ESG Ratings, Stock Returns and Downside Risk

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Disposition of the presentation

1. Research question and limitation
2. Definitions
3. Hypotheses
4. Background and Previous literature
5. Methodology
6. Data and summary statistics
7. Empirical results
8. Conclusions

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The aim of the study

The aim of the study is to investigate whether the environmental, social and corporate governance (**ESG**) rating has any impact on firms' their **Risk-adjusted return and Downside Risk**

We express this link through a panel data regression on **887 firms** listed in five **European** countries, observed over the **period 2005-2017**

Limitation:
Motivation for our choice of countries

European companies are considered to be world leaders in Corporate Social Responsibility, CSR [*Ho et al 2012*]

Europe is leading in the world when it comes to implementing the Paris agreement commitment to keeping global warming to well below 2 degrees (*EUROSIF 2018*).

The EU has also passed several directives to mitigate climate change such as ***Emissions Trading Scheme***, the directive on ***non-financial information disclosure*** in the management report (European Commission 2013), and the **Sustainability Act** (

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CSR and ESG

In the standard textbooks of Economics or Finance, the goal of a firm should be to **maximize shareholder value**.

Any externality, such as greenhouse emission or other non-market issues **is taken care of the government**, via regulation, taxes and other regulations mechanisms.

However, recently, a broader group of stakeholders than only the shareholders demands that firms should include **corporate social responsibility (CRS)** in their objectives.

ESG is one attempt to measure firms' CRS

ESG

CSR embraces a wide range of behaviours, such as being employee-friendly, environment-friendly, mindful of ethics, respectful of communities where the firm's plants are located, and even investor-friendly.

The information provided by ESG ratings (E = environmental, S = social, G = governance) as measures of corporations social performance (CSP) is nowadays demanded by many portfolio investors, e.g., pension funds.

ESG ratings of corporations are provided by different private agencies, e.g., MSCI, ISS, Thomson Reuters, Moody's, Sustainanalytics, etc.

CSR and financial performance

Sustainable, responsible and impact investing is an investment strategy that considers environmental, social and corporate governance criteria to generate long-term competitive financial returns and positive societal impact (USSIF 2018)

A standard definition of ESG and other measure on CSR, however is that is associated with sacrificing firms' profit in the social interest [*Bénabou and Tirole, 2010*]

To be a sacrifice, the firm must go beyond its legal and contractual obligation with its owners, on a voluntary basis.

New European Directive on CSR year 2017

From year 2017, the EU directive on non-financial information disclosure in the management report together with the ordinary financial report applies in most member countries.

The European Sustainability Act requires that all companies wit more than 500 employees (250 in Sweden) must establish an annual sustainability report with information on the firm's environmental impact, employee conditions and counteraction corruption.

The firm's auditor is obliged to confirm that the report has been properly produced, and the firm can also be considered to validate the report externally.

Risk adjusted return

Risk adjusted return is the excess return of a firms stock return over the risk-free interest rate (typically 10 year governmental bond).

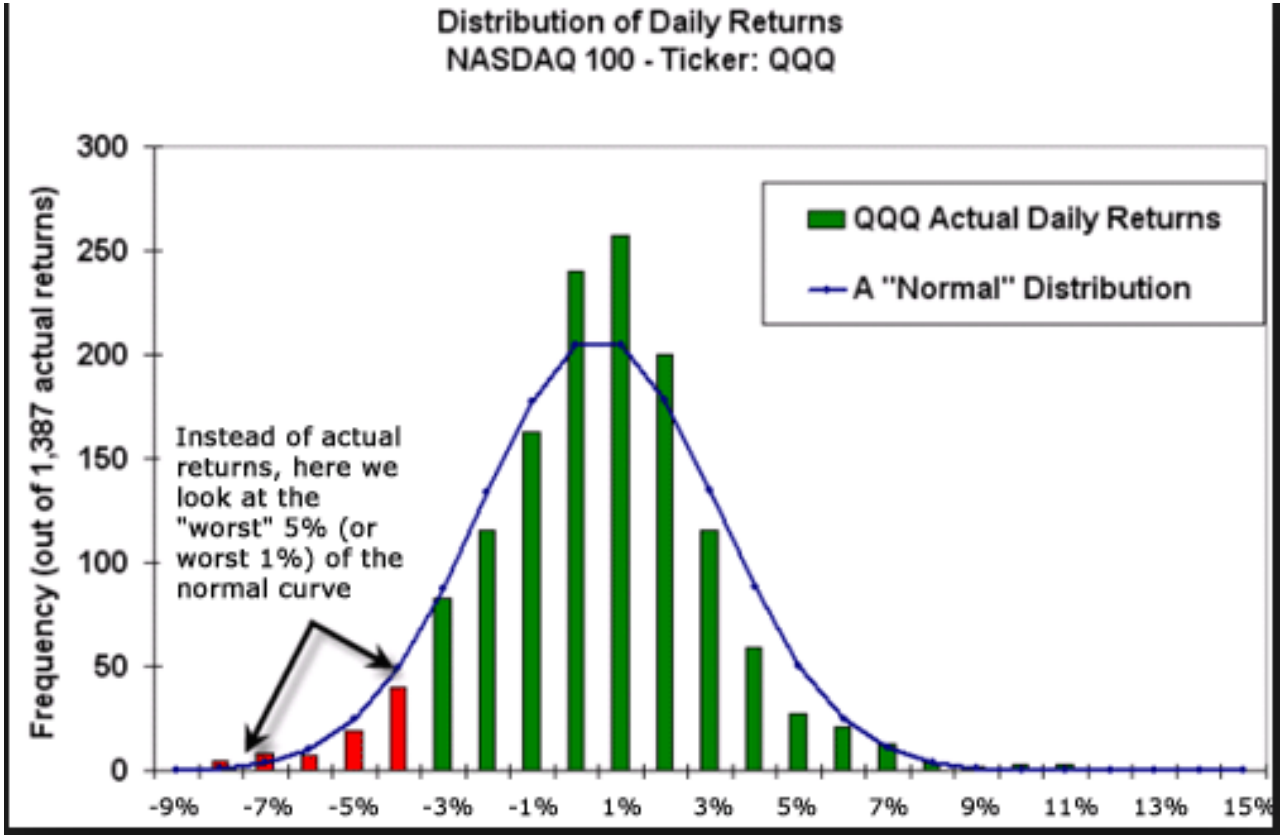
Role in the paper:

In order to invest in a risky company (or a stock portfolio with risky shares), investors require a high return.

We assume that good CRS performance should be associated with lower risk.

Downside risk

Nasdaq 100: Gains and Loss over 1,387 trading days and estimations om “worst” loss



Example for illustration (not real figures) NASDAQ 100. Daily return 1387 days

887 days return >=0

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500 days return < 0

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70 days return < - 4 % (**5 %** of the days)

14 days: negative return < - 7% (**1%** of the days)

7 days: negative return < - 10% (**0.5%** of the days)

NASDAQ 100. Daily return 1387 days

70 days return < - 4 % (**5 %** of the days)

If we invest $100, we are **95%** confident that our worst daily loss *will not exceed $4 (based on historical information)*

14 days: negative return < - 7% (**1%** of the days)

If we invest $100, we are **99%** confident that our worst daily loss *will not exceed $7 (based on historical information)*

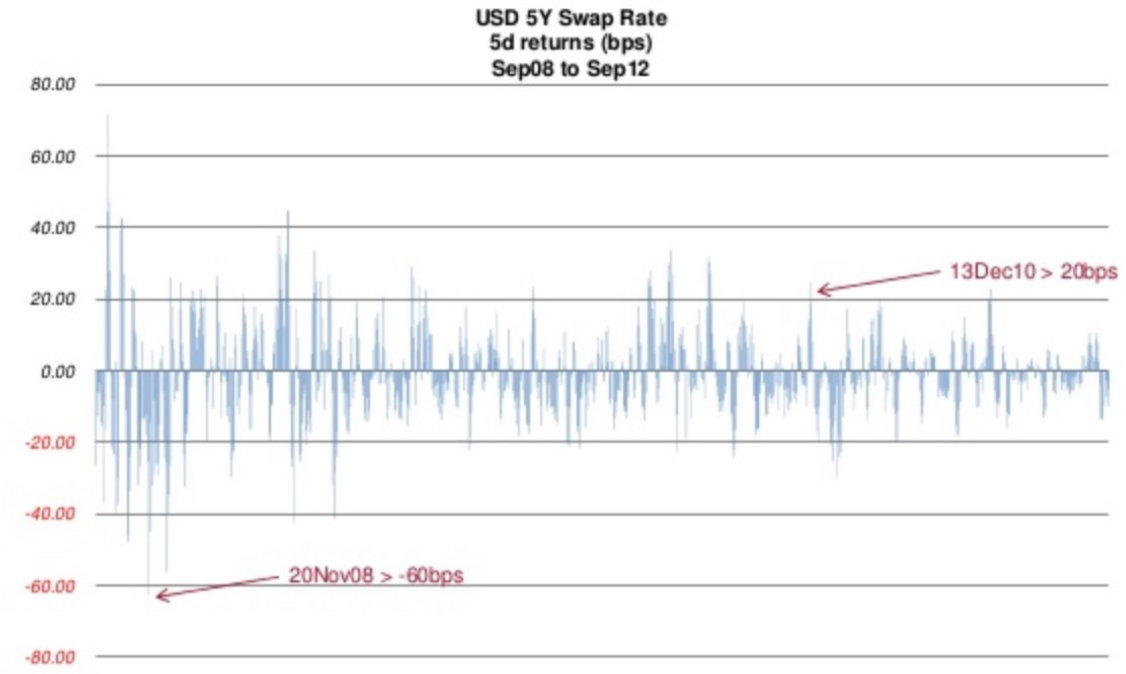
7 days: negative return < - 10% (**0.5%** of the days)

If we invest $100, we are 99.5% confident that our worst daily loss *will not exceed $10 (based on historical information)*

To calculate the future risk of an investment today, we use historical data for estimation.

Value at Risk (VaR) is one of the most common methods.

VaR - Historical Simulation



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Hypothesis 1: (Fama-French 3 factor model)

H1: ESG is not positively related to risk-adjusted return

Motivation

We assume that high ESG rating is associated with lower risk.

In an economy with agents placing greater emphasis on downside risk than upside gains, assets with high sensitivities to downside market movements have high average returns

Hypothesis 2: (Value at Risk Model)

H2: ESG is inversely related to downside risk.

<u>Motivation</u>

The ESG score signals to the investors that the firm is well managed and has a good governance. Firms with high ESG-scores tend to have lower-volatility and presumably be an higher quality firms that hold up better in downturns.

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Traditional stakeholder theory

The main purpose of a corporation is to maximize the profit and optimize the return of its shareholders [*e.g. Friedman 1970*].

Shifting the focus to include **CSR-related activities** might increase costs, reduce profits and thereby **harm the shareholders**.

Strong assumptions

Friedman is right only if the strong Arrow-Debreu type of conditions hold:

Homogenous firms, perfect competitions, full information, no market uncertainty.

The government is able to perfectly internalize externalities through laws and regulations.

More modern management theories

To be successful, a firm has to care about the value creation for a **wide set of stakeholders** including employees, suppliers, customers, financiers, public interest groups, and governmental bodies

[*e.g. Freeman 2010, Hart and Zingales 2017*]

CSR is expanding

Within the capital market, **asset management** considering **social responsibility** continues to expand.

In the **U.S**. more than **a quarter** of total asset under professional management (AUM) are using so called social responsible investment strategies (USSIF 2018).

The corresponding figure in **Europe** is **more than 50%** of professional managed assets (EUROSIF 2016).

Evidence from the literature

Recently, a number of meta studies report a positive association between CSR and firms' financial performance, for instance on accounting earnings.

However, we know that accounting earnings can be affected by earnings management, thus do not reflect performance in a specific year.

Our study is the long term perspective of financial performance

Evidence from the literature

In contrast to a large number of studies on ESG and financial performance, fewer studies exist on the link between firms' social policy and its financial downside risk.

The closest work to ours is [Hoepner et al., 2018], who exploit yearly data on 1,131 firms and find that environmental, social and corporate governance (ESG)-engagement are associated with lower downside risk

Their results are mainly driven by the impact of governance Indicator (G)

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Fama-French three factor model

To test hypothesis I on ESG and risk adjusted return ,we apply a fixed effect approach on the Fama-French 3 factor model.

The traditional capital **asset pricing model** (CAPM) uses only one variable to describe the returns of a portfolio or stock with the returns of the market.

The Fama and French Three-Factor Model is an asset pricing model that expands on CAPM by adding size risk and value risk.

Fama-French 3 factor model (FF3)

While our focus is changes of ESG ratings (level is also possible), in addition to unobserved heterogeneity, we control for the three FF3 factors:

(1) Excess return of the market portfolio

(2) **SMB** is Small minus Big Factor which is the difference between the return on a portfolio of firms with a low market value of equity (Small cap) and the return on a portfolio of firms with a high market equity value (Large cap)

(3) **HML** is the High minus low (HML) factor which is the difference between the return on a portfolio of firms with a high book-to market value and the return on a portfolio of firms with a low book-to-market value

Specification of the model

The model is estimated given the following equation:

$$r_{it} - r_{ft} = \delta_0 + \delta_1(r_{mt} - r_{ft}) + \delta_2 SMB_{it} + \delta_3 HML_{it} + \delta_4 \Delta ESG_{it} + u_i + \varepsilon_{it} \quad (1)$$

where $r_{it} - r_{ft}$ is the excess return of the each firm's stock return over the risk-free interest rate, $(r_{mt} - r_{ft})$ is the excess return of the market portfolio, SMB_{it}, HML_{it} are additional risk factors measured as portfolio returns

Value at Risk (VaR)

Value at risk (VaR) is a statistic that measures and quantifies the level of financial risk within a firm, portfolio or position over a specific time frame.

The most popular and traditional measure of risk is volatility.

"What is my worst-case scenario?"

"How much could I lose in a really bad month?"

Three VaR components

A VAR statistic has three components:

I. a time period,
II. a confidence level and
III. a loss amount (or loss percentage)

VaR estimations

In order to obtain the dependent variable of the model, *VaRit* , we estimate four types of VaR for each stock based respectively using conditional and unconditional forecasts from GARCH models, and on estimates from unconditional and conditional forecasts of an EVT model.

Using the daily historical stock returns of 887 stocks listed in different European countries, we compute VaR estimates for each stock from through a so called backtesting process (historical data).

We use the Value at Risk (VaR) estimates to regress the following model

$$VaR_{\theta i,t} = \gamma_0 + \gamma_i + \gamma_1 \Delta ESG_{i,t} + \gamma_2 \Delta ESG_{i,t-1}$$

$$+ \gamma_3 \Delta ESG_{i,t-2} + \gamma_4 \Delta ESG_{i,t-3} + e_{i,t}$$

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Data sources

The relevant stock prices were obtained from Thomson Reuters Datastream.

The SMB and HML factors used in the the Fama and French three-factor model were collected from the Fama and French database (European three factors) apart from the case of Sweden and UK for which the factors were obtained respectively from the Swedish House of Finance (SHoF) and the Xfi Centre for Finance and Investment of the University of Exeter.

DATA SOURCES

Monthly **ESG** ratings of various firms from different countries and industries were collected from **Sustainanalytics** which globally provides research and data related to ESG and corporate governance.

The data used consists of ratings of ESG and of its three pillars E, S, G which are respectively related to Environmental, Social and Governance criteria.

Data sources

In terms of the market factor the following indices were used:
the HDAX index for the German market,
the CACall for the French,
the FTSE250 for the British,
the SIXRX index for the Swedish
and the AEXall for the Dutch market.

The risk-free rate was defined by the 10-year government yields of the respective country.

C. DATA

Table 1: Total number of firms and observations per country

	Firms (n)	Obs.(N)
Sweden (SWE)	81	4,131
Germany (GE)	164	10,877
France (FR)	144	10,387
United Kingdom (UK)	396	22,236
Netherlands (NED)	92	5,515
Total (EU)	877	53,146

Descriptive Statistics ESG ratings

		Mean	Median	SD^1	Min	Max	Observations
ΔESG	Overall	0.002	0	0.021	-0.363	0.513	$N = 53,088$
	Between			0.004	-0.041	0.085	$n = 869$
	Within			0.021	-0.341	0.510	$\bar{T} = 61.091$
ΔENV	Overall	0.002	0	0.033	-0.522	0.892	$N = 53,088$
	Between			0.007	-0.063	0.151	$n = 869$
	Within			0.033	-0.521	0.887	$\bar{T} = 61.091$
ΔGOV	Overall	0.001	0	0.024	-0.342	0.472	$N = 53,088$
	Between			0.005	-0.031	0.035	n 869
	Within			0.024	-0.310	0.460	$\bar{T} = 61.091$
ΔSOC	Overall	0.002	0	0.030	-0.476	1.059	$N = 53,088$
	Between			0.004	-0.022	0.065	$n = 869$
	Within			0.030	-0.481	1.048	$\bar{T} = 61.091$

Descriptive Statistics VaR 0.95 (0.024-0.035)

Total number of observations (T): 37,975
Total number of stocks (n): 555
T-bar ($\bar{T}$): 68.423

year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean (in abs.)	0.033	0.030	0.035	0.031	0.027	0.026	0.029	0.030	0.024
SD overall	0.014	0.011	0.016	0.017	0.012	0.013	0.021	0.016	0.012
SD between panels	0.011	0.008	0.011	0.013	0.011	0.010	0.013	0.012	0.011
SD within panels	0.008	0.008	0.011	0.010	0.007	0.008	0.017	0.011	0.007
Min	-0.191	-0.106	-0.194	-0.354	-0.243	-0.356	-1.164	-0.328	-0.301
Max	0	0	0	-0.003	-0.005	-0.005	-0.006	0	0
N	1150	2990	3698	4382	5137	5313	5594	5693	4018
n	238	267	342	436	439	466	487	499	479
$\bar{T}$	4.832	11.199	10.813	10.051	11.702	11.401	11.487	11.409	8.388

Descriptive Statistics VaR 0.99 (0.043-0.059)

Total number of observations (T): 46,091
Total number of stocks (n): 686
T-bar ($\bar{T}$): 67.188

year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean (in abs.)	0.058	0.052	0.059	0.056	0.044	0.043	0.047	0.050	0.043
SD overall	0.033	0.024	0.030	0.151	0.019	0.020	0.035	0.028	0.024
SD between panels	0.028	0.018	0.022	0.178	0.016	0.016	0.025	0.021	0.021
SD within panels	0.017	0.017	0.021	0.017	0.011	0.012	0.028	0.020	0.013
Min	-0.415	-0.558	-0.587	-4.354	-0.344	-0.457	-1.906	-0.546	-0.421
Max	0	0	0	0	0	-0.007	0	0	0
N	1411	3588	4425	5347	6376	6507	6836	6815	4786
n	292	322	413	539	546	574	599	599	570
$\bar{T}$	4.832	11.143	10.714	9.920	11.678	11.336	11.412	11.377	8.396

Descriptive Statistics VaR 0.995 (0.053-0.087)

Total number of observations (T): 46,542
Total number of stocks (n): 695
T-bar ($\bar{T}$): 66.967

year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mean (in abs.)	0.087	0.079	0.085	0.073	0.055	0.055	0.057	0.061	0.053
SD overall	0.087	0.088	0.124	0.175	0.025	0.028	0.045	0.036	0.032
SD between panels	0.084	0.080	0.122	0.199	0.022	0.025	0.029	0.028	0.033
SD within panels	0.025	0.030	0.038	0.045	0.012	0.015	0.036	0.025	0.016
Min	-1.055	-1.255	-2.210	-4.821	-0.448	-0.616	-2.578	-0.738	-0.780
Max	0	0	0	0	0	0	0	0	0
N	1401	3588	4441	5383	6460	6591	6899	6901	4878
n	290	324	414	547	552	582	605	608	576
$\bar{T}$	4.831	11.074	10.727	9.841	11.70	11.325	11.40	11.35	8.469

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H1: No impact of improved ESG rating and adjusted return

Dep. var.: $r_{it} - r_{ft}$	SWE	EU	GE	FR	UK	NED
Rm-Rf	1.013***	0.919***	0.795***	0.948***	0.961***	0.938***
	(0.045)	(0.016)	(0.026)	(0.036)	(0.032)	(0.052)
SMB	-0.097***	0.103***	0.570***	0.271***	0.059***	0.216***
	(0.027)	(0.017)	(0.086)	(0.044)	(0.019)	(0.060)
HML	0.035	0.049***	0.136**	0.008	0.048*	0.131***
	(0.035)	(0.018)	(0.055)	(0.031)	(0.029)	(0.047)
ΔESG	0.085*	-0.050	-0.040	-0.016	-0.100	-0.021
	(0.047)	(0.084)	(0.045)	(0.032)	(0.230)	(0.059)
Constant	-0.002***	-0.001***	-0.003***	0.001*	0.100	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.230)	(0.001)
N	4,131	53,146	10,877	10,387	22,236	5,515
R-squared	0.289	0.145	0.171	0.268	0.089	0.164
n	81	877	164	144	396	92

H1: No impact of improved E rating and adjusted return (Individual pillars)

Dep. var.: $r_{it} - r_{ft}$	SWE	EU	GE	FR	UK	NED
Rm-Rf	1.013***	0.919***	0.797***	0.947***	0.961***	0.939***
	(0.045)	(0.016)	(0.027)	(0.036)	(0.031)	(0.052)
MB	-0.095***	0.102***	0.564***	0.270***	0.057***	0.219***
	(0.027)	(0.017)	(0.085)	(0.044)	(0.019)	(0.060)
HML	0.036	0.049***	0.134**	0.007	0.049*	0.132***
	(0.035)	(0.018)	(0.055)	(0.031)	(0.029)	(0.047)
ΔENV	0.058*	-0.044	-0.064**	-0.019	-0.071	0.024
	(0.029)	(0.050)	(0.025)	(0.019)	(0.121)	(0.038)
Constant	-0.002***	-0.001***	-0.003***	0.001*	0.071	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.121)	(0.001)
N	4,131	53,146	10,877	10,387	22,236	5,515
R-squared	0.289	0.145	0.171	0.268	0.089	0.164
n	81	877	164	144	396	92

H1: No impact of improved S rating and adjusted return (Individual pillars)

Dep. var.: $r_{it} - r_{ft}$	SWE	EU	GE	FR	UK	NED
Rm-Rf	1.014***	0.919***	0.795***	0.948***	0.963***	0.937***
	(0.045)	(0.016)	(0.027)	(0.036)	(0.031)	(0.052)
SMB	-0.097***	0.104***	0.571***	0.271***	0.059***	0.219***
	(0.027)	(0.017)	(0.085)	(0.044)	(0.019)	(0.060)
HML	0.034	0.048***	0.135**	0.007	0.046*	0.130***
	(0.035)	(0.017)	(0.055)	(0.031)	(0.026)	(0.047)
ΔSOC	0.025	-0.038	-0.038	-0.015	-0.060	-0.044
	(0.031)	(0.057)	(0.025)	(0.023)	(0.152)	(0.036)
Constant	-0.002***	-0.001***	-0.003***	0.001*	0.060	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.152)	(0.001)
N	4,131	53,146	10,877	10,387	22,236	5,515
R-squared	0.289	0.145	0.171	0.268	0.089	0.164
n	81	877	164	144	396	92

H1: No impact of improved G rating and adjusted return (Individual pillars)

Dep. var.: $r_{it} - r_{ft}$	SWE	EU	GE	FR	UK	NED
Rm-Rf	1.015***	0.920***	0.794***	0.949***	0.965***	0.939***
	(0.045)	(0.016)	(0.027)	(0.036)	(0.029)	(0.052)
SMB	-0.100***	0.103***	0.572***	0.267***	0.059***	0.216***
	(0.028)	(0.017)	(0.085)	(0.044)	(0.019)	(0.060)
HML	0.035	0.049***	0.138**	0.007	0.045*	0.132***
	(0.035)	(0.017)	(0.055)	(0.031)	(0.026)	(0.047)
ΔGOV	0.069	0.007	0.040	0.014	-0.028	0.005
	(0.042)	(0.027)	(0.050)	(0.023)	(0.063)	(0.048)
Constant	-0.002***	-0.001***	-0.003***	0.001*	0.028	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.063)	(0.000)
N	4,131	53,146	10,877	10,387	22,236	5,515
R-squared	0.289	0.145	0.171	0.268	0.089	0.164
n	81	877	164	144	396	92

Explaining downside risk (VaR 0.95)

	Dep. var.: $\Delta VaR_{0.95}$					
	SWE	EU	GE	FR	UK	NED
ΔESG	-0.416*	0.081	-0.102	0.478***	0.183	-0.425
	(0.215)	(0.108)	(0.139)	(0.163)	(0.242)	(0.308)
$\Delta ESG(t\text{-}1)$	-0.443**	0.025	0.344	0.200	-0.190	-0.011
	(0.198)	(0.079)	(0.220)	(0.161)	(0.118)	(0.189)
$\Delta ESG(t\text{-}2)$	-0.813***	-0.602***	-0.539**	-0.667***	-0.580***	-0.499
	(0.204)	(0.109)	(0.207)	(0.173)	(0.222)	(0.310)
$\Delta ESG(t\text{-}3)$	-0.014	-0.105	-0.100	-0.016	-0.248**	0.065
	(0.246)	(0.072)	(0.152)	(0.128)	(0.112)	(0.302)
Constant	0.035***	0.034***	0.033***	0.027***	0.034***	0.052***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
N	2,874	35,625	7,614	7,436	14,293	3,396
R-squared	0.003	0.001	0.002	0.003	0.001	0.001
n stocks	55	541	114	94	227	54

Explaining downside risk (VaR 0.99)

	Dep. var.: $\Delta VaR_{0.99}$					
	SWE	EU	GE	FR	UK	NED
ΔESG	-0.377*	0.021	-0.017	0.201	0.105	-0.359
	(0.229)	(0.091)	(0.131)	(0.167)	(0.208)	(0.231)
$\Delta ESG(t\text{-}1)$	-0.328*	0.014	0.334*	0.177	-0.196*	0.046
	(0.190)	(0.068)	(0.197)	(0.145)	(0.109)	(0.141)
$\Delta ESG(t\text{-}2)$	-0.539***	-0.490***	-0.490***	-0.551***	-0.540***	-0.338
	(0.193)	(0.094)	(0.187)	(0.173)	(0.199)	(0.248)
$\Delta ESG(t\text{-}3)$	0.039	-0.077	-0.062	0.028	-0.170*	-0.020
	(0.247)	(0.061)	(0.143)	(0.112)	(0.091)	(0.217)
Constant	0.029***	0.032***	0.033***	0.024***	0.032***	0.048***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
N	3,229	43,168	9,032	8,861	17,638	4,452
R-squared	0.002	0.001	0.001	0.002	0.001	0.000
n stocks	64	666	138	114	285	70

Explaining downside risk (VaR 0.995)

	Dep. var.: $\Delta VaR_{0.995}$					
	SWE	EU	GE	FR	UK	NED
ΔESG	-0.319*	-0.172	-0.178	0.094	0.194	-1.774
	(0.160)	(0.228)	(0.132)	(0.226)	(0.201)	(1.785)
$\Delta ESG(t\text{-}1)$	-0.313**	-0.194**	0.169	-0.204	-0.198*	-0.638
	(0.150)	(0.095)	(0.154)	(0.274)	(0.114)	(0.422)
$\Delta ESG(t\text{-}2)$	-0.456**	-0.438***	-0.374**	-0.751***	-0.318	-0.428
	(0.195)	(0.106)	(0.187)	(0.233)	(0.197)	(0.353)
$\Delta ESG(t\text{-}3)$	-0.067	-0.157**	-0.177	-0.126	-0.142	-0.222
	(0.196)	(0.075)	(0.139)	(0.196)	(0.086)	(0.330)
Constant	0.021***	0.040***	0.030***	0.061***	0.026***	0.093***
	(0.001)	(0.001)	(0.000)	(0.002)	(0.000)	(0.005)
N	3,331	43,535	8,944	8,794	18,128	4,382
R-squared	0.002	0.000	0.000	0.000	0.001	0.000
n stocks	66	676	137	112	296	70

Disposition of the presentation

1. Research question
2. Definitions
3. Hypotheses
4. Background and Previous literature
5. Methodology
6. Data and summary statistics
7. Empirical results
8. **Conclusions**

Conclusion (1)

- No relationship between ESG risk rating and financial return using FF model.
- Stocks with a positive change of ESG have lower financial downside risks as described by VaR.
- An important implication of reduced downside risk is that firms might lower their capital costs, not only on equity markets but also with respect to debt.
- Firms that increase ESG rating tend to be lower-volatility and presumably higher-quality companies that hold up better during downturns.

Conclusion (2)

H1 is not rejected: Investors don´t require risk compensation for investing in firms with good CRS (ESG) performance.

Instead of excessive dividends, the firm can use internal resources for long-term investment and possible also for transition to sustainable growth

Conclusion (3)

H2 is not rejected: ESG is inversely related to downside risk.

Reduced downward risk implies reduced interest on bank loans, improved possibilities for bank loans and increased attractiveness for risk capital. This improves firms capacities for long-term investment and possible also for transition to sustainable growth

Thank you very much for the attention