THESIS SYNOPSIS

Máté Fain

SUSTAINABLE INVESTING

DOES ESG INDUCE A VIRTUOUS CIRCLE?

PhD Dissertation

Supervisor:

Helena Naffa, PhD
Senior Lecturer

Budapest, 2021

Department of Finance

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1. RESEARCH BACKGROUND AND OBJECTIVES

1.1. ABOUT SUSTAINABILITY – A STAKEHOLDER PERSPECTIVE

What do oil, soybean, gold, and water have in common? The answer, at first, may sound surprising: in late 2020, water joined these well-known commodities on Wall Street as Californian farmers, hedge funds, and municipalities can now purchase water futures to hedge related risks. Compared to water futures, weather derivatives have a more mature market. The Chicago Mercantile Exchange introduced the first exchange-traded weather futures contracts and corresponding options in 1999, mostly tracking cooling degree days or heating degree days. Some recent studies[1] have even gone further by designing and pricing air pollution derivatives. More importantly, these market developments and scientific initiatives on risk management draw attention to sustainability. Sustainability challenges are getting more severe as life-sustaining natural resources may become scarce worldwide. Consequently, the dissertation aims to analyse if it is possible to reconcile *sustainability* with the *financial objectives* of corporates and investors. However, a question arises: what does sustainability, in fact, connote? The following examples illustrate that sustainability challenges are much more diverse than one might first think.

The increase in CO_2 emissions was relatively slow until the mid-20th century: in the 1950s, the world emitted just over 5 billion tonnes of CO_2 – about the same as the US or half of China's annual emissions of today. By the 1990s, this figure had quadrupled to 22 billion tonnes. Emissions have continued to proliferate; societies around the globe now emits over 36 billion tonnes each year. Consequently, today's arctic ice area is 4.70 per cent smaller, while the global temperature is 0.79 degrees Celsius higher than the 20th-century average. These numbers frequently pop up in the press and everyday conversations; hence, raising concerns about *environmental* sustainability.

Decent working conditions greatly influence the well-being of citizens. However, UNDP global statistics show some 700 million workers lived in extreme or moderate poverty in 2018, with

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[1] Liu, Z., Zhao, L., Wang, C., Yang, Y., Xue, J., Bo, X., Li, D., Liu, D., 2019. An Actuarial Pricing Method for Air Quality Index Options. International Journal of Environmental Research and Public Health 16. https://doi.org/10.3390/ijerph16244882

Xue, J., Xu, Y., Zhao, L., Wang, C., Rasool, Z., Ni, M., Wang, Q., Li, D., 2019. Air pollution option pricing model based on AQI. Atmospheric Pollution Research 10, 665–674. https://doi.org/10.1016/j.apr.2018.10.011

around USD 3 income per day. Further, approximately 2 billion employees were in informal employment in 2016, accounting for 61 per cent of the world's workforce resulting in significant vulnerability towards employers. Then, fatal occupational injuries can be unexpectedly high even in some of the most prosperous countries: 2016 data show 5.24 cases of fatal injury per 100.000 employees in the US comparing with Germany's 0.97 figure. All these examples are about the *social* dimension of sustainability.

Other well-known destructive factors are corruption, bribery, fraud and tax evasion. The estimated annual cost of these illegal actions in developing countries equals USD 1.26 trillion. Almost one in five firms worldwide have reported receiving at least one bribery payment request when involved in regulatory or utility transactions (*Cardoni et al., 2020*). These unacceptable activities provide cases of corporate governance and business ethics concerns that can significantly impact sustainable *economic* growth.

The examples above illustrate that "sustainability" is a multifaceted notion closely intertwined with the concept of "development". However, sustainability or sustainable development has several competing definitions. The dissertation applies the well-known terminology of the Brundtland Commission articulated in Our Common Future (*WCED, 1987, p. 43*): *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.".* WCED (1987) underscores that it is essential to simultaneously consider the demands of the world's poor and the environmental and socioeconomic constraints to meet present and future needs.

The cases and statistics presented above each underscore the need of fostering environmental, social, and economic dimensions of sustainability; hence, responding to urgent challenges of society. Global organisations have started elaborating standards and rules to enhance sustainable practices. The most prominent standard-setting framework is the Paris Agreement on climate change mitigation, adaptation, and finance, signed in 2016. The Sustainable Development Goals (SDGs) of the United Nations, established in 2015, define environmental and social challenges more broadly than focusing solely on climate change. Paris Agreement and UN SDGs both influenced the European Union's Taxonomy Regulation (TR) and Sustainable Finance Disclosure Regulation (SFDR), requiring corporations and investment firms to align business models with environmental sustainability objectives.

This dissertation evaluates the consequences of promoting sustainability in a corporate context. The examples enumerated in the previous paragraphs each underscores the inevitability of

sustainability and its coherence with stakeholder theory. Stakeholder theory argues that maintaining stakeholder "satisfaction" – such as customers, employees, local communities, shareholders, and even the natural environment – is imperative for companies in fulfilling their mission. However, there is no light without shadow; therefore, advocates of the trade-off hypothesis assert that resource reallocation to sustainable activities does not pay off; instead, they induce higher operating costs due to the internalisation of externalities.

The examples also illustrated that alignment with sustainability goals might be assessed from as many angles as stakeholders recognised. The dissertation focuses on shareholder wealth; viz., examines sustainability from an asset owner perspective. Hence, the research question is the following: is it possible to boost corporate profitability by implementing sustainable corporate practices? Put it another way, does the academic literature's "doing well while doing good" concept prevail? If so, as influential stakeholders, investors may drive and can "force" sustainable economic growth.

Studying the impact of sustainability on shareholder value-added may manifest in several forms. In line with the figure below, the analysis might cover (1) accounting profitability, (2) respond to how equity markets price sustainability, and, finally, (3) identify the potential risk-adjusted excess returns for investors. The dissertation intends to explore the latter case.
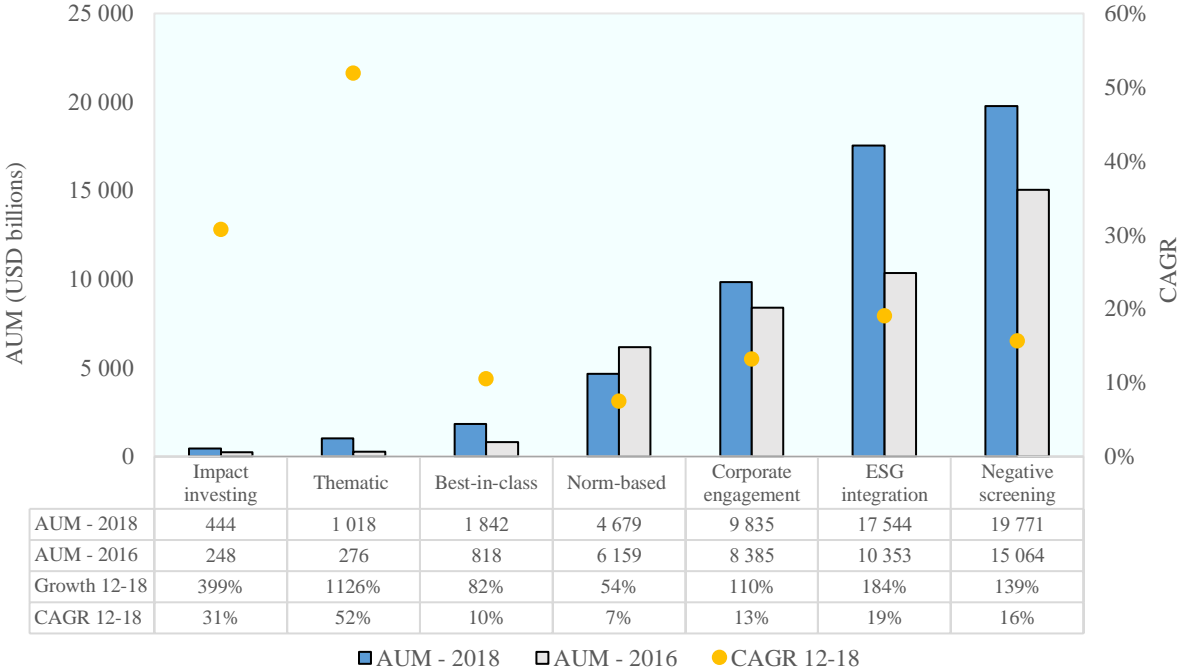
The three approaches of measuring financial performance concerning sustainability
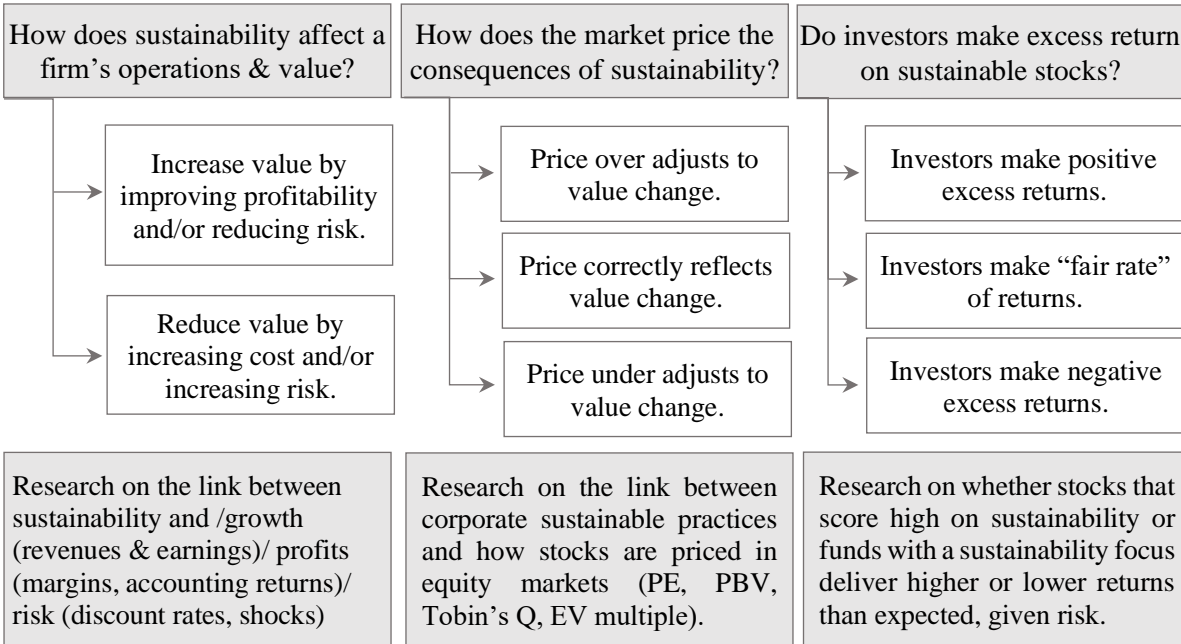
Source: *Cornell and Damodaran (2020, p. 80)*

In the investment literature and practice, ESG is a broad umbrella term for sustainability covering firms' environmental, social and governance attributes. A wide-scale of ESG-conscious investment strategies exist, from exclusionary screening to impact/community investing. The dissertation concentrates on two distinct strategies, the ESG integration approach and ESG-themed investing. ESG integration has exceptional popularity, with USD 17,500 billion total assets under management (AUM) in 2018, while thematic investing is the most rising strategy with a 1,100 per cent increase in AUM between 2012 and 2018 (see the figure below).

Global growth of sustainable investing strategies

|	Impact investing	Thematic	Best-in-class	Norm-based	Corporate engagement	ESG integration	Negative screening
AUM - 2018	444	1 018	1 842	4 679	9 835	17 544	19 771
AUM - 2016	248	276	818	6 159	8 385	10 353	15 064
Growth 12-18	399%	1126%	82%	54%	110%	184%	139%
CAGR 12-18	31%	52%	10%	7%	13%	19%	16%

Source: Global Sustainable Investment Alliance (*GSIA, 2018*)

The ESG integration strategy applies separate E, S, and G scores from Sustainalytics, and each stock belongs to one of the following portfolios: leaders, followers, loungers, laggards, and not rated. Thematic portfolios discover nine SDG-related challenges, which are the following: Energy efficiency, Food security, Water scarcity, Ageing population, Millennial generation, Urbanisation, Cybersecurity concerns, Disruptive technologies, and Robotics. Each thematic portfolio fits E, S, and G megatrends (MT) and encompasses firms with business models addressing critical ESG challenges.

Garvare and Johansson (2010) present a conceptual model of stakeholder theory that interprets sustainability management on two levels. The authors differentiate *organisational* and *global*

sustainability and connect *stakeholders* and *interested parties* with the two forms. Corporates can reach organisational sustainability if they satisfy the demands of their *stakeholders*. According to the authors, stakeholders can be either primary and secondary or overt and latent; nevertheless, they are analogous to *Freeman's (1984)* standard classification. Global sustainability is attained if corporates achieve their primary profit goals without compromising the ability of interested parties to meet their own needs. Interested parties are actors with enquiry in the corporate activities but do not possess the direct power or ability to control and influence corporates or their stakeholders. Interested parties might include, among others, nature and future generations. The figure below depicts the conceptual model of organisational and global sustainability.

Stakeholder theory – organisational sustainability – global sustainability
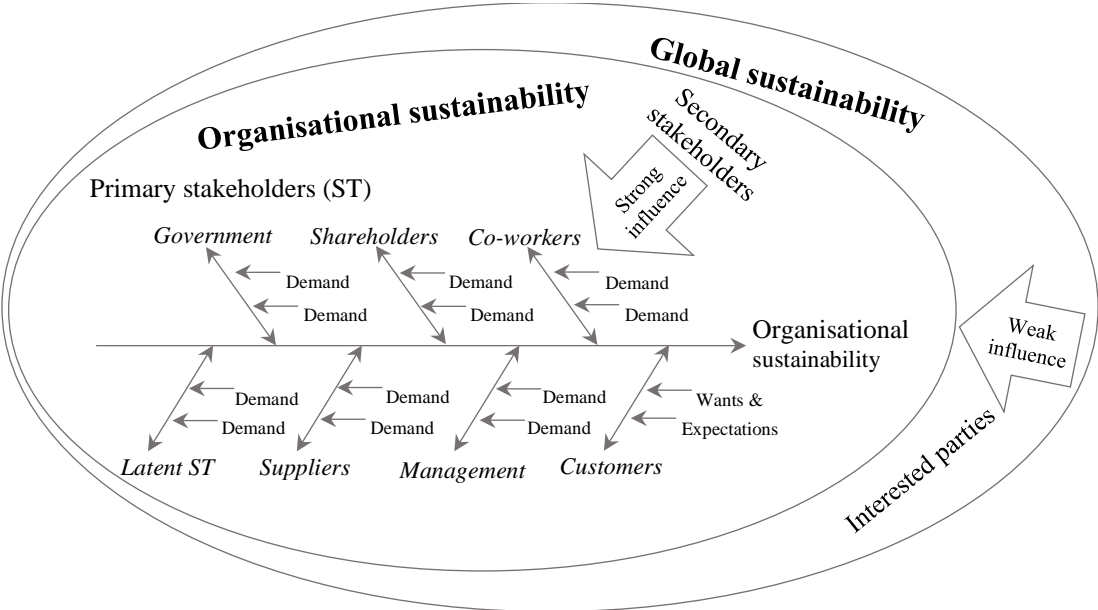
Source: *Garvare and Johansson (2010, p. 741)*

Following the model of *Garvare and Johansson (2010)*, ESG integration is rather consistent with the "organisational sustainability" concept, while ESG-themed investing corresponds more to the "global sustainability" idea. Based on the figure above, organisational sustainability is a prerequisite of global sustainability. In the dissertation, however, no such precondition is employed, i.e., companies with possibly low ESG scores can still promote global sustainability. Put another way, ESG-themed investing does not consider ESG scores of portfolio firms but emphasises SDG-related business models. In this respect, the ESG-themed investment strategy is also closely related to the "shared value" concept of *Porter et al. (2019)*.

1.2. SUSTAINABILITY IN THE INVESTMENT DISCIPLINE

In the investment literature, the conclusions on the role of ESG are mixed. There are essentially three competing arguments concerning the risk-adjusted returns of ESG strategies: the positive, the negative, and the neutral relationship. Neutrality or the no-effect hypothesis is closely related to the modern portfolio theory (MPT) of *Markowitz (1952)* and the efficient market hypothesis (EMH), often attributed to *Fama (1970)*. The former argues that there is no return premium for factors that incorporate only idiosyncratic risk, i.e., ESG risks are diversifiable. The latter insists that stock prices reflect all public and relevant information; hence it is not possible to attain superior risk-adjusted returns relative to the market portfolio. Studies from *Bauer et al. (2007), Hamilton et al. (1993), Hartzmark and Sussman (2019),* and *Managi et al. (2012)* support neutrality.

The advocates of the negative relationship or trade-off hypothesis contend that ESG investments are likely to underperform in the long run either because ESG portfolios are a subset of the market; thus, the degree of diversification is limited or due to overvaluations that might derive from investors' value-driven attitude. The effects of values-driven ESG investors on stock prices can be understood theoretically by *Merton*'s *(1987)* model on neglected stocks and segmented markets. *Renneboog et al. (2008)* argue that diversification constraints may shift the mean-variance frontier towards less favourable risk-return trade-offs than those of conventional portfolios. *Hong and Kacperczyk (2009)* demonstrate that sin stocks have historically outperformed the market; therefore, underinvestment in such financially attractive investment opportunities results in significantly lower risk-adjusted returns. According to *Derwall et al. (2011)*, investors' non-pecuniary utilities might be the reason why ESG investments can achieve significant negative risk-adjusted returns. The authors argue that if a significant number of investors are values-driven, they are willing to sacrifice returns to meet high ESG standards by shunning sin stocks. The other concept of negative abnormal returns is in line with the possible overvaluation of ESG stocks found by *Renneboog et al. (2008)*. Put another way, ESG-conscious investors pay the price for ESG compliance. Overvaluation, hence forgoing returns, also corresponds to the "delegated philanthropy vision" emphasised by *Bénabou – Tirole (2010)*.

Several research studies claim that investors may realise significant superior risk-adjusted returns by incorporating ESG criteria into the investment process. *Hamilton et al. (1993)* refer to this positive ESG-CFP relation as the "doing well while doing good" concept; *Derwall et al.*

(2011) term it the "errors-in-expectations hypothesis", *Porter and Kramer (2019)* introduce the "shared-value" concept, while *Bénabou and Tirole (2010)* draw up the "win-win" vision which underlines the long-term perspective of ESG. *Derwall et al. (2011)* argue that at least two conditions should be met to maintain the errors-in-expectations hypothesis. First, firms expected future cash flows – i.e., projects with positive net present value, NPV – should increase due to ESG practices. Second, stock prices should not reflect all the value-relevant information related to ESG practices. In summary, "true" NPV and "value-relevant information" indicate that the "doing well while doing good" hypothesis might be valid only if markets misprice social responsibility; therefore, it is against the EMH. There might be several reasons for mispricing, which are summarised in *Derwall et al. (2011)*. The possible explanations of *Klassen and McLaughlin (1996)* are also appealing: financial markets pay less attention to positive corporate social responsibility practices than to controversies. *Derwall et al. (2005)*, *Edmans (2011)*, *Flammer (2012),* and *Kempf and Osthoff (2007)* found evidence for the "doing well while doing good" concept.

Besides the trade-off and the win-win approaches, the proponents of the inverted U-shaped relationship doubt the linear relation between ESG and financial performance. Instead, in many cases, considering non-linearity may be a suitable assumption. The inverted U-shaped relation, first described by *Bowman and Haire (1975)*, contends that the intermediate level of ESG performance maximises investor yields. The economic rationale behind non-linearity is the diminishing marginal returns to ESG. According to *Sun et al. (2019)*, ESG activities utilise substantial corporate resources, such as dedicating employees to ESG duties and managerial investments. The resource reallocation to ESG becomes increasingly challenging because of the increased competition between ESG and other core business activities. Thus, the authors assert, the cost of managing ESG becomes high and thus reduces returns. Beyond a certain point, consumers also perceive that additional costs of excessive ESG compliance reflected in product prices no longer associated with sufficient utility, resulting in demand reduction (*Bhattacharya and Sen, 2004*). The drop in demand reduces net cash flows, which, in turn, pushes down shareholder value. Recent empirical studies of *Azmi et al. (2021)*, *Grassmann (2021)*, *Groening and Kanuri (2018),* and *Han et al. (2016)* found evidence on inverted U-shaped relation.

The dissertation examines the pure market performance of ESG integration and ESG-themed investment strategies in global equity markets between 2015 and mid-2020. Consequently, each theory presented so far might be relevant. However, the first hypothesis derives from the "doing

well while doing good" concept and the shared-value theory of *Porter and Kramer (2019)*. Therefore, the hypothesis is the following.

Hypothesis 1 (H₁): Assuming a positive relation between ESG and financial performance, we predict that, in the *longer term*, it is possible to generate significant positive risk-adjusted returns with ESG leaders in the ESG integration approach (**H₁ₐ**) and with ESG-themed investment strategies (**H₁ʙ**).

The reference period includes the first wave of the COVID-19 pandemic, allowing the performance measurement of ESG-conscious investment strategies during an exogenous market crash. According to *Tsai and Wu (2021)*, most academic literature presumes a stationary relation between ESG and financial performance. However, there is some empirical evidence that this assumption is unrealistic. Although research is limited concerning the performance of ESG during crisis periods *(Broadstock et al., 2021)*, some insights can still be gained from previous research. *Nofsinger and Varma (2014)* study two crisis periods – 2000-2002 after the dot-com bubble and the global financial crisis of 2007-2009 – and found that socially responsible mutual funds outperform during periods of market crises. *Cornett et al. (2016)* report that US banks' financial performance during the global financial crisis (GFC) is positively related to their ESG rating. *Lins et al. (2017)* show that during the GFC, non-financial US firms with high ESG scores have better financial performance than other firms with low ratings.

Studies examining ESG performance during the COVID-19 pandemic have mixed results. *Broadstock et al. (2021)* analyse a dataset covering China's CSI300 constituents and show high-ESG portfolios generally outperform low-ESG portfolios. *Pástor and Vorsatz (2020)* investigate US active equity mutual funds' performance and flows, including sustainable funds, and conclude that most active funds underperform passive benchmarks. However, they find funds with higher sustainability ratings perform better than their conventional counterparts. *Ding et al. (2021)* evaluate 6,700 firms across 61 economies and assert that pandemic-induced drop in stock returns is milder among firms with stronger pre-2020 finances, less exposure to COVID-19 through global supply chains and customer locations, *more corporate social responsibility activities*, and less entrenched executives. *Albuquerque et al. (2020)* analyse 2,171 US stocks and show that firms with higher ES ratings have significantly higher returns, lower return volatility, and higher operating profit margins during the first quarter of 2020.

Contrary to the previous findings, *Demers et al. (2021)* find evidence that once industry effects, market-based measures of risk, and accounting-based measures of performance, financial position, and intangibles investments have been controlled, ESG does not offer positive explanatory power for returns. The authors conclude that a high ESG level is not associated with significant superior returns during the first wave of COVID and the entire year of 2020. The results of *Folger-Laronde et al. (2020)* also indicate that higher levels of the sustainability performance of the examined ETFs do not safeguard investments from financial losses during a severe market downturn.

Some of the studies presented above are consistent with the "flight to quality" phenomenon (*Broadstock et al., 2021*) and underline the "insurance-like protection" ability of ESG (*Shiu and Yang 2017*). Regarding ESG performance during the COVID-19 crisis, most of the publications cover the US stock market. The dissertation analyses ESG factor portfolios in *global* markets by controlling 83 secondary style, industry, and country factors to measure *pure* ESG performance during the COVID-19 crisis. Consequently, the research question is whether "flight to quality" maintains in global circumstances. The second hypothesis tested is as follows:

Hypothesis 2 (H₂): Assuming a positive relation between ESG and financial performance, we predict that it is possible to beat the market with ESG leaders in the ESG integration approach (**H₂A**) and with ESG-themed investment strategies (**H₂B**) during severe market conditions such as the COVID-19 pandemic.

The investment literature follows two distinct approaches to evaluate ESG investments. One compares ESG funds' performance with their non-ESG counterparts (*Lesser et al., 2016*; *Nofsinger and Varma, 2014*; *Pástor and Vorsatz, 2020*). Another approach is to identify ESG as new risk factors beyond the original Fama-French (FF) factors (*Hübel and Scholz, 2020*; *Jin, 2018*; *Maiti, 2020*). The thesis applies the right-hand-side (RHS) method, popularised by *FF (2018),* which combines the two approaches with the benefit of capturing specific factors' pure performance (*Bali et al., 2016*) while testing whether they are valid new factors (*FF, 1996, 2015, 2017*). *Harvey et al. (2016, p. 37)* argue that, due to data mining, a newly discovered factor requires a t-statistic of at least 3.0; therefore, ESG factors might be considered as new risk measures in FF if this requirement is satisfied. The third hypothesis is the following.

Hypothesis 3 (H3): Following the literature's recommendations on the t-statistic being higher than 3.0, it is assumed that ESG factors can be included in the FF framework as new risk factors.

1.3. THE NOVELTY AND CONTRIBUTION OF THE DISSERTATION

Overall, the thesis helps scientific thinking about sustainability in several ways. Firstly, it contributes to the active debate of investment literature on the role of ESG, which is far from being settled. Introducing an expanded conceptual model of stakeholder theory, which distinguishes between organisational and global sustainability, is a novelty in the discipline of investments. Then, the dissertation emphasises the megatrend concept and integrates signalling theory into thematic portfolios' stock selection processes. It also creates a new mathematical formula for measuring megatrend exposures. Utilising the right-hand-side (RHS) approach of Fama and French in the ESG integration framework is a novelty as well. Further, ESG-themed investing is a relatively new strategy; hence, it is currently under-researched in the literature. Finally, the analysed database is unique and comprehensive, making it suitable for measuring the *pure* performance of ESG factors.

2. METHODS

2.1. QUANTITATIVE METHODS

The baseline performance evaluation rests on *alpha* calculations utilising the CAPM and Fama-French factor models and consists of two consecutive stages, cross-sectional and time-series analysis. The cross-sectional analysis applies *Fama and MacBeth (1973)* (*FM*) regressions to construct ESG as well as style, industry, and country pure factor portfolios (PFP). The style factors, among others, include the *FF (2015)* five factors and the momentum factor popularised by *Carhart (1997)*. The term "pure" factor portfolio is "borrowed" from *Clarke et al. (2017)* and *Menchero (2010)* to point out that *numerous* secondary factor exposures are disentangled compared to "simple" or "primary" factor portfolios that concentrate solely on one factor. In the time-series analysis, ESG PFP returns are regressed on the FF pure factors to get ESG PFP alphas. The time-series regression approach corresponds to the FF right-hand-side technique using spanning regressions (*FF 2018*), a routine in the FF universe as emphasised in the previous section.

Factor Portfolio Construction

The standard FM procedure runs cross-sectional regressions in each time period. The method is concurrently suitable for determining factor portfolio returns (i.e., regression coefficients) and calculating stock weights in each factor portfolio. The FM regressions equation using conventional matrix algebra notations is the following:

$$R_{t+1} = Z_t F_{t+1} + u_{t+1} \,, \tag{1}$$

where R_{t+1} is the ($N \times 1$) vector of stock returns on N individual securities from t to $t+1$; Z_t is the ($N \times K$) matrix of standardised factor exposures at date t, with a vector of ones in the first column; $\hat{F}_{t+1}$ is the ($K \times 1$) vector of the ordinary least squares (OLS) values of the regression coefficients at $t+1$, and u_{t+1} is the ($N \times 1$) vector of security return disturbances for $t+1$. K is the number of explanatory variables, including the standard portfolio.

The OLS solution for the regression coefficients is as follows.

$$F_{t+1} = (Z_t`Z_t)^{-1} Z_t`R_{t+1} \tag{2}$$

Fama (1976) notes that the individual security weights in each factor portfolio are the elements of the weight matrix W_t.

$$W_t \stackrel{\text{def}}{=} (Z_t`Z_t)^{-1}Z_t` \tag{3}$$

One must emphasise that even though the stock weights are observable at t, the returns (i.e., slope coefficients, F) are not observable until the next period ($t + 1$).

Perfect multicollinearity emerges from ESG, sector, and country dummy factors, making the $(Z_t`Z_t)$ matrix singular. The thesis follows *Heston and Rouwenhorst (1994)* and *Menchero (2010)* to solve this problem by imposing three and two constraints in the ESG integration and ESG-themed investment strategies. The heteroscedasticity of u_{t+1} and the influence of small stocks are well-known facts; therefore, weighted least squares regressions (WLS) are applied supplemented with the predefined constraints (CWLS). The z-scores calculation of firm characteristics rests on the capitalisation weighting scheme presented by *Clarke et al. (2017)*. The *extended* version of the FM regression is the following.

$$V_t R_{t+1} = V_t Z_t C_t G_{t+1} + V_t u_{t+1} \tag{4}$$

In (4), V_t is the ($N \times N$) diagonal matrix in time t with market capitalisations in the diagonal to correct heteroscedasticity. Matrix $C_t G_{t+1}$ equals F_{t+1}, where C_t is the $K \times (K - 2)$ or $K \times (K - 3)$

constraint matrix depending on which ESG strategy is examined. G_{t+1} is the $(K - 2) \times 1$ or $(K - 3) \times 1$ vector of auxiliary returns in time $t+1$.

After some calculations, the final solution is in (5) (for further derivation, see *Menchero 2010*).

$$F_{t+1} = C_t(C_t'Z_t'V_tZ_tC_t)^{-1}C_t'Z_t'V_tR_{t+1} \tag{5}$$

The individual stock weights are calculated according to (6):

$$W_t \stackrel{\text{def}}{=} C_t(C'_tZ_t'V_tZ_tC_t)^{-1}C_t'Z_t'V_t \tag{6}$$

Performance analysis

The alpha calculations derive from the CAPM and the Fama-French factor models:

$$RP_{it} = \alpha_i + b_{1i} MRP_t + u_{it}, \tag{7}$$
$$RP_{it} = \alpha_i + b_{1i} MRP_t + b_{2i} R_{SIZEt} + b_{3i} R_{VALUEt} + u_{it}, \tag{8}$$
$$RP_{it} = \alpha_i + b_{1i} MRP_t + b_{2i} R_{SIZEt} + b_{3i} R_{VALUEt} + b_{4i} R_{MOMt} + u_{it}, \tag{9}$$
$$RP_{it} = \alpha_i + b_{1i} MRP_t + b_{2i} R_{SIZEt} + b_{3i} R_{VALUEt} + b_{4i} R_{PROITt} + b_{5i} R_{INVt} + u_{it}, \tag{10}$$

Equation (7) is the CAPM, and Equations (8)-(10) are the Fama-French three (FF3), Carhart's four (FFC), and Fama-French five-factor (FF5) models, respectively. In each equation, RP_{it} is the excess return of ESG PFP i, α_t is the abnormal return, MRP_t is the market risk premium, R_{SIZEt}, R_{VALUEt}, R_{MOMt}, $R_{PROFITt}$, and R_{INVt} are the factor returns of size, value, momentum, profitability, and investment, respectively. Variables b_{1i}, b_{2i}, b_{3i}, b_{4i}, and b_{5i} are sensitivities to factor returns. The OLS method with *Newey and West (1987)* HAC standard errors is used to calculate regressions.

Robustness tests

In the dissertation, robustness tests are performed to check if the findings are valid under various model conditions. Robustness checks include different performance measures (deltas and Sharpe ratios), other statistical methods than OLS HAC (GMM-IV$_d$ based on *Racicot, 2015*; and EGARCH by *Nelson, 1991*), different sample periods (Pre-crisis), and transaction costs.

2.2. QUALITATIVE RESEARCH

In the discipline of financial economics, most empirical studies have a purely quantitative approach: large samples of numerical data are collected and analysed statistically to test various hypotheses. However, conducting qualitative research is desirable since it might reveal aspects

for which quantitative research is not appropriate. The inherent nature of quantitative analyses is that they cannot always answer *why* the researcher ended up with the particular finding (*Agee, 2009*). Firstly, qualitative research may help to interpret the quantitative results obtained and can provide further practical implications. Secondly, by asking professionals, researchers can discover the leading motivations shaping actors' behaviour operating in the area.

Overall, seven in-depth, semi-structured interviews were undertaken during November-December 2020, which lasted between 30-60 minutes. Among the seven interviewees, two were from the asset management sector, two from ESG rating agencies, two from rated corporates, and one from the regulatory side. The involvement of other critical stakeholders besides investors and Hungarian organisations was an explicit goal to understand the complexity of ESG. Thematic analysis was conducted within each case and across cases using data storage, coding, and theme development. Thematic analysis is a general method of studying qualitative data; further, it is also widely applied to a set of texts, such as interview transcripts (*Seidman, 2006*).

3. FINDINGS OF THE EMPIRICAL RESEARCH

3.1. MAIN RESULTS

The main results of the dissertation are the following, for the entire period (H_1) and COVID-19 pandemic (H_2), as well as identifying new ESG risk factors (H_3).

The ESG integration strategy covering the *entire period*, from 2015 to mid-2020, shows an inverted U-shaped relation between average risk-adjusted returns and ESG ratings. Economically speaking, instead of strictly monotone increasing functions, a diminishing marginal utility to ESG alignment for ESG leaders are observed. Consequently, instead of E, S, and G leaders, environmental and governance followers and social loungers produced significant alphas. *Sun et al. (2019)* draw attention that the inconclusive pattern of a positive, negative, and neutral relationship suggests there may be a more complicated mechanism at work than the traditional simple linear associations. The findings, therefore, corresponds to *Sun et al. (2019)* and other recent studies of *Azmi et al. (2021), Grassmann (2021)*, and *Groening and Kanuri (2018)*.

Furthermore, the results still satisfy the "doing well while doing good" concept since the "second-best" follower environmental, and governance portfolios attain above-average E and

G ratings. Investor perceptions of social concerns might not be as straightforward as E and G. What can be interpreted as a desirable balance, for instance, in terms of trade union influence and labour rights? There seems to be a particular level of social performance below which company behaviour is unacceptable for the markets. However, it is a social justice issue of how a company should be managed: reward increased social sensitivity or greater business efficiency? The question about the fair limits for "social sensitivity versus business efficiency" is no longer an economic issue but rather a moral one. The difficulty of the question is well illustrated by one interviewee's argument that, in contrast to environmental regulations, the regulatory framework of social sustainability is still in its infancy. Overall, the results suggest that investors prefer increased financial efficiency, but not without limits. In other words, inverted U-shaped relation also exists but at a "lower" level.

The analysis also uncovered that investing in ESG laggards might induce negative externalities without generating superior risk-adjusted returns. Additionally, although capital allocation to ESG leaders did not deliver significant positive alphas, there was no evidence for significant underperformance either. Consequently, investors have the chance to "do good" without forgoing returns.

Investors engaging in pure ESG-themed investment strategies attained returns at least commensurate with risk in eight out of the nine themes during the entire period. The lone exception was Ageing, which obtained significant negative alpha. However, this finding is only valid in the FF 5-factor model calibration; therefore, it fails to pass the robustness checks. The outcomes suggest that allocating capital to ESG-themed portfolios can enhance alignment with UN SDGs without any robust evidence of sacrificing risk-adjusted returns. These results coincide with the conclusions of *Alvarez and Rodríguez (2015)*, *Ibikunle and Steffen (2017)*, and *Reboredo et al. (2017)*. Further, ESG-themed investing resonates with the global sustainability concept of *Garvare and Johansson (2010)* and the shared-value theory of *Porter and Kramer (2019)*.

By examining the impact of the *first wave of the COVID-19 pandemic*, the thesis refutes the literature's usual finding that ESG-aligned investment strategies significantly outperform during adverse market conditions (e.g., *Cornett et al., 2016; Lins et al., 2017; Nofsinger and Varma, 2014*). Firstly, none of the leader portfolios generated significant positive alphas, but there were some model calibrations where the negative abnormal returns were significant. E and G leaders' returns were not statistically different from zero; by contrast, S leaders exhibited significantly negative alphas. Based on the CAPM, both the follower E and S portfolios

underperformed significantly; however, the results were not significant in FF3. In conclusion, we found no evidence for a positive link between ESG and financial performance in line with *Demers et al. (2021)*; however, a negative relationship arose, particularly for social leaders.

Most ESG-themed strategies resulted in positive alphas under the coronavirus crisis, albeit the majority were not statistically different from zero. Consequently, environmental and governance themes were resilient during the first wave of the pandemic as investors could obtain at least returns commensurate with risks. However, the CAPM alpha of Ageing and the FF3 alpha of Urbanisation indicated underperformance, which is not surprising, as segments such as older generations and urban lifestyle have been hit most severely by the pandemic. To the best of the author's knowledge, no one has studied so far the performance of ESG-themed investment strategies during the coronavirus crisis.

The last conclusion is related to the applied FF spanning technique, or right-hand-side regression procedure that tests whether ESG factors are relevant new risk factors in the FF framework. *Harvey et al. (2016)* argue that a newly detected factor requires a t-statistic of at least 3.0. Although the dissertation's ESG portfolios are suitable to measure the performance attribution of ESG factors, the t-statistics do not justify them as new factors in the FF factor models. The results contradict *Díaz et al. (2021)* and *Hübel and Scholz (2020)* but are consistent with *Xiao et al. (2013)*.

3.2. IMPLICATIONS

The findings have practical implications, which are listed below.

The first important implication is that most ESG portfolios yielded non-negative excess returns relative to the MSCI ACWI Index benchmark, even after accounting for *transaction costs* up to 25-50 basis points per annum. Higher transaction costs, as is the case for some ETFs with expense ratios reaching 80-100 basis points per annum, may be an indication of two things: ESG themed megatrend investors are willing to sacrifice approximately 25-50 basis points of annual return to remain aligned with sustainability objectives, or that expense ratio may well decline in the future. The interviews with asset managers suggest no reason for such high fees (i.e., 80-100 bps) as the competition among investment funds is intense, which will force cost reductions soon.

Portfolio managers who integrate sustainability in their investment portfolios undertake a dual optimisation process that combines ESG strategies with fundamental valuation. ESG pure

factor portfolios might be utilised as *smart beta indices* to measure ESG tilt to different ESG factors. This method is superior to calculating the overall ESG rating of investment portfolios currently commonly used by asset managers, as it separates the performance contribution of the ESG tilt from the secondary factors such as geographical, industry, or style effects. *Alessandrini and Jondeau (2020)* and *Bender et al. (2017)* present a similar technique; however, the dissertation's comprehensive approach controls 107 different styles (including each ESG factor), industry, and country factors altogether. Furthermore, interviewees from the asset management sector underscored that they would welcome such indices. Corporate representatives also mentioned that belonging to a particular sector or country meaningfully determines ESG scores.

ESG portfolios presented in the dissertation are suitable for asset owners and managers to align their investment policies with the requirements and targets of *international standards and regulations*. Based on an interview with a representative of the central bank of Hungary, both strategies are consistent with the EU SFDR requirements. Thematic investing might be aligned with the Taxonomy Regulation and can be flexibly adapted to the UN SDGs.

As outlined above, the results do not provide sufficient evidence for "flight to quality" during the first wave of the COVID-19 pandemic regarding ESG leaders, which contradicts *Albuquerque et al. (2020)*, *Broadstock et al. (2021)*, *Ding et al. (2021)*. One possible explanation might be that secondary factor effects have a substantial influence on good ESG portfolios. Once these secondary effects are considered and filtered out, the otherwise observable outperformance disappears. For instance, both interviewees from the asset management sector drew attention that many good ESG stocks belonged to the tech sector; thus, the performance was partly due to sector effects. The robust outperformance of the Robotics thematic portfolio during the coronavirus crisis supports this argument. In summary, good ESG is not necessarily a guarantee to generate superior returns during adverse market conditions. However, the combination with traditional styles or sectors might yield positive outcomes.

In summary, the dissertation's most important conclusion is that, in most cases, investors could realise at least fair returns with sustainable investing. This finding is consistent with the efficient market hypothesis. Put it another way, although there is only a slight chance for investors to gain superior risk-adjusted returns, they could contribute to the higher goals of sustainability without sacrificing returns. Overall, investors should keep in mind the message of the Rolling Stones, the motto of the thesis: *"You can't always get what you want / But if you try sometimes, well, you might find / You get what you need."*

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