-0.042407359437885	0.0849551522890348	0.282879955619123	
0.0254741928808822	0.025303174558437	0.000355321829285904	3.56704460962526e-05	0.0029160210817079	0.0266713867710476	0.00601127240914797	0.00127477315530202	0.00604954400456219	0.0669275132574184	
0.382109638396978	0.173059241270567	0.342233059864851	0.231706938180398	0.429547040395791	0.19711538116127	0.286259701612828	0.371431219622691	0.48543411638406	0.39833385075555	
0.0842758499977505	0.0867026343415079	0.842213954966749	0.949042576101209	0.578853717079214	0.0811693044571968	0.79400776428317	0.706074691148263	0.423647822397901	0.0068624836865051	
0.00243753753499275	0.00467377586383925	0.00299572631123366	0.0041750128725121	0.00230714416107526	0.0043181507880138	0.00321194664163743	0.0026131152698737	-0.00414796242341762	0.0024679569548672	
-0.1611697242465	-0.187068032716233	-0.0441412619084983	-0.0551883614323573	0.0643028591163397	-0.195067611255796	-0.0306058992693757	-0.0760455537286978	0.0717958956636561	0.238925831540202	
0.0957142079772441	0.0812014373913452	0.0874806455788902	0.0927466499350248	0.0502870496798787	0.137310056718325	0.0921266328950341	0.12827890503506	0.11984107766055	0.18584168613037	
0.557647096988281	0.27923794422787	0.470862675029906	0.30076684582734	0.534004708413622	0.294757040075403	0.47146183735106	0.53857322566105	0.297033392688016	0.5162920201019115	
0.16003836352313	0.113782295703306	0.698581492088414	0.61575697033822	0.544467313745788	0.0840617323851069	0.799756631630383	0.508724372535805	0.51654638130857	0.024888994788976	

Appendix V: Value-Weighted Portfolio of Winners Results

	(3,0,1)	(3,0,3)	(3,0,6)	(3,0,9)	(3,0,12)	(6,0,1)	(6,0,3)	(6,0,6)	(6,0,9)	(6,0,12)
mean	0.136076716580546	0.19357508137513	0.171324918766706	0.19149741720703	0.179995705432785	0.132586012958143	0.152949427006919	0.130854184441154	0.172820199191375	0.143660134578439
vol	0.14766158508299	0.176319179569681	0.171480982340711	0.179267113944924	0.176259916790594	0.142069267284357	0.160799580510719	0.161952306023828	0.193177073456547	0.162649253511014
sharpe	0.918944798923434	1.09575557306401	0.997121759117148	1.06658380282597	1.01927998551269	0.930497541052565	0.948822502245787	0.80563853011942	0.892842024996214	0.880919923201922
skew	-0.209873862974855	0.242449219061968	-0.0062782792519413	0.115488998669771	0.00178328736595063	-0.380904622483365	-0.264396572261774	-0.333052547913481	0.0392895297576272	-0.446686936833002
min	-1.22062976216215	-1.4309445631660078	-1.68708615244697	-1.68708615244697	-1.19742301745728	-1.31495624894975	-1.34451731416076	-1.87430470976935	-1.34451731416076	-0.1810081078726
first_quartile	-0.175344631660078	-0.171198020665236	-0.180760267966741	-0.179989354101602	-0.135832289740183	-0.234797167134516	-0.206735302877538	-0.160546691484622	-0.127543803012158	-0.193860525267943
median	0.199157383979881	0.185435334572987	0.191713672976328	0.154039495444675	0.192383665443022	0.183940413039555	0.190966430948943	0.152019329583874	0.19078326624408	0.193860525267943
third_quartile	0.494498555537896	0.570501470372041	0.500446473613397	0.5919888749006	0.494532688328209	0.452115913421728	0.523020588687898	0.505301119350142	0.5720413441111393	0.52811595732773
max	1.6970212593743	2.12150766877152	2.12150766877152	2.12150766877152	2.12815586383296	1.34321425675577	2.8365368566798	1.34321425675577	2.8365368566798	1.34321425675577
num_pos	78	77	75	70	78	79	77	74	75	73
num_neg	46	46	45	47	42	42	43	46	42	47
intercept_CAPM	0.000354671293148114	0.00319415223023632	0.00162596562793717	0.00218696779585808	0.0015177979884219	0.000923114606668193	0.00148769615919176	-0.00052131285854481	0.00014855504228504	-4.98683282325104e-06
slope_CAPM	0.915677647660868	1.087375936099065	1.08180197109203	1.13874816613939	1.154785339681679	0.891817153685459	0.999212193621265	1.0146187427797	1.30078810189963	1.065212202244
r_squared_CAPM	0.654042571212593	0.652457139243962	0.681912739689122	0.679225471094771	0.730504951632214	0.66904748221953	0.66212217363396	0.672472344243265	0.774288772372775	0.734668642469781
p_value_intercept_CAPM	0.881321642246548	0.264056868066786	0.544765566819874	0.445617002652764	0.546821430883484	0.681800497424332	0.564933500628321	0.838698564405075	0.953829665395392	0.998281306359602
p_value_slope_CAPM	6.739317393467556e-30	1.518865703762916e-29	3.951594894322756e-31	3.62574213028277e-30	7.83260946072128e-36	2.37042439759381e-30	1.48744354972053e-29	2.23422487203672e-30	5.68102699878621e-39	8.59531498761262e-36
intercept_FF3	0.000871664866610075	0.0036294818242965	0.00155514501658835	0.00203168249487323	0.001036304385283678	0.000862682347534582	0.000626323587291232	-0.00116170629899688	0.000483359807158277	-0.00060241415057551
slope_FF3	0.873858093678511	1.07025030894139	1.08741311844855	1.15266625397363	1.18701360311191	0.866233691380763	1.00977252867332	1.01234011544087	1.25508087529057	1.07907348028008
r_squared_FF3	0.661432948977737	0.6545366623049187	0.682015076836635	0.679822857918226	0.738741132318825	0.686495590573735	0.679485063169526	0.687859034159068	0.78144592437798	0.74065700027776
p_value_intercept_FF3	0.716112193256359	0.221832205646256	0.569558285566576	0.48513352513162	0.676476073375338	0.700384394023134	0.80836728503212	0.650996791900291	0.851529934191713	0.797721242786103
p_value_slope_FF3	1.93353436486109e-25	7.5926066607731e-26	5.89668718793636e-28	2.62831118405965e-27	2.09282319081233e-33	3.81671961247412e-27	1.136576169657366e-27	6.0223147125965e-28	1.170661151399085e-34	3.55042362293735e-33
	(9,0,1)	(9,0,3)	(9,0,6)	(9,0,9)	(9,0,12)	(12,0,1)	(12,0,3)	(12,0,6)	(12,0,9)	(12,0,12)
0.158598987410902	0.177190746451831	0.166826853484165	0.1724203297778	0.142613952329941	0.176811661144986	0.167960433812158	0.135440482272544	0.116650935482578	0.17044933593869	0.17044933593869
0.158943668651703	0.164383049314453	0.181029346138462	0.180196372826488	0.156208482663187	0.167682393167883	0.18512220397174	0.18762491523537	0.17966186047666	0.197016794126214	0.197016794126214
0.995313569151451	1.07555318508288	0.919602830421045	0.954693442998638	0.911300326281049	0.105200130195531	0.905148260754732	0.719750415853214	0.647533351180021	0.863558093127788	0.863558093127788
-0.166927490506502	-0.343795877080992	-0.124297299020375	-0.1509796044743	-0.148977608435904	-0.536886574643665	-0.162519064032138	-0.332243425903287	-0.183243425903287	-0.121099203747999	-0.121099203747999
-1.381790924605	-1.96422779509	-1.86924813294445	-1.84804036721255	-1.44316191534392	-1.91152302479186	-2.05872120712917	-0.205872120712917	-1.74285356470485	-0.9512185316826	-0.9512185316826
-0.184859044754673	-0.0775823507247036	-0.15831998428586	-0.162609342718066	-0.163770078748004	-0.105230085656568	-0.145866271483355	-0.147484386509437	-0.193893222150654	-0.103979309922773	-0.103979309922773
0.178060089088563	0.180352138104528	0.151988028998696	0.16801055638466	0.103241652728557	0.200662346776964	0.183245173304683	0.12959996628019	0.113854930906868	0.166030780096868	0.166030780096868
0.531582249588638	0.471225995498023	0.570478047028668	0.604330656532503	0.43720038235358	0.556006969639256	0.543707599801243	0.549734110439586	0.49709690626473	0.522890060619526	0.522890060619526
1.44132485881007	1.53564380817211	2.51742543923503	2.51742543923503	1.8136597708565	1.46533545393416	2.00089198955301	2.00089198955301	2.00089198955301	2.00089198955301	2.6727187212507
75	74	70	73	63	77	73	71	67	69	69
43	43	44	44	45	38	41	43	41	39	39
0.00205696731298978	0.00307696824278558	0.00141414802859577	0.00162573164365064	-0.00195666135725612	0.00307127853026598	0.00102286669187162	-0.00161284300894408	-0.00352725970283842	-0.00363594901296657	-0.00363594901296657
1.01546394194013	1.06974473584097	1.17189753234258	1.169483860503575	1.08468517473473	1.05869441671482	1.1867538435081	1.17974396540749	1.19240500832245	1.31405230284955	1.31405230284955
0.693654693998521	0.725509186060477	0.715299175882584	0.721155191290768	0.738344017864775	0.683114492673535	0.711243816186114	0.684015951466087	0.746258987727777	0.753600773756186	0.753600773756186
0.40126969687025	0.202372195563047	0.6047375628990107	0.541123392948644	0.933335541308724	0.249754330307576	0.716246655681634	0.588996676214082	0.182780941862738	0.898457128891805	0.898457128891805
1.4023098839279e-31	4.5110903046152e-34	2.47390387464118e-32	1.11829465394667e-33	1.23721480135513e-32	5.70745806503051e-30	5.47736213934118e-32	8.6763033116449e-30	2.4163874233307e-33	5.073033926769e-34	5.073033926769e-34
0.00115869067167414	0.0025380690597255	0.000702467792174988	0.00152115061047095	-0.000522694753744493	0.00246872337295693	-0.013613811499515e-05	-0.00260388775007621	-0.00414620548726278	-0.0061831192178259	-0.0061831192178259
1.03502347471565	1.06267262873054	1.15037331939846	1.1146569039916	1.09403654077091	1.03777593059751	1.17529020616115	1.14496719654226	1.17013939366504	1.26417149541718	1.26417149541718
0.726839598316508	0.739439273579722	0.747543786276587	0.74809322183927	0.744580408848894	0.733527349318264	0.752352665408707	0.744589772212098	0.773941626631456	0.77984065971836	0.77984065971836
0.623167705242146	0.291104981751813	0.787896481120336	0.556635597410779	0.823779250639519	0.324724504466435	0.97912874777682	0.346402245335691	0.10490600158831	0.822839248324521	0.822839248324521
6.19448186205847e-31	2.24648394606892e-31	1.633405047251e-30	1.96385620925472e-30	1.75719192323809e-30	5.5432201830689e-29	5.86198828044889e-29	4.00625897787296e-29	2.57219500530653e-31	4.0383515839774e-31	4.0383515839774e-31

Appendix VI: Value-Weighted Portfolio of Losers Results

	(3,0,1)	(3,0,3)	(3,0,6)	(3,0,9)	(3,0,12)	(6,0,1)	(6,0,3)	(6,0,6)	(6,0,9)
mean	0.127438005246123	0.130773493695205	0.147002319616998	0.173933246589515	0.163693488592315	0.155298965263966	0.136685468520177	0.142573283896869	0.111770318745437
vol	0.188916731401673	0.176353671734438	0.172317162827701	0.181593407660999	0.16710813786975	0.186288388060169	0.186333327959856	0.18630057404698	0.175485340628318
sharpe	0.672540400925314	0.739429662502247	0.85113297602078	0.956197869361314	0.977546579566581	0.831549715933038	0.731518635693963	0.763251095481569	0.63496317471812
skew	0.11902228422971	-0.0283416587874273	-0.282328128298103	-0.00249376353219844	-0.286852984593756	0.0693368978889845	-0.063310456279249	-0.0477285009591762	-0.109500855755744
min	-2.003564282298	-2.003564282298	-1.82457473624839	-2.003564282298	-1.82457473624839	-1.80941901776528	-1.80941901776528	-1.80941901776528	-1.37099047695483
first_quartile	-0.252827592195508	-0.214779778403862	-0.143117106434892	-0.119279044345145	-0.108754906701097	-0.196679326384677	-0.17405095394171	-0.1766719911335393	-0.22787095370524
median	0.0986712714765219	0.109555967450007	0.17469205081081	0.151033781328998	0.16847335819916	0.138567603411	0.122091966309066	0.174650245785977	0.147655626385597
third_quartile	0.464036290002365	0.490846681425025	0.451830940268867	0.501710064780763	0.504829086883217	0.494970291449516	0.499223645633487	0.427875539352527	0.380513424368274
max	2.63592721340752	2.05515726060842	2.05515726060842	2.04119585489736	1.73081087961024	2.04852705080204	1.99403890142397	1.98498981072848	1.8733209752951
num_pos	75	72	78	75	81	74	73	75	74
num_neg	49	51	42	42	39	47	47	45	43
intercept_CAPM	-0.00425075537169741	-0.0026599389750934	-0.000806743205479782	0.000717152537641533	0.000803085304944206	-0.00090554175158869	-0.00223675396304163	-0.00137113872910716	-0.00272864723215195
slope_CAPM	1.25129078687221	1.14106860220385	1.11745543658215	1.13926648901836	1.09822435707581	1.23273908617547	1.21681221643074	1.18237235856222	1.09408707052177
r_squared_CAPM	0.747726288622938	0.720194634476056	0.721023889620522	0.66264958938202	0.739991855236728	0.744436577909732	0.7306676223325	0.690453789853183	0.663782409863084
p_value_intercept_CAPM	0.102971385868109	0.299209454260639	0.749282105681031	0.809502155210578	0.73409760621024	0.726857012702027	0.403179750699761	0.632171452558415	0.338422331067534
p_value_slope_CAPM	2.71654431113674e-38	2.91309160211585e-35	1.67173949512952e-34	6.64976918936303e-29	2.59079495942282e-36	4.70206889589544e-37	2.08410795286157e-35	7.88329339067827e-32	5.4758095424002e-29
intercept_FF3	-0.00335320092640402	-0.00213389240415675	-0.00068486681958553	0.0013144434274275	0.000961877693356301	-0.000343794274596372	-0.0021348353786695	-0.001143235382326	-0.0025197716755297
slope_FF3	1.18469766641665	1.09908113314126	1.10657947349498	1.10626186863427	1.08688916840607	1.20475145847243	1.21428922890245	1.18827730992104	1.1097691625963
r_squared_FF3	0.759208583671363	0.725505465910403	0.721394361248947	0.672695622498033	0.740489260810506	0.748009346197581	0.730794836333823	0.693072636318205	0.670134735537554
p_value_intercept_FF3	0.195743679993444	0.410390616585766	0.789855885964905	0.659003260350093	0.689387765593788	0.896119541703764	0.436938707503115	0.69623001891686	0.382322477104447
p_value_slope_FF3	3.0164822019053e-33	1.3817330267725e-30	1.30207099250943e-30	2.77168955180502e-25	2.74776578291058e-32	6.54274434251858e-33	7.03491593042346e-32	6.71023391039274e-29	9.5798256284366e-27
	(9,0,1)	(9,0,3)	(9,0,6)	(9,0,9)	(9,0,12)	(12,0,1)	(12,0,3)	(12,0,6)	(12,0,9)
0.133353597040259	0.125588900836288	0.116667597122041	0.109177027985884	0.0966787242561544	0.130100127633783	0.108756415027157	0.088614692496661	0.136431426620308	0.0890202543685326
0.18237270811252	0.194624126526848	0.181942157501135	0.183303861087646	0.152547483716712	0.186907203070473	0.185075390693089	0.185230068020863	0.170975326093087	0.15600819162745
0.729021345442923	0.643295715092047	0.63930121712089	0.59348991970128	0.632049843077684	0.693876748920653	0.585501329298232	0.76258120607461	0.796123866769586	0.569754476033578
-0.18029086476983	-0.142115127091031	0.00630687104936732	-0.0965262631692922	0.246271885687301	-0.130065567509622	-0.0977738225326419	-0.120259457402907	-0.046764916429849	-0.029069061849207
-0.19753797318334	-0.19753797318334	-1.73694666909524	-1.73694666909524	-1.21393547663113	-1.92355468923689	-1.9960080758186	-1.9960080758186	-1.72281987441956	-1.22486166100757
-0.140678447131364	-0.273300340017926	-0.271372100832984	-0.218598535610002	-0.180590393714637	-0.221027750402792	-0.227331995155327	-0.170063989643068	-0.225996614493618	-0.24703104637232
0.160950048644916	0.168774676852586	0.15113751142415	0.170525226687486	0.139856422806913	0.165016113487118	0.147120615359007	0.150940610093285	0.138965819841791	0.129720941606372
0.429019746248168	0.480974185676618	0.44425358550035	0.451597475087383	0.377496516692438	0.46049398808468	0.438862390243053	0.438710461855091	0.48429969879745	0.437485600305149
1.94649588216229	2.15108867739607	1.85226140658833	1.85226140658833	1.76918716660862	1.95224314882614	1.94171726601357	1.94171726601357	1.63908349780343	
77	74	70	70	63	75	69	69	66	67
41	43	44	47	45	40	45	45	42	41
-0.00205359794465076	-0.00325182605694673	-0.00300338455897032	-0.00372546904335545	-0.00342326992900996	-0.00286229818551512	-0.0042085691681624	-0.00597445554509454	-0.00096502910449615	-0.00407356103710061
1.2048587765853	1.2617762393338	1.19483992239709	1.17714878716421	1.02959013480495	1.25070122804156	1.21789887532079	1.2231003318095	1.10815704897	1.03187954016702
0.740634376497403	0.719515297675074	0.737170741177769	0.70724026873422	0.696947132796011	0.767299673454517	0.748764990094378	0.75387330724615	0.71169324960513	0.740201051079424
0.4276291666466	0.26009953777342	0.255724498432424	0.180086190297245	0.165874765796972	0.261396136027237	0.108176202145059	0.023129019133273	0.718851561615582	0.081043722072202
8.7018886188729e-36	1.56884568858925e-33	2.77304790787299e-34	1.85670174889067e-32	3.05778075647564e-29	1.4283992490275e-37	2.19992877553674e-35	6.93999433669523e-36	2.37002897305383e-30	8.47167572536358e-33
-0.001674688940755645	-0.00251285015166823	-0.0026442469421126	-0.00303100564604267	-0.00309457028284849	-0.0022539277703737	-0.0036671497204129	-0.00560207051835248	-0.000312613995833394	-0.00340063980863801
1.19618030658806	1.24968942085943	1.19509155370321	1.16979402483662	1.03019313774534	1.23295720946454	1.20596978916553	1.22108643400597	1.09896781309536	1.02586997897096
0.744979819405187	0.728585446958734	0.741793306007557	0.71768237670318	0.70773929820791	0.773757353728307	0.753032933845428	0.756829362158965	0.723670282129657	0.758016102788379
0.522257538671957	0.38684718080777	0.321842128215359	0.277228174955748	0.208798406614501	0.381138197084561	0.172670110656096	0.037010463752352	0.906944896142799	0.13862642933291
2.3488650753969e-32	1.96971364551885e-30	2.82776724303364e-31	1.3627900599644e-29	3.49632486095989e-27	5.75780820664611e-34	7.0747756409533e-32	1.52016955404143e-32	1.15087363375388e-27	1.71823013490802e-30

Appendix VII: ESG-Weighted Winners Minus Losers Results

	(3,0,1)	(3,0,3)	(3,0,6)	(3,0,9)	(3,0,12)	(6,0,1)	(6,0,3)	(6,0,6)	(6,0,9)	(6,0,12)
mean	-0.0119010167918427	-0.0133834158918441	-0.00881890861892176	0.00886819664436039	-0.0122769605345815	-0.0009685094638551	0.00110103306397312	0.00374809945514279	0.00809102002980253	0.0145924224501914
vol	0.0717099436380181	0.0737035435926059	0.0746598958628181	0.0726164984066211	0.0745108699687824	0.0728923878558662	0.0728042517279155	0.0710614166564466	0.0725336724224553	0.0728799671609754
sharpe	-0.171313588274411	-0.186636529872375	-0.12264159376469	0.118074814105351	-0.169296916542063	-0.018649664179643	0.00991516814161102	0.0474087479111705	0.106811499093686	0.195022807188303
skew	-0.576590961345607	-0.532695884933138	-0.433457604406156	-0.721624565355418	-0.706589336111091	-0.324956925934847	-0.169180866417988	-0.13180299741012	-0.0236510218152578	-0.178651590764593
min	-1.1003136360594	-1.06564659335679	-1.06564659335679	-1.06564659335679	-1.06564659335679	-0.90970032085798	-0.781054759399115	-0.629942052590048	-0.678156549011358	-0.629942052590048
first_quartile	-0.121661041192152	-0.1457398721911	-0.14876373703027	-0.11324023481064	-0.152684416552439	-0.132230946093902	-0.151330434482071	-0.143839855373924	-0.140257191770324	-0.146859388331213
median	-0.021725894820186	-0.0288021795902103	0.000206063967523408	0.00558963802912837	-0.00412173995853893	-0.0184567426191289	-0.00335119358339542	0.0183308440556591	-0.0153932138405684	0.0126001599837432
third_quartile	0.13293210984957	0.153039430757266	0.150535703694388	0.155613713022348	0.156695586264167	0.154802764101263	0.170361502815954	0.169750785645705	0.174418559353667	0.19765150660931
max	0.72034534346547	0.72034534346547	0.72034534346547	0.674320611569769	0.631776119233804	0.57570783237751	0.581885054720913	0.717710483378197	0.63763897265838	
num_pos	56	57	60	60	59	55	60	64	54	65
num_neg	68	66	60	57	61	66	60	56	63	55
intercept_CAPM	0.000718078456720971	0.000512082244591288	0.00119214846867381	0.00244729898631679	0.00038568564839526	0.00097477166768924	0.00117135541860275	0.00135176965405721	0.00204725676220034	0.00251061989887151
slope_CAPM	-0.180843481575026	-0.173057151182812	-0.198950803448331	-0.169183895062866	-0.153414336954798	-0.132505432730873	-0.133985701946114	-0.130295724405233	-0.160532008541975	-0.15373146832198
r_squared_CAPM	0.108534866993278	0.0947808960483376	0.121957746397574	0.0914907360346959	0.0727264554918061	0.0561041799795066	0.0580396656111171	0.0577060169968317	0.083870813122818	0.0764027617723706
p_value_intercept_CAPM	0.697802876386742	0.789977599767986	0.538841326246449	0.211229471542876	0.846270729777481	0.61737778143892	0.548771636187201	0.47822547506658	0.292041498130459	0.195596141177182
p_value_slope_CAPM	0.000186773865553927	0.00053209266262806	0.254766064043609e-05	0.000917638316479854	0.00289521932406892	0.0089022747222536	0.00803442042505234	0.0082233697484363	0.00153979911492601	0.0024309205608539
intercept_FF3	-0.000615070936131824	-0.000935507544271053	-0.000343889036270628	0.00132802952356866	-0.00947138167614951	-0.00014307478036875	-0.000145821257434982	0.000121630325100588	0.00065942830532014	0.00110736391130744
slope_FF3	-0.0921053571527238	-0.0847705466879775	-0.0950626676035344	-0.0900707506887378	-0.0568639124059039	-0.0631660097364723	-0.057021967597487	-0.0512251391343067	-0.0727772727191845	-0.0563213623735945
r_squared_FF3	0.279368713227296	0.249423719320807	0.35374365607592	0.2745515686880236	0.250329063432918	0.15126378173136	0.175086094070324	0.18135101792436	0.248499547624221	0.253175267601222
p_value_intercept_FF3	0.716759769931157	0.601327058779872	0.8391552468665774	0.454023385319364	0.603392421547515	0.939722570792662	0.938037329762324	0.946786082074668	0.713506590752016	0.532596995734376
p_value_slope_FF3	0.0492000837916008	0.0840646713547942	0.0422485916286967	0.0676045931806866	0.255704925701726	0.22347746119225	0.264046881295804	0.301544744686995	0.139528358728959	0.246400731192681
	(9,0,1)	(9,0,3)	(9,0,6)	(9,0,9)	(9,0,12)	(12,0,1)	(12,0,3)	(12,0,6)	(12,0,9)	(12,0,12)
0.00791930944740025	-0.00121173638614206	0.00547356651158628	0.0106786002627821	0.00208752271342721	0.000502634918921468	0.00797307634538601	0.0182816471770539	0.0192155632241339	0.0029799569305776	
0.0742452397234002	0.0759552036943212	0.0772398600495967	0.0809311953624061	0.077043031624711	0.0711311001702602	0.0718076169247405	0.0784284512556333	0.0739759628153234	0.0750213236081334	
0.101276653902841	-0.0210620273051267	0.0663104791014974	0.127152033363845	0.023706382833075	0.00130842488457778	0.10550060422187	0.228030473569796	0.25551102839218	0.0348448504830893	
0.0979637438887327	-0.188745473615105	0.00916060441990551	-0.304980737816696	0.1104504087260463	0.218088195607198	0.265835188685453	-0.016113927535397	0.214541672434726	-0.0271345838870539	
-0.779586951230676	-0.844634713137228	-0.83507956156188	-0.83507956156188	-0.72038497229113	-0.708866196025146	-0.87054416886086	-0.79127229349822	-0.151170612176833	-0.155348124132321	-0.1431494212873
-0.143971368692683	-0.1511707368873	-0.141574602571477	-0.127836160323905	-0.154852641350342	-0.156706162176833	-0.155348124132321	-0.1431494212873	-0.154620240484556	-0.14754765524923	
-0.00756145800673967	-0.00527534670044236	-0.00563702583241785	0.00862747690235194	0.000147790797290829	-0.00300223891656386	-8.39554061294046e-05	0.00953240979624421	0.0162213126754025	0.00763420000304733	
0.155408715277589	0.145579449606404	0.152163726969253	0.179612875900186	0.134341518681552	0.148180270728035	0.155696464203437	0.17511789407412	0.158045496893235	0.160615232082579	
0.710983163768553	0.710983163768553	0.820229168392307	0.820229168392307	0.724610310723504	0.771698603466871	0.771698603466871	0.781820361998102	0.781820361998102	0.781820361998102	
58	58	55	61	54	56	57	62	59	58	
60	59	59	56	54	59	57	52	49	50	
0.00175572008077194	0.00123602786837824	0.00162273992697847	0.00191321700210553	0.00172442506766835	0.00150146347528109	0.00225574209620621	0.002711706317630918	0.0030844669605764	0.0020013858184059	
-0.141167527765325	-0.163292629745258	-0.146614831285343	-0.133600353304386	-0.166256120740429	-0.17584373501663	-0.187658615748978	-0.150127931394119	-0.165669963913825	-0.190949814042098	
0.061593913503572	0.079274848497045	0.061602274243059	0.0466926677433296	0.07148575849151	0.104725039257186	0.11810953514483	0.0635495558847261	0.0850295047088395	0.109741672432978	
0.380321827085935	0.543742172443137	0.443177944899622	0.386679213829889	0.427614703193396	0.429320813619221	0.238511029976999	0.206691527815239	0.136499442496331	0.32881289405361	
0.00673296186923614	0.00210304188473797	0.00775340048415647	0.0192870348289594	0.00515225279051423	0.000418915649519801	0.000181363256717586	0.00681460690597554	0.00219901204539972	0.00461681408551985	
0.000591375761428173	-0.000202434883722986	0.000195630603539513	0.000594761096593739	0.00089907704366532	0.000113958970311594	0.000758028771450923	0.00124322540560863	0.00187642101788537	0.000831712521902507	
-0.056568201356356	-0.0650530009895038	-0.0472761532722875	-0.0309718284772506	-0.085794101662283	-0.087033272841037	-0.09531366138101	-0.0567601005281463	-0.0776160609815089	-0.096508817119125	
0.196942261145339	0.252740150677869	0.261223972831936	0.20563193191953	0.19821210324341	0.257222177099718	0.280996611294955	0.202892728943836	0.236903324791675	0.267278733416749	
0.753811607852384	0.914046592745899	0.918513217320618	0.772990183979249	0.660857172261329	0.948710213698532	0.669042390517325	0.54171737943874	0.329889992839182	0.663413100401677	
0.2763971207892	0.205576669846972	0.368823809033612	0.58240122435451	0.14512055010746	0.073792831641293	0.049042870269015	0.304303806136268	0.144609332402428	0.068852803275269	

Appendix VIII: ESG-Weighted Portfolios of Winners Results

	(3,0,1)	(3,0,3)	(3,0,6)	(3,0,9)	(3,0,12)	(6,0,1)	(6,0,3)	(6,0,6)	(6,0,9)	(6,0,12)
mean	0.188557117868253	0.182969675360279	0.182082915400893	0.194083372074698	0.176136860410503	0.173372633709785	0.175346589513129	0.174364271990946	0.16613941982409	0.178128091441026
vol	0.133949149326141	0.13473588341634	0.131800580212305	0.130580417577473	0.130686518528806	0.133356249704695	0.133926554345846	0.132676933040491	0.128829327426378	0.128565432757442
sharpe	1.40481106335618	1.3552471947359	1.37894245312226	1.48406138206524	1.34519889572048	1.29713999157841	1.30644310010869	1.31134403951878	1.28694167230864	1.38255611140601
skew	-0.184910413790722	-0.211220084834391	-0.22332455824374	-0.16405208129372	-0.25437912298524	-0.18624596149415	-0.20447364906807	-0.163588609176069	-0.271888445713265	-0.171398001997003
min	-1.03214432431222	-1.03214432431222	-1.03214432431222	-0.966771182146676	-0.966771182146676	-0.105949478684156	-0.105949478684156	-0.10665778190583	-0.10665778190583	-0.10665778190583
first_quartile	-0.040763320402149	-0.0478427996291485	-0.0519294547629102	-0.057105481087718	-0.0519294547629102	-0.0731756805423868	-0.0763487451291285	-0.0745842795525287	-0.0731756805423868	-0.0647110592200868
median	0.209247855547157	0.202231041507070	0.206630988810779	0.264358968069666	0.213595362333363	0.174463169220118	0.194457017797401	0.174504132077333	0.173154999271815	0.170005962136472
third_quartile	0.46572092954948	0.465870104538867	0.444814548282061	0.44063420559349	0.442613283705329	0.47227958846557	0.426974089242067	0.437363266030787	0.42287400058823	0.421871694564553
max	1.57090922192406	1.5056844853851	1.34656456368424	1.50568448538517	1.34656456368424	1.48287315348821	1.41152630312403	1.41152630312403	1.32134722771073	1.41152630312403
num_pos	87	85	86	84	85	85	84	84	83	84
num_neg	37	38	34	33	35	36	36	36	34	36
intercept_CAPM	0.00399240740112963	0.00354677587774019	0.00392337585193664	0.00452510972915982	0.00350188103957787	0.00347838091443717	0.0036711713431177	0.0036545213263971	0.0034672905502339	0.00425235916342558
slope_CAPM	0.979217772057127	0.980360050292558	0.958726152556212	0.95939556540522	0.952224086211057	0.969102033560548	0.970092104062126	0.964102687134948	0.938363319404934	0.938000623650353
r_squared_CAPM	0.91048120569164	0.909139723102181	0.905687008583982	0.9083387284248854	0.908348697056749	0.896373093325017	0.897808782378898	0.903555965696487	0.905046289374362	0.910615918052052
p_value_intercept_CAPM	0.00038362122584051	0.00181002362784221	0.000657237951668091	8.77407490401774e-05	0.00179163777446938	0.00384876698844044	0.00235877084450393	0.00168274769219925	0.00222050200451061	0.000106994909361618
p_value_slope_CAPM	8.80356765310375e-66	7.2713153024446e-65	2.431831551441986e-62	1.67454524898667e-61	4.48505940988881e-63	2.02867103704394e-60	2.77636717219125e-60	9.09835181910131e-62	1.25562412593575e-60	1.02189823805781e-63
intercept_FF3	0.0043535670710331	0.00378690098705836	0.00407567193998965	0.0046185326030835	0.0036655996246017	0.00379354732986098	0.00380144695040641	0.0038444331479135	0.0034552009773518	0.0043683350620472
slope_FF3	0.942654629956116	0.951462562384949	0.932374815797224	0.926661297698578	0.928473422522243	0.936652155312517	0.94519985387095	0.938673697945813	0.914130277278636	0.916311069330437
r_squared_FF3	0.920409042192958	0.915919867609207	0.912785891451118	0.918874155492068	0.91323231034603	0.903965081016665	0.90385727095944	0.908797755360924	0.914853725897043	0.9155448821491979
p_value_intercept_FF3	6.41572816466289e-05	0.000740314501547195	0.000318073056005998	2.64268207146729e-05	0.00100664504288575	0.00143794133823776	0.0016014822423364	0.000964387038362892	0.00167454750754337	6.94791599147421e-05
p_value_slope_FF3	1.18207067245485e-61	3.26621477889108e-60	5.64979207600616e-58	7.53758198703135e-58	2.83653549314882e-58	5.39482840050256e-56	6.74454175238645e-56	3.47194631648606e-57	2.26558623564202e-57	3.04633770314077e-59
	(9,0,1)	(9,0,3)	(9,0,6)	(9,0,9)	(9,0,12)	(12,0,1)	(12,0,3)	(12,0,6)	(12,0,9)	(12,0,12)
0.172931321976721	0.169311402400131	0.165955822370541	0.173515088813489	0.168242959430067	0.16715395932087	0.168855871607065	0.172735937017858	0.17512709043354	0.171731954538054	
0.13219234653246	0.132858174946087	0.130638443690235	0.129164680884842	0.122134102989164	0.132312500299069	0.130078184948378	0.13018762096385	0.129714138945966	0.128455983947196	
1.30515363787991	1.27145633515322	1.26765187418529	1.3403590938285	1.37538856230728	1.26023160274199	1.29505576398429	1.32377096338934	1.3476803952903	1.3344982772954	
-0.19820630883846	-0.224338083362353	-0.285841713492309	-0.210536086235934	-0.0680252685777021	-0.235632338950976	-0.181678541589447	-0.122002768512237	-0.191729670987155	-0.14722801243907	
-0.13797456197674	-0.13797456197674	-0.13797456197674	-0.13797456197674	-0.933476930648273	-1.0627609777676	-1.0627609777676	-1.05322211664575	-1.06883795809032	-1.05171901388514	
-0.0632359625360097	-0.0763902703673703	-0.0665706998321132	-0.0593871646312249	-0.0516773463790848	-0.066825398484316	-0.0964279101234254	-0.0787797030117015	-0.071944545648638	-0.0622513218236407	
0.19342093977367	0.190412869321046	0.183838697959787	0.184923276213565	0.17157978513536	0.190209814338048	0.182697625082846	0.193836048541382	0.18897677773076	0.185632326401188	
0.451720366902708	0.475599234085771	0.42502579356568	0.415779312629128	0.424173748918805	0.425891571814742	0.424846414952216	0.4093410604637	0.438314761267616	0.426177632970947	
1.44282612823439	1.39931784277023	1.32389196591527	1.32389196591527	1.4971184837315	1.42950253483714	1.42913962820586	1.42913962820586	1.42913962820586	1.4151952695412	
83	82	81	81	77	82	80	79	74	74	
35	35	33	36	31	33	34	35	34	34	
0.00377250451932199	0.00351100207600536	0.00367234317078193	0.00419966326642404	0.00365115065793873	0.00323867239582598	0.00366913498458862	0.00398351793833218	0.00394697329306239	0.00380237023134013	
0.966276733176918	0.966503989084671	0.946834822167542	0.934475334757205	0.92765326632667	0.967232318932025	0.944085251240804	0.94493030715821	0.95259831702477	0.939847721602864	
0.907123495698837	0.905763035879789	0.895687063642182	0.895500875431673	0.881868095916892	0.915031618532473	0.90961658265736	0.90974346436506	0.912036784962259	0.905241180436493	
0.00101364173490657	0.0025274424591039	0.00257058268215707	0.000459476976375959	0.00362209938789599	0.00348158885265968	0.00121134705684258	0.000466625074458103	0.000622916378468841	0.0012942109965944	
1.06685599043831e-61	8.11845885017289e-61	8.44847843596726e-57	3.1128582899733e-58	5.62970734544348e-51	2.49121960845146e-62	2.76403926203515e-60	2.53122048829321e-60	9.03291023165902e-58	4.68060287076483e-56	
0.00393650627750258	0.00345594238536278	0.00352715423829824	0.00423100254804611	0.0036447547783798	0.00332696281748261	0.00362702419648396	0.00392481413809351	0.00382559224232636	0.00365845791180895	
0.940662679603659	0.949295607222577	0.926698968765282	0.910258932639448	0.909316697530851	0.951547097492173	0.931661710747416	0.932591557585462	0.944026481203956	0.933219429773386	
0.912853619096016	0.9112538537878158	0.906407312272803	0.903025572563425	0.887839048861071	0.91837338184633	0.913260177989203	0.913759110527999	0.91554459113558	0.908706184451661	
0.000539141631276427	0.0027613652358121	0.00272208804601468	0.000351391273588959	0.00336047584861515	0.00285142266438132	0.00149717694903165	0.000604368773544355	0.000904628289531294	0.00197959948951282	
2.61284071007154e-57	8.85245447448987e-57	7.67049221220083e-54	3.0957900363638e-54	3.17752047336009e-47	7.53484163524421e-58	4.84112736705949e-56	3.57662954948446e-56	7.85245447448951282	3.50573276783156e-52	

Appendix IX: ESG-Weighted Portfolios of Losers Results

	(3,0,1)	(3,0,3)	(3,0,6)	(3,0,9)	(3,0,12)	(6,0,1)	(6,0,3)	(6,0,6)	(6,0,9)	(6,0,12)
mean	0.200458134660096	0.196353091252123	0.190901824019814	0.185215175430338	0.188413820945084	0.17434114317364	0.174245556449156	0.170616172535803	0.158048399794288	0.16353568990834
vol	0.163997543579475	0.163877081758195	0.165031085083116	0.159365492286342	0.158386717885616	0.155927537257115	0.155993794032024	0.154454308995348	0.155866470744125	0.156022524672804
sharpe	1.21998329563635	1.19590080214951	1.15471775468142	1.1603584358241	1.18745008076315	1.11558379708068	1.11457247938207	1.102183597055	1.01179432175372	1.04572402392747
skew	-0.00399954189390884	-0.0243255023891366	0.00211037112574306	0.0338446584310742	0.106306835677324	0.0666141471207639	0.0613585870392892	0.0308230024436551	0.088066400976855	-0.000992814649489752
min	-1.19930243875686	-1.19930243875686	-1.216995444601	-1.18708735295573	-1.216995444601	-1.11583814071103	-1.11583814071103	-1.11762220802059	-1.27400636968257	-1.11762220802059
first_quartile	-0.0966652780336184	-0.104710689936353	-0.0759328929679704	-0.10296181803005	-0.0979992746353291	-0.132554019237455	-0.122432871418843	-0.14152414486474	-0.132554019237455	-0.119228355304569
median	0.207621365985	0.181750168629298	0.198891363149968	0.197961361842105	0.193347844813089	0.199682123932936	0.194885637630521	0.220453737798896	0.170915921677545	0.204318919516949
third_quartile	0.545193371934818	0.485487585311578	0.511032339116028	0.471057746335505	0.499530741874507	0.495463185668473	0.496326968203399	0.487588522682716	0.460718130490207	0.462973015887906
max	1.83406392189679	1.82007892950779	1.97528536646599	1.82007892950779	1.97528536646599	1.85246991045808	1.93665809639046	1.9950377672209	1.93665809639046	
num_pos	87	88	83	81	83	80	80	80	79	81
num_neg	37		35	37	36	37	41	40	40	39
intercept_CAPM	0.00287843662676629	0.0026500804890872	0.00237879192213146	0.00177450206919201	0.00276378693260696	0.00210253450948783	0.0021102015670927	0.00191313731491764	0.0010632658011265	0.0013521249071318
slope_CAPM	1.16109959814849	1.15447779158273	1.15898909842768	1.1293646409694	1.10695056558899	1.10253875279087	1.10503741021082	1.09535801574276	1.10012771765846	1.09269169617491
r_squared_CAPM	0.854731702675916	0.853135017934166	0.84518282808862	0.845588045546999	0.838661956046539	0.849532931409637	0.859446611739692	0.861076261563565	0.850435737412462	0.839663663898238
p_value_intercept_CAPM	0.0937257551171012	0.125596694601888	0.188200205230671	0.316044928577119	0.121262330289456	0.208175685317498	0.193245921276421	0.230641817479081	0.528503308559742	0.434211585213149
p_value_slope_CAPM	6.07832131944708e-53	3.10520279871871e-52	1.25901432660175e-49	1.8011308407822e-48	2.77849174383037e-48	9.03228283139407e-51	4.16886126629257e-52	2.09308755426556e-52	2.86930240549732e-49	9.98212999783345e-49
intercept_FF3	0.00455810651844791	0.00435578266318338	0.00407821153638435	0.00303610421999218	0.00427138835199918	0.00354871948208405	0.00357800465283177	0.0033535479508923	0.00245199140805782	0.00289171627881914
slope_FF3	1.03494915621748	1.0363261522281	1.02812803469495	1.01732259928622	0.986027886222517	0.99993000893179	1.00234537673913	0.990023158702406	0.98763093415182	0.97256747926227
r_squared_FF3	0.909597704166285	0.901475899923157	0.906762689799008	0.895106767339977	0.8921121256644	0.891904460913092	0.902233320465462	0.90725202957265	0.902569959683505	0.8994324060907073
p_value_intercept_FF3	0.00109744680913161	0.00302000112261815	0.00487664453764939	0.0419681567825278	0.00431415925624015	0.0152291240016217	0.0108006466494482	0.013179108589728	0.0800636469094889	0.0412727304745782
p_value_slope_FF3	9.99796138581118e-54	1.21661664235382e-51	6.51813552931266e-51	8.4135242527478e-48	9.3777010322972e-48	2.04226553456506e-49	2.01639304826622e-51	1.86844370091922e-51	1.33508092648452e-49	1.67400066210124e-49
	(9,0,1)	(9,0,3)	(9,0,6)	(9,0,9)	(9,0,12)	(12,0,1)	(12,0,3)	(12,0,6)	(12,0,9)	(12,0,12)
	0.165012012529321	0.170523138786273	0.160428255858955	0.162836488550707	0.16615543671664	0.166651324613165	0.160882795261679	0.1544542889840804	0.15591152771922	0.168803958844997
	0.156593611253155	0.160512462299024	0.155552891176206	0.155451355809387	0.14936954254185	0.16133310951321	0.160142419901531	0.158047418925932	0.157931707342029	0.159786091051759
	1.0512051622796	1.05994950274508	1.0294279988123	1.04501149904325	1.11063020467542	1.03042561269515	1.00214188682365	0.972536024286748	0.985221026537486	1.05447269438195
	0.111118121456212	0.16334259346365	-0.0384847458636497	-0.0320916214664715	-0.0798520187954112	0.121116701489567	0.0649542533546243	0.081304624309124	0.0539254398561423	-0.0122934704797302
	-1.29451479499705	-1.29451479499705	-1.32179166122905	-1.32179166122905	-1.2780226594726	-1.36159101778615	-1.36159101778615	-1.36159101778615	-1.36159101778615	-1.24101921404237
	-0.119078623170788	-0.134677028865135	-0.132841603268963	-0.113851249621544	-0.0824777466629427	-0.137132170139232	-0.130094308374466	-0.141927569330475	-0.104229216550393	-0.120716224065167
	0.200995933706319	0.186760698652944	0.207322103641986	0.220561433933707	0.2060867688980076	0.174360161433437	0.199991922882351	0.188449977128435	0.18500063921237	0.187476534919658
	0.472649500102924	0.479651617178499	0.46310479502528	0.435485927795258	0.47995291290982	0.455041267548966	0.451899564980174	0.452462776246001	0.414162279162783	0.486160525500998
	2.06340886528328	2.24395255590746	1.85988076603352	1.85988076603352	1.9112021595127	2.14974103206626	2.13802582423101	2.13802582423101	2.13802582423101	1.95775990720613
	76	77	74	77	74	75	72	74	74	72
	42	40	40	40	34	40	42	40	34	36
	0.0016074370222698	0.00187728675952091	0.00168542250768101	0.0018887588162123	0.00165764049569962	0.00131789243072477	0.00100596749625806	0.000859029369898661	0.000540496364659949	0.0014794244510818
	1.10832644531889	1.13071039830277	1.09464955512827	1.06898946753443	1.0946411938428	1.14399342660025	1.132692873448	1.09600728856816	1.11897698855289	1.13150472858155
	0.850710091953256	0.850072913717511	0.845339338139698	0.810101910107315	0.821365616860023	0.861991898419486	0.864982980490538	0.827162090938995	0.849351472321314	0.848635169413333
	0.340618282422683	0.280661936908544	0.330747723887416	0.319135260352898	0.3709530727870	0.435850677607167	0.546032027900131	0.645050188930637	0.762152956038099	0.414975003516776
	9.93131817202681e-50	3.29692526901293e-49	3.29177031087584e-47	2.69429746136028e-41	1.92429746136028e-41	2.04500665253561e-50	1.61816254301378e-50	1.67709655473301e-44	2.26541616299386e-45	2.91449855252015e-45
	0.00294928797183655	0.00328123388508424	0.00298053521170614	0.00325909806745085	0.00248076706612471	0.00280850248597809	0.00248392848374413	0.00229652179119598	0.00163480029338999	0.0025123744579182
	0.997217988585926	1.01429736762474	0.974552094433825	0.941179520529363	0.995570255283911	1.038694048788752	1.02704905586343	0.989425341848613	1.02226685727945	1.03035256198649
	0.899933025645454	0.901968967655238	0.905064587773123	0.878440368655001	0.86757891578738	0.903674353414182	0.908227475756229	0.87274842658904	0.885386741798094	0.886956591267839
	0.0377185554022346	0.0239143099650069	0.0327592013597016	0.03719045649225	0.1270931482068	0.0542131592490333	0.08070504843036435	0.164746641046052	0.305510998950739	0.118250082111251
	1.67216378135627e-49	2.25816902875421e-49	2.20496319927899e-48	3.40866505232909e-43	3.3648863505823e-40	1.2542202652365e-49	3.258086018836e-50	1.5706869850397e-42	3.38869712404361e-43	2.55630479142086e-43