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The stock markets' reflection on the IPCC's findings

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Abstract: Climate change already has widespread impacts on society, including the performance of stock markets. Previous studies have focused on how financial markets react to natural disasters such as extreme weather events and provided empirical evidence and mechanistic processes on how this information is assimilated by the investors. Market efficiency theory indicates that investors and financial institutions rely on all available information when managing their portfolios, and change their position as new information arises.

Based on empirical analysis, here we show for the first time that investors closely follow the discussion generated by the Intergovernmental Panel on Climate Change (IPCC) and its Working Groups and we quantify the U.S. stock market's reactions to the publication of their reports. Our results show that the market recognises the importance of the IPCC findings, although there seems to be a reduction in the stock market's reaction with every passing IPCC report. This highlights the effectiveness of scientific bodies in communicating knowledge to different sectors of society, and the importance of maintaining these institutions as honest brokers of scientific information.

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Key words: IPCC; stock market; event study

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Climate change already has widespread impacts on society (1), including the performance of stock markets (2). Previous studies have focused on how financial markets react to natural disasters such as extreme weather events and provided empirical evidence and mechanistic processes on how this information is assimilated by the investors (3–5). Market efficiency theory indicates that investors and financial institutions rely on all available information when managing their portfolios, and change their position as new information arises. Based on empirical analysis, here we show for the first time that investors closely follow the discussion generated by the Intergovernmental Panel on Climate Change (IPCC) and its Working Groups and we quantify the U.S. stock market's reactions to the publication of their reports. Our results show that the market recognises the importance of the IPCC findings, although there

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report. This highlights the effectiveness of scientific bodies in communicating
knowledge to different sectors of society, and the importance of maintaining
these institutions as honest-brokers of scientific information.**

Main body

20 The IPCCs main purpose is to gather and communicate scientific information about observed
and projected climate change, its potential environmental and socio-economic impacts, as well
as possible mitigation and adaptation options. The IPCC does not conduct any research, but
reviews and assesses scientific, technical and socio-economic information relevant to climate
change and policy (6). The IPCC’s work is divided into three Working Groups. Working Group
25 I (WG I) focusses on the physical scientific aspects of the climate system and climate change.
Working Group II (WG II) assesses the impact on socio-economic and natural systems to cli-
mate change, including adaptation. Working Group III (WG III) works on the mitigation op-
tions to climate change by focusing on the main economic sectors such as energy, transport,
and construction (7) Since 1988, the IPCC has prepared five Assessment Reports (AR 1-5 in
30 1990 (supplementary report, 1992), 1995, 2001(TAR), 2007(AR4), and 2014(AR5) respec-
tively) gathering the scientific, technical and socio-economic knowledge on climate change, its
causes, potential impacts and response strategies.

 In 2014 the IPCC published its Fifth Assessment Report (AR5). Part of the contribution of
the WGII (section 10.7) is dedicated to the effects of climate change on the financial markets
35 and insurance. The report indicates climate change will affect most sectors of the economy,
assets, and investments, making the effects of climate change relevant to investors and financial
institutions. Moreover, the report stresses the importance of the way society reacts to climate
change (1).

Investors and financial institutions seem to agree, to some extent, with the IPCC. Based on
40 the Global Investor Survey on Climate Change (8), the majority of respondents view climate
change as a material risk across their total portfolio and act accordingly in their investment pol-
icy. Nevertheless, only 56% of asset managers use climate change data in making investment
decisions. One would thus expect that information on climate change and policy affects stock
markets. However, the mechanisms driving the stock markets' reactions to climate change
45 related signals—such as publications, reports, disasters, and news-coverage—is not fully ex-
plored. (9) finds that the stock market reacts to record temperatures and news about the risks
of ice shelf collapse, indicating a mechanism through which investors identify and react to sci-
entific information about climate change. (10) show that the stock returns of energy-related
firms are significantly affected by reports and scientific papers related to unburnable carbon
50 (i.e., the economic value of the excess of a firm's prove economically recoverable oil, gas, and
coal reserves over those reserves consistent with stabilising global temperature increases less
than 2°C.), meaning that the markets realise the effects of potential climate policies and re-
ports. Furthermore, the stock market reacts to natural disasters (4) and to news-coverage of
hurricanes (3) that could potentially increase in frequency or intensity in the future as a result
55 of climate change.

If investors and financial institutions use the information in the IPCC reports to update their
beliefs about how climate change and climate policy would affect the profitability of compa-
nies, then the publication of IPCC assessments should impact stock prices. These effects are
expected to be differentiated depending on the specific firm or industry and its exposure to
60 climate change and policy. A report commissioned by the German Finance Ministry (11) in-
dicates that climate-related risk factors can significantly affect firms in the fossil fuel, utilities
and energy-intensive sectors (12). However, there is a gap in the literature regarding if investors
and financial institutions understand or accepted the message conveyed by the IPCC about cli-

mate change and if investors in energy-related firms pay more attention to the IPCC's findings
65 compared to other industries.

At present, the IPCC is the gold standard for independent scientific assessment of climate
change on an international level (13). Each iteration of the reports published by the IPCC have
contributed to make anthropogenic climate change one of the most discussed and important
international political issues. As indicated by the news release of the Norwegian Nobel Com-
70 mittee when the IPCC was awarded the Nobel Peace Prize with Albert A. Gore Jr. in 2007:
“[T]hrough the scientific reports it has issued over the past two decades, the IPCC has cre-
ated an ever-broader informed consensus about the connection between human activities and
global warming.” (14). The IPCC is viewed as the authority on scientific matters on climate
change (15). Moreover, the IPCC reports are the technical backbone for international climate
75 policy and are used as guidelines for the international research agenda, funding priorities, and
to determine mitigation and adaptation goals (16).

Here we present an event study to estimate the effects of the release of IPCC reports on
the US stock market. The stock market returns before and after publication are analysed, in
order to understand how the message conveyed by the IPCC about climate change is integrated
80 by investors and financial institutions in their decisions. Figure 1-A shows the Calendar-Time
Abnormal Returns model coefficients (between 2000 and 2016 including TAR, AR4, AR5, and
the publication dates of the three WGs findings), and the 95% confidence intervals (CI) of
the S&P500 firms returns separated into *Energy*- and *Non-Energy*-related firms (see Methods).
Energy firms, which includes Utilities, Extraction and Pipeline firms, respond negatively to
85 the publication of the findings of WGI, positively to the findings and sessions of WGIII (only
significant at 10%) but are not affected by the findings of WGII.

This result may be explained as follows. WGI focuses on the physical consequences of
climate change, and conveys a message that is clear and pessimistic. Thus, the discouraging

findings of WGI about climate change affect investors and financial institutions negatively when
90 investing in energy-related firms. These reactions could be driven by expectations about the
effects on climate change on the profitability of these companies, but more likely they are related
to the expectation of an intensification of climate policy. This is suggested by a significant
reduction of $1.3e-3$ (Standard Error (SE) $3.6e-4$) percentage points in the firms' returns (see
Table 1 regression 1 in Methods).

95 WGII contributions are devoted to impacts, adaptation and vulnerability to climate change,
and convey a mixed and more complex message. The impacts prominently described by WGII
have no immediate effect on the bottom line of companies, and politicians typically refer to WGI
rather than WGII when they call for stricter emission reduction. WGII thus has no discernible
effect on the returns of the energy-related firms in the S&P500 index.

100 However, WGIII focuses on greenhouse gas emissions reduction, and delivers a more posi-
tive message: It finds that the climate problem can be solved at a modest cost and that new
technological options are available and profitable. Alternatively, WGIII may be seen as high-
lighting that, for all its promises, climate policy is not doing much. This is indeed understood
by investors in energy firms and realised into stock returns by a significant increase of $4.6e-4$
105 percentage points (SE $2.8e-4$). These results indicate that investors in Energy-related firms do
pay close attention to IPCC publications. The reactions of the market are consistent with the
general messages of each WG.

IPCC reports have an effect beyond the days of key announcements (see Figure 1-B, and
Table 1 regression 3 in Methods). Two weeks after the IPCC sessions that have produced a
110 report (between 2000 and 2016) have ended, stock market returns are still affected. The effects
for WGI and WGIII are similar to the immediate ones. This indicates that the stock market not
only recognises the importance of the IPCC findings, but also the effects created by the IPCC
tend to linger for a prolonged period of time. However, WGII has a significant, positive impact.

This may be because investors need a little time to see confirmed that politicians indeed do not
115 respond to WGII reports by tightening climate policy.

The findings of the IPCC's Working Groups have similar effects on non-energy firms as on
energy firms, but with a smaller magnitude (see Figure 1-A and -B, and Table 1 regression 2
and 6 in Methods). However, non-energy firms show no effect of the IPCC publications in the
long-term. In other words, investors identify and use information concerning climate change
120 differently depending on the type of firms in which they invest.

The publication of the IPCC *Synthesis Reports* generates a stronger negative reaction to
stock market prices on both firm categories, compared to those of the three IPCC WGs. Energy-
related firms have the largest losses of 4.6e-3 percentage points (SE 7.3e-4) for Utilities and
7.0e-3 percentage points (SE 1.3e-3) for Extraction firms compared to losses of 1.0e-3 percent-
125 age points (SE 3.1e-4) for other firms listed in the S&P500 (see Table 2 regressions 9-11 in
Methods). Additionally, the effect of Synthesis Reports is also negative and significant in the
longer-term (see Table 1 regression 12-14 in Methods) for energy firms but insignificant for
other S&P500 firms. Investors recognise the importance of the Synthesis Reports relative to
the findings of the Working Groups separately. This difference can be attributed to the style in
130 which the Synthesis Reports are written. The reports contain material of the underlying Assess-
ment Reports and are written in a non-technical style that can be better understood by policy
makers (17). This simplification of the findings makes the message about the effects of climate
change more accessible. The same is true of the underlying IPCC reports, which contain no
new information for those who stay abreast of the scientific literature. From these results, we
135 can conclude that the stock market is sensitive to the way the information about climate change
is transferred and that investors are affected by the message conveyed by the IPCC.

The effects of the Synthesis Reports on stock market (see Figure 2-A, and Table 1 regression
1-4 in Methods) fall over time. The Synthesis Report of AR3 in 2001 caused a returns reduction

in the energy firms of $1.4e-2$ percentage points (SE $1.9e-3$), compared to a reduction of $2.4e-$
140 3 percentage points (SE $6.3e-4$) for AR4 in 2007, and no significant effect in 2014. These
coefficients are statistically different from each other. There are several possible explanations
for these findings. First and foremost, even though the number of studies included in the IPCC
reports increase over time, subsequent reports seem to add less (16). As information about
climate change and its impacts in the IPCC reports saturate, the stock market seems to react
145 accordingly. As a result, the effect of each passing IPCC Synthesis Report is decreasing up to
a point where a report (AR5) has no effect on stock returns. Another explanation is that the
general public's concern about climate change in the U.S is decreasing during the 2000s (18).
Even though the trend halts after 2010 the estimates from 2014 show a new decrease compared
to 2010. Similar results about the public concern about climate change are available for the UK
150 where it has decreased from 82% in 2005 to 60% in 2016 (19–21). As public interest wanes,
politicians are less likely to act on the release of IPCC reports. Another possible explanation of
the decline in the Synthesis Reports' effect on the stock market can be found in the availability of
information. Investors have access to other sources of information on climate change and policy
and thus the novelty of the IPCC Synthesis Reports is decreasing over time. The decline in
155 influence can be also attributed to changes in news-coverage (21), and particularly the *Climatic
Research Unit email controversy* (22, 23). The continuous challenge of scientific evidence, as
presented in the media, could affect the way investors react to new IPCC reports.

We also include the news-coverage of the IPCC sessions and findings (see Methods). News-
coverage has a positive effect on the stock returns for non-energy firm, as shown in Figure 1-A.
160 Figure 1-B shows that the effect of news, in the wider time-window analysis, is positive and
significant for energy firms. However, these positive effects are very small in magnitude and
barely significant. A possible explanation of this result comes from the tendency of the news
to present scientific and pseudo-scientific information about climate-change as if they stood in

equal footing. Climate-change sceptics' views could have a reassuring effect on investors when
165 considering the effect climate change on their investments.

Figure 2-A and -B shows the Calendar-Time Abnormal Returns model coefficients (between
2000 and 2016 including TAR, AR4, AR5, and the publication dates of the three WGs findings),
with the 95% CI of the S&P500 firms returns, separated into *Utilities*, *Oil-extraction firms*
and *Non-Energy* firms. In contrast to Figure 1, in Figure 2 we split the Energy firms into its
170 parts and the three WG covariates are merged into one. IPCC reports remind investors that
power generation would be decarbonised first; and that substituting gas for coal reduces carbon
dioxide emissions. The long-term effects (see Table 1 regression 5-10 in the Methods) are
similar. Furthermore, Figure 3-A and -B show the regression coefficients with the 95% CI of
the S&P500 firms returns, separated into *Energy*- and *Non-Energy*-related firms. The graph
175 depicts the sum of the effects of the full IPCC cycle. The negative and significant effects of the
complete set of IPCC assessment reports, in the short-term, fade away over a two-week period.

These results could imply that the efficient Market Hypothesis may be rejected. The IPCC
does not create new scientific information. People who follow the literature should not be
surprised by anything the IPCC reports. Yet, markets treat the IPCC reports as new and relevant
180 information. This may be because climate change and policy are not sufficiently important to
traders to follow the scientific literature in detail. It may be because IPCC reports do have the
power to change public opinion and political trend. Ultimately, stock prices are determined
by the net present value of future profits. Climate policy would impact profits before climate
change would, and the impact of climate change is therefore more heavily discounted than the
185 prospect of stringent greenhouse gas emission regulation or consumer boycotts. As the WGI
report is released, investors expect a tightening of climate policy, and stock markets fall. After
the WGII report is released, investors realise that their initial reaction to the WGI report is too
strong, and stock markets rise. Upon release of the WGIII report, investors are reminded that

climate policy is not too expensive, and stock markets rise again. Finally, as the Synthesis
190 Report appears, investors are reminded that the message from WGI dominates, and the stock
market falls again.

This study is the first to quantify the effects of the IPCC on the U.S. stock market. The results
show that the stock market reflects the findings of the IPCC but the effect is more pronounced
in Energy-related firms, both in short- and longer-term. The results indicate that investors,
195 indeed, recognise the potential effects of climate change and climate policy but these effects
seem to decrease with every passing IPCC report. Possible explanations for this reduction are
the saturation of new information with each passing IPCC report, changes in peoples perspective
about climate change, and the way the media approach the matter. The importance of news-
coverage about the IPCC is also recognised but the news has a calming effect on investors apart
200 from investors in Oil-extracting firms.

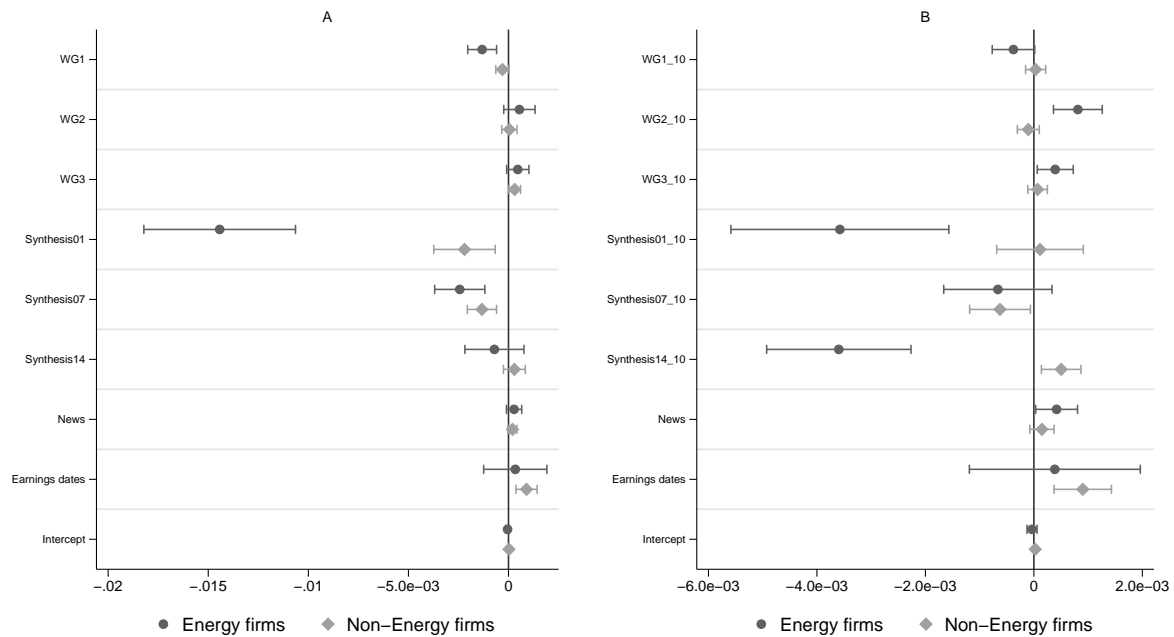


Figure 1: IPCC Working Groups and Synthesis Reports effects on the S&P500 returns based on Energy and Non-energy firms. Coefficients and 95% CI of regressions 1-4 (see Table 1 in Methods) for Energy and Non-Energy related firms are shown, excluding the Fama-French-Carhart covariates for the Calendar-Time Abnormal Returns model estimation of *abnormal returns* between 2000 and 2016. **A** depicts the short time window, and **B** the wide time window estimates where WG and Synthesis Reports are recorded for two weeks after each session. WG1-3 are binary variables equal to 1 during the days of the WG’s sessions producing reports, and zero otherwise. Earnings dates is a binary variable for the earnings announcement dates of each firm. Synthesis01-14 are binary variables equal to 1 during the days of the sessions the published the Synthesis reports in 2001, 2007, and 2014 respectively. The notation *_10* is given to the Synthesis and WG variables that also equal to 1, for 10 working days after each session has past and 0 otherwise.

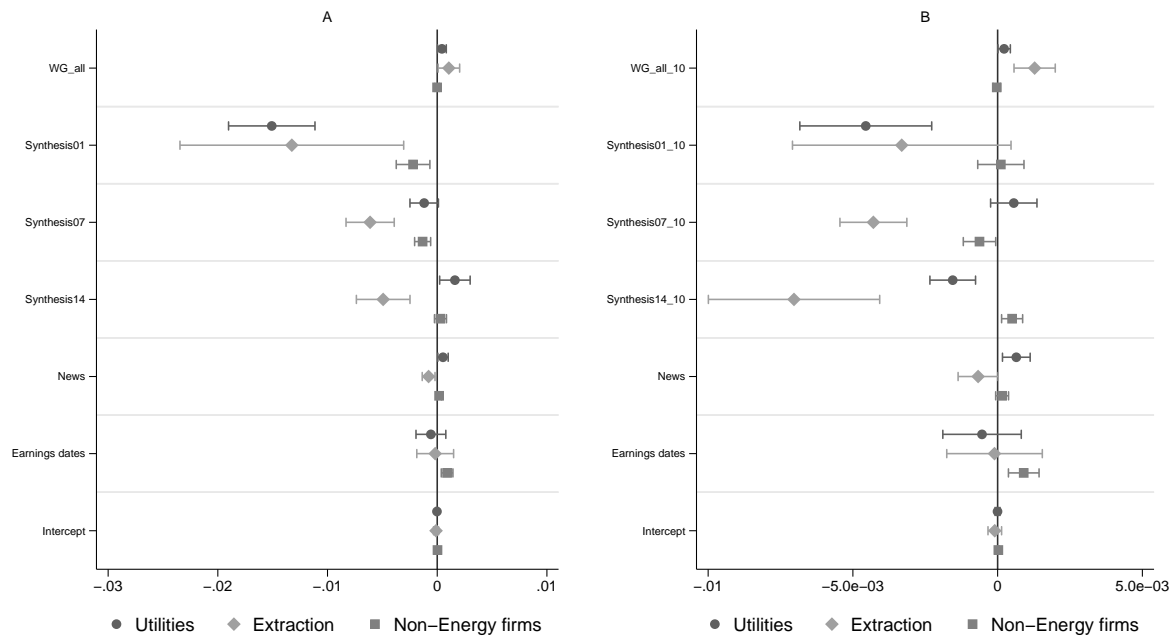


Figure 2: IPCC sessions effect on the S&P500 returns based on Utility, Oil-Extracting and Non-energy firms. Coefficients and 95% CI of regressions 5-10 (see Table 1 in Methods) are shown, excluding the Fama-French-Carhart covariates for the Calendar-Time Abnormal Returns model estimation of *abnormal returns* between 2000 and 2016. **A** depicts the short time window, and **B** the wide time window estimates where WG and Synthesis Reports are recorded for two weeks after each session. WG_all is a binary variable equal to 1 during the days of the WG’s sessions producing reports, and zero otherwise. Earnings dates is a binary variable for the earnings announcement dates of each firm. Synthesis01-14 are binary variables equal to 1 during the days of the sessions the published the Synthesis reports in 2001, 2007, and 2014 respectively. The notation _10 is given to the Synthesis and WG variables that also equal to 1, for 10 working days after each session has past and 0 otherwise.

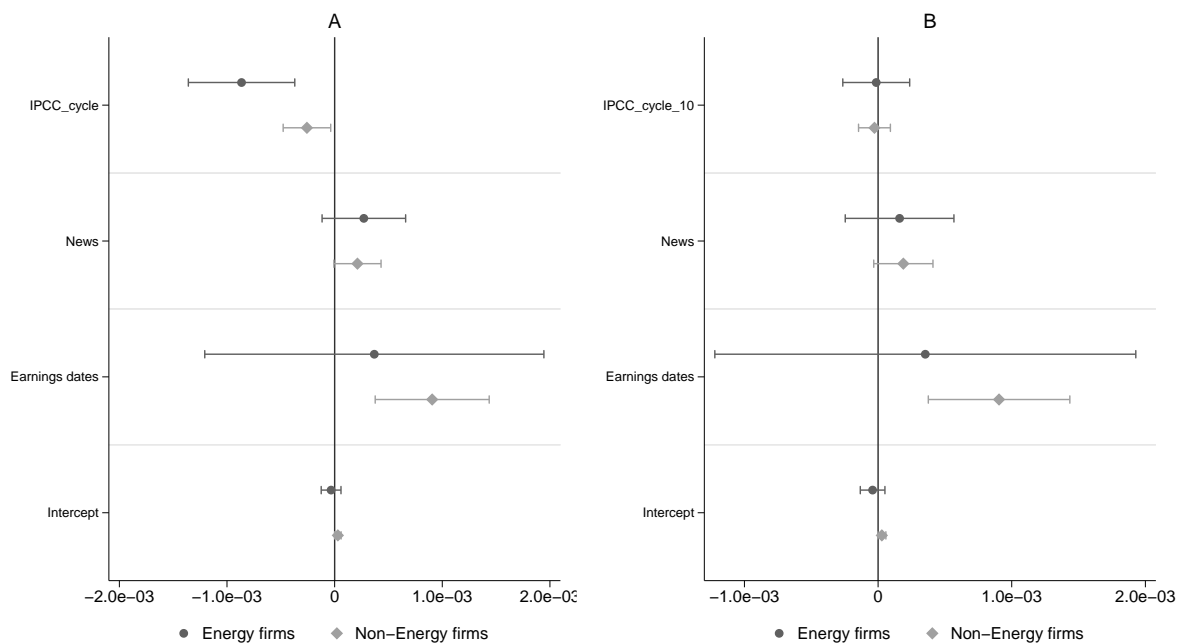


Figure 3: IPCC cycle (WG1 + WG2 + WG3 + Synthesis Reports) effect on the S&P500 returns based on Energy and Non-energy firms. Coefficients and 95% CI of regressions 11-14 (see Table 1 in Methods) are shown, excluding the Fama-French-Carhart covariates for the Calendar-Time Abnormal Returns model estimation of *abnormal returns* between 2000 and 2016. **A** depicts the short time window, and **B** the wide time window estimates where IPCC_cycle is recorded for two weeks after each session and report.

Methods

The estimates presented in this paper are based on an event study type (3, 10). Based on the Calendar-Time Abnormal Returns model (the Fama-French-Carhart model (24, 25)), we estimate the *abnormal returns* by regressing the daily stock returns of each firm (R_{it}) on the daily one-month treasury bill rate (R_{tf}), the returns on the US market minus weighted equity index in excess returns of free risk rate ($R_{mk} - R_{tf}$), the size factor of Fama-French model (SMB), the Earnings growth rate of Fama-French model (HML), Momentum (UMD) and the IPCC related variables. The intercept β_0 which is the estimated daily average abnormal return of the S&P500

firms should be statistically insignificant. If significant, it might be an indication of missing
210 factors affecting the stock returns or ignored structural breaks occurring in the U.S. market, a
problem that is only existing in Table 1 regressions 7, 10 and 12 for Non-energy firms, where
the intercept is barely significant at 10%.

Data on the daily holding period returns of the S&P500 constituents were downloaded from
the Center for Research in Security Prices (CRSP) for the whole period between 2000 and 2016.
215 The daily five Fama-French factors of the Fama-French-Carhart model (24, 25) was accessed
through WARDS (Wharton Research Data Services) database. WG1-3 are binary variables
equal to 1 during the days of the WG's sessions and zero otherwise. WG1_10, WG2_10, and
WG3_10 equal to 1 during the WG session dates plus 10 working days after each session has
past and 0 otherwise. Synthesis is also a binary variable equal to 1 during the dates of sessions
220 that produced a Synthesis Report and Synthesis_10 is the extension of this variable 10 working
after the sessions have finished. We also include specific the Synthesis Reports separately. IPCC
is a binary variable equal to 1 during all sessions of the IPCC from 2000 till the end of 2016.
Earnings dates equal to 1 during the dates of earnings announcements for every firm of the
S&P500 index and 0 otherwise. The news coverage of the IPCC was downloaded, with daily
225 frequency, from LexisNexis Academic NL. Here we only focus on the news containing *IPCC*
in their headline. The news have been collected manually excluding all irrelevant information
such as the Pachauri scandal and news about the Independent Police Complaints Commission
(IPCC) for the UK.

Based on the North American Industry Classification System we classified firms into two
230 categories Energy- and Non-Energy-related firms. Energy-related firms contain Utility, Oil
Extraction, and Pipeline firms. Non-Energy-related firms are all the remaining firms in the
S&P500 index. Standard errors are clustered at firm-level.

Table 2 in the Supplementary material contains some sensitivity analyses. The news con-

taining the terms *IPCC* and *climate* include a lot of irrelevant information such as the Pachauri
235 scandal who was the chairman of the IPCC till 2015, and news about the Independent Police
Complaints Commission (IPCC) in the UK. So, this variable is prone to measurement error,
even though an effort was made to manually exclude all irrelevant information. As such, we
have excluded the news in Table 2 regressions 1 and 2 and we compare the results with our
main findings in Table 1 regressions 1 and 2. Our results seem robust to the exclusion of news
240 with only change in the significance of WGI for non-energy firms which becomes insignificant.
In regressions 3-8 we included a binary variable *IPCC*, equal to 1 during the days of all IPCC
sessions and zero otherwise. Even though some of the 28 sessions are just internal bureaucratic
discussions, there seems to be a strong negative effect on the stock market returns that is persis-
tent in the wider time window for all but the oil-extracting firms. Last, in the regressions 9-14
245 we have included an interaction term between all WG sessions and the IPCC-related news. The
combined effect of WG sessions and news is only significant (and positive) for oil-extracting
firms ($4.9e-3$, SE $1.4e-3$) but the effect is not sustained in the wider time window. In these
regressions the combined effect of all Synthesis Reports are negative and significant with the
effect for energy companies to be persistent over time but with reduced magnitude.

Table 1: Main regression coefficients on the S&P500 returns. Coefficients and SE of regressions for Energy and Non-Energy related firms are shown, including the Fama-French-Carhart covariates for the Calendar-Time Abnormal Returns model estimation of *abnormal returns* between 2000 and 2016. **A** depicts the short time window, and **B** the wider time window estimates where *WG*, *Synthesis Reports* and *IPCC cycle* are recorded for two weeks after each session and report respectively, with the notation *_10*.

	(1-A) Energy firms	(2-A) Non-Energy firms	(3-B) Energy firms	(4-B) Non-Energy firms	(5-A) Utilities	(6-A) Extraction	(7-A) Non-Energy firms	(8-B) Utilities	(9-B) Extraction	(10-B) Non-Energy firms	(11-A) Energy firms	(12-A) Non-Energy firms	(13-B) Energy firms	(14-B) Non-Energy firms
Rmk-Rft	.82*** (.036)	1*** (.012)	.82*** (.036)	1*** (.012)	.67*** (.02)	1.1*** (.043)	1*** (.012)	.67*** (.02)	1.1*** (.043)	1*** (.012)	.82*** (.036)	1*** (.012)	.82*** (.036)	1*** (.012)
smb	-.18*** (.032)	.069*** (.013)	-.18*** (.032)	.069*** (.013)	-.3*** (.025)	.075 (.056)	.068*** (.013)	-.3*** (.025)	.076 (.056)	.069*** (.013)	-.18*** (.032)	.069*** (.013)	-.18*** (.032)	.069*** (.013)
hml	.35*** (.027)	.25*** (.026)	.34*** (.027)	.25*** (.026)	.28*** (.021)	.41*** (.11)	.25*** (.026)	.28*** (.021)	.41*** (.11)	.25*** (.026)	.34*** (.027)	.25*** (.026)	.34*** (.027)	.25*** (.026)
rf	4.5*** (.51)	3*** (.2)	4.2*** (.51)	3*** (.2)	3.5*** (.54)	7.6*** (1.1)	3*** (.2)	3.2*** (.56)	7.2*** (1.1)	3*** (.2)	4.2*** (.5)	3*** (.2)	4.1*** (.5)	2.9*** (.2)
Momentum	.094*** (.021)	-.14*** (.099e-03)	.092*** (.021)	-.14*** (1.0e-02)	.15*** (.014)	-.024 (.07)	-.14*** (9.9e-03)	.15*** (.014)	-.025 (.07)	-.14*** (1.0e-02)	.092*** (.021)	-.14*** (1.0e-02)	.092*** (.021)	-.14*** (1.0e-02)
WG1	-1.3e-03*** (3.6e-04)	-3.1e-04* (1.7e-04)												
WG2	5.5e-04 (3.9e-04)	4.4e-05 (1.9e-04)												
WG3	4.6e-04* (2.8e-04)	3.1e-04** (1.5e-04)												
AR3(TAR) synthesis report	-.014*** (1.9e-03)	-2.2e-03*** (7.8e-04)			-.015*** (2.0e-03)	-.013** (5.0e-03)	-2.2e-03*** (7.8e-04)							
AR4 synthesis report	-2.4e-03*** (6.3e-04)	-1.3e-03*** (3.7e-04)			-1.2e-03** (6.4e-04)	-6.1e-03*** (1.1e-03)	-1.3e-03*** (3.7e-04)							
AR5 synthesis report	-7.0e-04 (7.4e-04)	2.9e-04 (2.8e-04)			1.6e-03** (6.9e-04)	-4.9e-03*** (1.2e-03)	3.0e-04 (2.8e-04)							
news	2.8e-04 (1.9e-04)	2.0e-04* (1.1e-04)	4.2e-04** (1.9e-04)	1.5e-04 (1.1e-04)	5.3e-04** (2.3e-04)	-7.8e-04** (2.8e-04)	1.7e-04 (1.1e-04)	6.5e-04*** (2.4e-04)	-6.7e-04* (3.4e-04)	1.6e-04 (1.1e-04)	2.7e-04 (1.9e-04)	2.1e-04* (1.1e-04)	1.6e-04 (2.0e-04)	1.9e-04* (1.1e-04)
Earnings announcement	3.4e-04 (7.9e-04)	9.0e-04*** (2.7e-04)	3.9e-04 (7.9e-04)	9.0e-04*** (2.7e-04)	-5.7e-04 (6.7e-04)	-1.8e-04 (8.2e-04)	9.0e-04*** (2.7e-04)	-5.4e-04 (6.7e-04)	-1.1e-04 (8.0e-04)	9.0e-04*** (2.7e-04)	3.7e-04 (7.9e-04)	9.1e-04*** (2.7e-04)	3.5e-04 (7.9e-04)	9.1e-04*** (2.7e-04)
WG1_10		-3.8e-04* (2.0e-04)		3.2e-05 (9.5e-05)										
WG2_10		8.1e-04*** (2.3e-04)		-1.0e-04 (1.0e-04)										
WG3_10		3.9e-04** (1.7e-04)		6.8e-05 (9.2e-05)										
AR3(TAR) synthesis report_10		-3.6e-03*** (1.0e-03)		1.1e-04 (4.1e-04)				-4.6e-03*** (1.1e-03)	-3.3e-03* (1.3e-03)	1.1e-04 (4.1e-04)				
AR4 synthesis report_10		-6.6e-04 (5.0e-04)		-6.2e-04** (2.9e-04)				5.6e-04 (4.0e-04)	-4.3e-03*** (5.6e-04)	-6.3e-04** (2.9e-04)				
AR5 synthesis report_10		-3.6e-03*** (6.7e-04)		5.0e-04*** (1.9e-04)				-1.6e-03*** (3.9e-04)	-7.0e-03*** (1.4e-03)	5.0e-04*** (1.9e-04)				
WG_all					4.3e-04** (2.0e-04)	1.1e-03** (4.3e-04)	-1.2e-05 (1.0e-04)							
WG_all_10								2.3e-04** (1.1e-04)	1.3e-03*** (3.5e-04)	-3.0e-05 (6.4e-05)				
IPCC cycle											-8.6e-04*** (2.5e-04)	-2.6e-04** (1.1e-04)		
IPCC cycle_10													-1.4e-05 (1.3e-04)	-2.7e-05 (6.1e-05)
Intercept	-4.6e-05 (4.6e-05)	2.5e-05 (1.5e-05)	-3.5e-05 (4.6e-05)	2.5e-05 (1.5e-05)	-2.0e-05 (4.2e-05)	-1.0e-04 (1.1e-04)	2.6e-05* (1.5e-05)	-3.6e-06 (4.2e-05)	-9.8e-05 (1.1e-04)	2.6e-05* (1.5e-05)	-3.3e-05 (4.6e-05)	3.0e-05** (1.5e-05)	-4.1e-05 (4.6e-05)	2.8e-05* (1.5e-05)
N	200364	2015774	200364	2015774	134861	56785	2015774	134861	56785	2015774	200364	2015774	200364	2015774
R ²	0.209	0.257	0.208	0.257	0.208	0.291	0.257	0.207	0.291	0.257	0.208	0.257	0.208	0.257

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

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Supplementary material

Table 2: Sensitivity analyses regression coefficients on the S&P500 returns. Coefficients and SE of regressions for Energy and Non-Energy related firms are shown, including the Fama-French-Carhart covariates for the Calendar-Time Abnormal Returns model estimation of *abnormal returns* between 2000 and 2016. **A** depicts the short time window, and **B** the wide time window estimates where *WG* and *IPCC sessions* are recorded for two weeks after each session, with the notation *_10*.

	(1-A) Energy firms	(2-A) Non-Energy firms	(3-A) Utilities	(4-A) Extraction	(5-A) Non-Energy firms	(6-B) Utilities	(7-B) Extraction	(8-B) Non-Energy firms	(9-A) Utilities	(10-A) Extraction	(11-A) Non-Energy firms	(12-B) Utilities	(13-B) Extraction	(14-B) Non-Energy firms
Rmk-Rft	.82*** (.036)	1*** (.012)	.67*** (.02)	1.1*** (.043)	1*** (.012)	.67*** (.02)	1.1*** (.043)	1*** (.012)	.67*** (.02)	1.1*** (.043)	1*** (.012)	.67*** (.02)	1.1*** (.043)	1*** (.012)
smb	-.18*** (.032)	.068*** (.013)	-.3*** (.024)	.076 (.056)	.069*** (.013)	-.3*** (.024)	.076 (.056)	.069*** (.013)	-.3*** (.025)	.075 (.056)	.069*** (.013)	-.3*** (.025)	.075 (.056)	.069*** (.013)
hml	.35*** (.027)	.25*** (.026)	.28*** (.021)	.41*** (.11)	.25*** (.026)	.28*** (.021)	.41*** (.11)	.25*** (.026)	.28*** (.021)	.41*** (.11)	.25*** (.026)	.28*** (.021)	.41*** (.11)	.25*** (.026)
Rft	4.5*** (.51)	3*** (.2)	3.1*** (.53)	7.3*** (1.1)	3*** (.2)	3.2*** (.53)	7.3*** (1.1)	3*** (.2)	3.2*** (.53)	7.5*** (1.1)	3*** (.2)	3.2*** (.54)	7.4*** (1.1)	2.9*** (.2)
Momentum	.094*** (.021)	-.14*** (9.9e-03)	.15*** (.014)	-.025 (.07)	-.14*** (1.0e-02)	.14*** (.014)	-.025 (.07)	-.14*** (1.0e-02)	.15*** (.014)	-.024 (.07)	-.14*** (1.0e-02)	.15*** (.014)	-.026 (.07)	-.14*** (1.0e-02)
WG1	-1.2e-03*** (3.6e-04)	-2.5e-04 (1.7e-04)												
WG2	5.3e-04 (3.9e-04)	3.1e-05 (1.9e-04)												
WG3	4.4e-04* (2.8e-04)	2.9e-04** (1.5e-04)												
AR3(TAR) synthesis report	-.014*** (1.9e-03)	-2.2e-03*** (7.8e-04)												
AR4 synthesis report	-2.4e-03*** (6.3e-04)	-1.3e-03*** (3.7e-04)												
AR5 synthesis report	-6.6e-04 (7.4e-04)	3.2e-04 (2.8e-04)												
Earnings announcement	3.4e-04 (7.9e-04)	9.0e-04*** (2.7e-04)	-5.3e-04 (6.7e-04)	-2.1e-04 (8.2e-04)	9.1e-04*** (2.7e-04)	-5.2e-04 (6.7e-04)	-2.1e-04 (8.2e-04)	9.1e-04*** (2.7e-04)	-5.3e-04 (6.7e-04)	-1.5e-04 (8.2e-04)	9.1e-04*** (2.7e-04)	-5.4e-04 (6.7e-04)	-1.5e-04 (8.1e-04)	9.1e-04*** (2.7e-04)
IPCC sessions			-6.5e-04*** (2.0e-04)	1.2e-03** (4.7e-04)	-3.3e-04*** (9.1e-05)									
news			7.4e-04*** (2.3e-04)	-1.0e-03*** (2.8e-04)	2.4e-04** (1.1e-04)	7.8e-04*** (2.4e-04)	-8.6e-04*** (2.7e-04)	2.4e-04** (1.1e-04)	6.7e-04*** (2.4e-04)	-1.3e-03*** (3.7e-04)	2.3e-04* (1.2e-04)	4.9e-04 (3.1e-04)	-1.5e-03** (5.5e-04)	1.3e-04 (1.4e-04)
IPCC sessions_10						-4.4e-04*** (1.1e-04)	2.2e-04 (2.4e-04)	-1.7e-04*** (5.1e-05)						
WG_all									4.2e-04** (2.0e-04)	4.2e-04 (4.8e-04)	6.9e-06 (1.1e-04)			
WG_all*news									6.6e-06 (5.5e-04)	4.9e-03*** (1.4e-03)	-2.3e-04 (3.0e-04)			
Synthesis									-4.6e-03*** (7.3e-04)	-7.0e-03*** (1.3e-03)	-1.0e-03*** (3.1e-04)			
WG_all_10												2.0e-04* (1.1e-04)	1.2e-03*** (3.2e-04)	-4.6e-05 (6.8e-05)
WG_all_10*news												4.9e-04 (3.7e-04)	1.7e-03 (1.0e-03)	2.0e-04 (2.2e-04)
Synthesis_10												-1.3e-03*** (3.4e-04)	-3.6e-03*** (9.0e-04)	-6.2e-06 (1.5e-04)
Intercept	-4.2e-05 (4.6e-05)	2.8e-05* (1.5e-05)	6.6e-06 (4.3e-05)	-1.3e-04 (1.2e-04)	3.5e-05** (1.5e-05)	2.9e-05 (4.2e-05)	-1.2e-04 (1.2e-04)	4.3e-05*** (1.6e-05)	-4.7e-06 (4.2e-05)	-9.4e-05 (1.1e-04)	2.9e-05* (1.5e-05)	-5.2e-06 (4.2e-05)	-1.1e-04 (1.1e-04)	2.9e-05* (1.5e-05)
N	200364	2015774	134861	56785	2015774	134861	56785	2015774	134861	56785	2015774	134861	56785	2015774
R ²	0.209	0.257	0.207	0.290	0.257	0.207	0.290	0.257	0.207	0.291	0.257	0.207	0.291	0.257

Standard errors in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01