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RESEARCH INSTITUTE on SUSTAINABLE ECONOMIC GROWTH

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"Do companies gain from environmental disclosure? Evidence from CDP announcements in the stock markets"

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Motivation

- Environmental performance is increasingly considered one of the facets of the overall performance of companies
- Environmental disclosure is becoming integral part of companies' communication towards stakeholders.
- This paper assesses whether investors are in fact responsive to environmental performance by measuring stock prices reactions to environmental disclosure.

What is the effect of environmental disclosure on firms' stock prices if any?
Do financial markets really care about environmental disclosure?

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Motivation

- Several projects in the green finance field
- Green finance:
  - ✓ how to finance the green economy
  - ✓ but also how green strategies impact financial performances of firms.
- Empirical evidence is inconclusive both in terms of the significance of the effects and their direction.
- It is important to distinguish between different types of disclosures. ETS, 8-K filings about climate change, CDP, other channels of information. However, much is unknown at this stage on how these alternative channels might influence investors' returns.
- No study exists which assesses the impact of CDP environmental disclosure on firms' stock prices and the relationship between this disclosure and other events such as inclusion into sustainability indices and ETS emissions disclosure.

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Literature Review

Empirical evidence on the impact of environmental disclosure concerning ETS on stock prices is mixed.

- **ETS (positive):**
  - ✓ EUA price developments positively related with stock performances (Oberndorfer et al, 2009)

- **ETS (negative)**:
  - ✓ Relation between stock returns and the announcements on verified emissions are showed to be negative. However investors did not perceive the EU ETS in its first set-up as an efficient and effective environmental policy instrument (Schmidt and Werner, 2012)
  - ✓ For firms in the ETS, news about allowances show that shareholders did interpret the event as value-relevant with a negative impact (Jong et al, 2013).
  - ✓ Reductions in CO2 allowance prices → stock prices to fall for both carbon- and electricity-intensive industries (Bushnell et al, 2012)

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Literature Review

Empirical evidence on the impact of environmental disclosure concerning ETS on stock prices is mixed.

- **ETS (no impact)**
  - ✓ Being subject to the ETS did not significantly affect economic and financial performance of firms during the first phase and the beginning of the second phase (Demailly and Quirion, 2008; Anger and Oberndorfer, 2008)
  - ✓ EU ETS had a modest impact on the participating companies' performance (Abrell et al, 2011)
  - ✓ Publication of verified emissions in the first phase provides insignificant results, while significant results are found in the second phase (Brouwers et al, 2014)
  - ✓ No evidence that the EU ETS has induced a displacement of carbon emissions from Europe towards the rest of the world (Dechezleprêtre et al, 2015).

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Literature Review

Voluntary environmental disclosure does not show a significant relationship with stock prices or financial performance

- **Voluntary environmental programs:**
  - ✓ Participation in the CDP for the FT 500 Global companies does not provide any systematic evidence of increased shareholder value (Kim and Lyon, 2011);
  - ✓ Joining EPA's Climate Leaders involves significantly negative abnormal stock returns, however joining Ceres have insignificant announcement returns (Fisher-Vanden and Thorburn, 2011).
  - ✓ Reporting on climate change falls far short of the quality required for investors to make meaningful comparisons between companies. This, in turn, has limited investor interest in these data. (Sullivan and Gouldson, 2012)
  - ✓ The major driving force for climate change disclosure comes from the general public and government rather than from the other major stakeholders such as shareholders and debtholders. (Luo et al, 2012)
  - ✓ Inclusion of German corporations in the DJSI STOXX and DJSI World suggests that stock markets may penalize this inclusion but the overall effect is not significant (Oberndorfer et al, 2011).
  - ✓ No direct relationship exists between share returns and environmental disclosure (Murray et al, 2006)

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Hypothesis

1. The impact of disclosure for voluntary programs (CDP in our case) is not relevant for financial markets.

2. Differences exist between voluntary and mandatory market-based schemes (ETS). The latter have significant impacts contrary to the former.

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Data

Carbon Disclosure Project (CDP)

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Data

- **CDP**
  - ✓ The Carbon Disclosure Project (CDP) aims at evaluating the level of environmental performance and disclosure for **thousands of companies** in the world.
  - ✓ By leveraging market and stakeholders reactions, CDP provides incentives to improve the management of **environmental risk**.
  - ✓ CDP works with 822 **institutional investors** holding US$95 trillion in assets to help reveal the risk in their investment portfolio
  - ✓ More than 4,500 companies around the world **voluntary** report environmental information to CDP
  - ✓ CDP provides a **synthetic ranking** about 'CO2-related performance' (A-to-E) and a score about the quality of the disclosure
  - ✓ Global **direct and indirect CO2 emissions** are computed by means of standardized methods
- OUR DATA:
  - ✓ We considered CDP's assessments of the **500 largest companies** (Fortune) in the world including level of disclosing, environmental performance and emissions
  - ✓ Results of the assessment are disclosed once per year in **September** (2011-2013)

- **Datastream**
  - ✓ Time series of stock price returns and the returns for the reference market indices.

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Methodology: what we do

WHAT WE DO: we use an event study to assess the impact of environmental disclosure (CDP) on the stock performance of firms.

- Methodology: **event study**.
- Basic assumption: stock valuation is the measure of a firm financial performance and market participants are quick to react to any significant event (i.e. **financial markets are efficient**).
- **Event**: corporate environmental disclosure from CDP
- Measured variable: **stock performance of firms**
- Sample: **500 largest world's companies (Fortune)**
- Time frame: **years 2011-2013**. For each of the years in the time interval, there is one disclosing event taking place in September.

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Methodology: Event study

- Definition: an **event study** is a statistical method to assess the effect of an event on the stock value of a firm.
- Events deemed to be positive or negative from market participants' point of view will determine **abnormal returns** attributable to the event being studied.
- It is important that in this time interval, no other significant events take place able to impact stock prices such as disclosure of quarterly results (which is not our case).
- The methodology requires:
  1. Calculating normal returns
  2. Calculating abnormal returns (ARs) per difference
  3. Calculating cumulative abnormal returns (CARs) as sum of ARs
  4. Testing whether ARs and CARs are significantly different from normal returns

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Methodology: Event study (con't)

1. Calculating normal returns

Estimation window (≠ event window): 180 trading days ending 20 days prior to the event.
Specification of normal returns: market model (MacKinlay,1997) based on a reference market index.

$$RI_t = \alpha + \beta\ RI\_market_t + \varepsilon_t \qquad [1]$$

The market relationship between each firm's stock return (RI) and a market reference index (RI_market) is estimated through a regression analysis using stock market data from Datastream. Using the alphas, betas and sigmas (standar dev ε) of this relationship we are then able to predict the normal returns ($NR_t = \alpha + \beta\ RI\_market_t$) for all days of the event window.

2. Calculating abnormal returns (ARs)

Abnormal returns (ARs) attributable to the event are calculated as the difference between normal returns (cfr formula 1) and actual returns (RI_t) around the event date (event window = between 0 and 3 days after the event).

$$AR_t = RI_t - NR_t \qquad [2]$$

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Methodology: Event study (con't)

3. Calculating cumulative abnormal returns (CARs) as sum of ARs

Cumulative abnormal returns (CARs) are obtained as the sums across the event windows (from day *a* to day *b*) of the abnormal returns.

$$CAR(a,b) = AR(a) + AR(a+1) + \ldots + AR(b-1) + AR(b) \qquad [3]$$

4. Testing whether ARs and CARs are significantly different from normal returns

Assess statistically whether ARs and CARs differ significantly from zero in the days of CDP disclosure (cfr next slides).

We implemented along with the t-test, also the Patell's Z-test, the BMP-test and the Corrado rank test.

Methodology: digression

- Foster and Gutierrez (2013) (and many others…) indirectly estimate ARs and event-induced ARs within a single regression equation as follows:

$$RI_{it} = \alpha_i + \beta\ RI\_market_{it} + \delta\ Event_{-3} + \ldots + \phi\ Event_0 + \ldots + \rho\ Event_{+3} + \varepsilon_{it}$$

where δ is the AR estimated for the third day prior to the event date, ϕ is the AR of the event date and ρ is the AR for the third day after the event date.

- This approach is potentially affected by the following issues:
  - ✓ it is assumed that each company reacts in the same way to market returns ($\beta_i = \beta$ for all *i*)
  - ✓ α_i and β are estimated also using information on RI and RI_market within the event window (and its proximity) ➔ they may incorporate part of the event-induced AR
  - ✓ a simple *t*-test on δ, ϕ or ρ may be misspecified (see next slides)

Methodology: digression (con't)

	(1) AR	(2) Daily return	(3) AR	(4) Daily return
3 days before event	0.000308	0.000297	0.000308	0.000297
	(0.000472)	(0.000460)	(0.000472)	(0.000460)
2 days before event	0.0000105	-0.0000275	0.0000105	-0.0000276
	(0.000414)	(0.000416)	(0.000414)	(0.000416)
1 day before event	0.000887**	0.000850**	0.000887**	0.000849**
	(0.000419)	(0.000426)	(0.000419)	(0.000426)
Event day	0.000197	0.000184	0.000197	0.000184
	(0.000408)	(0.000414)	(0.000408)	(0.000414)
1 day after event	0.00111***	0.00102***	0.00111***	0.00101***
	(0.000386)	(0.000389)	(0.000386)	(0.000390)
2 days after event	0.000504	0.000536	0.000504	0.000535
	(0.000441)	(0.000474)	(0.000441)	(0.000474)
3 days after event	-0.000714**	-0.000686*	-0.000714**	-0.000685*
	(0.000339)	(0.000361)	(0.000339)	(0.000361)
Market return		0.999***		0.999***
		(0.0174)		(0.0173)
Day of week dummies	Yes	Yes	Yes	Yes
Year x EU dummies	No	No	Yes	Yes
Year x sector dummies	No	No	Yes	Yes
N	149976	149976	149976	149976

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Methodology: tests

- The robustness of tests about ARs and CARs depends on the likelihood that the assumptions needed by each test (e.g. probability distribution) are satisfied

- Parametric tests
  - ✓ t-test
  - ✓ BMP
  - ✓ Patel test

- Non-parametric tests
  - ✓ Corrado

Methodology: *t*-test

- The most common test, the t-test, is based on the Student's t-distribution.
- Its power is based on the assumption that abnormal returns are normally distributed.
- The t-statistics is computed as follows:

$$\frac{AR_0}{\sqrt{Var(AR_0)}}$$

- Where Var(AR_0) is the variance of abnormal returns across companies in the event date.

Methodology: Patel test

- Other parametric tests have been proposed such as the Patel's T-test (Patel, 1976).
- The Patel test considers the variance of ARs within companies in the estimation period (i.e. when normal returns are estimated).

$$Var(AR_0) = \sigma_\varepsilon^2 \left(1 + \frac{1}{k} + \frac{\left(RI\_market_0 - \overline{RI\_market}\right)^2}{\sum_{j=1}^{180} \left(RI\_market_h + \overline{RI\_market}\right)^2} \right)$$

- The statistics (distributed as a Student's t) is then given by:

$$\frac{1}{n} \sum_{i=1}^{n} \frac{AR_{i,0}}{\sqrt{Var(AR_{i,0})}}$$

- This statistics still relies on the normality assumption

Methodology: BMP test

- Other parametric tests have been proposed to correct for potential cross-sectional increase in returns variance on the event date such as the standardized cross-sectional.
- The Boehmer-Musumeci-Poulsen test (BMP) developed by Boehmer et al (1991) accounts for event-induced variance on the event day.
- The statistics is distributed as a Student's t (and still relies on the assumption of normality):

$$\frac{\sum_{i=1}^{n} \frac{AR_{i,0}}{\sqrt{Var(AR_{i,0})}}}{\sqrt{Var\left(\sum_{i=1}^{n} \sqrt{Var(AR_{j,0})}\right)}}$$

Methodology: Corrado rank test

- Some non-parametric tests have been developed to go beyond the assumption (often rejected) of normality of ARs.
- The most popular non-parametric test is the one developed by Corrado rank test (Corrado, 1989; Corrado and Zivney, 1992).
- The main idea of the Corrado rank test is to compare the ARs in the event-day with the actual distribution of ARs in the estimation window with no a-priori assumption on the distribution of ARs.
- Being h_i the position (rank) of the AR in the event day of company *i* over the distribution of ARs in the estimation windows, the test statistics is given by:

$$Z_U \sqrt{\frac{12}{n}} \sum_{i=1}^{n} \left(\frac{h_i}{180+2} - \frac{1}{2} \right)$$

- This statistics converges in distribution to a normal distribution as *n* increases.

Methodology: subsamples

- We also performed several robustness checks subdividing the total sample into subsamples based on:

  - ✓ the geographic dimension (EU based firms vs non-EU based firms),
  - ✓ the sectorial dimension (high- vs low- emissions sectors),
  - ✓ the environmental performance (companies with a good ranking A+B vs companies with bad ranking C+D+E),
  - ✓ the quality of environmental disclosing (high scoring > 70 vs low scoring <=70).

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Methodology: determinants of CARs

- To identify the determinants of CARs, we regressed the latter on a series of observable characteristics company-related:
  - ✓ market value (as a proxy for size of the firm),
  - ✓ Profitability (ROE)
  - ✓ Sector
  - ✓ Geography

- and environmental-related:
  - ✓ quality of environmental disclosing,
  - ✓ environmental performance (rating),
  - ✓ emissions.

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Results (ARs)

All companies participating to CDP

Day	AR	t-test	Patel	BMP	Corrado
0	0,00024	0,650	0,032	0,053	0,201
1	0,00111	2,819	0,785	1,738	1,126
2	0,00034	0,795	-0,177	0,122	-0,062
3	-0,00083	-2,277	-0,256	-0,651	-0,257
4	0,00015	0,352	0,522	0,978	0,462

Level of significance: yellow: 10%; blue: 5%; green: 1%

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Results (CARs)

All companies participating to CDP

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00022	0,195	-0,811	-1,045	0,201
1	0,00133	1,148	-0,179	-0,259	0,664
2	0,00167	1,346	-0,183	-0,437	0,287
3	0,00084	0,654	-0,399	-0,691	0,150
4	0,00099	0,741	-0,035	-0,169	0,120

Level of significance: yellow: 10%; blue: 5%; green: 1%

Results (ARs): subsamples (geography)

EU27

Day	AR	t-test	Patel	BMP	Corrado
0	0,00112	1,255	0,282	0,530	0,389
1	0,00003	0,029	0,084	0,124	0,039
2	-0,00035	-0,372	-0,365	-0,448	-0,566
3	-0,00087	-1,402	-0,147	-0,394	-0,310
4	0,00045	0,572	0,632	1,299	0,702

non-EU27

Day	AR	t-test	Patel	BMP	Corrado
0	-0,00008	-0,202	-0,131	-0,309	0,003
1	0,00151	3,505	0,864	2,059	1,285
2	0,00060	1,248	0,018	0,449	0,279
3	-0,00082	-1,837	-0,215	-0,607	-0,121
4	0,00004	0,075	0,224	0,324	0,117

Level of significance: yellow: 10%; blue: 5%; green: 1%

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Results (ARs): subsamples (rating)

Rating AB

Day	AR	t-test	Patel	BMP	Corrado
0	0,00060	1,090	-0,009	0,046	-0,005
1	0,00095	1,882	0,546	1,391	0,756
2	-0,00033	-0,607	-0,287	-0,274	-0,108
3	-0,00086	-1,726	-0,175	-0,560	-0,224
4	0,00011	0,198	0,342	0,842	0,190

Level of significance: yellow: 10%; blue: 5%; green: 1%

Results (ARs): subsamples (disclosing)

Score >=70

Day	AR	t-test	Patel	BMP	Corrado
0	0,00011	0,244	-0,153	-0,350	-0,075
1	0,00127	2,766	0,664	1,514	0,821
2	0,00040	0,773	-0,142	0,165	0,098
3	-0,00084	-1,915	-0,172	-0,543	-0,095
4	-0,00033	-0,652	0,068	0,130	-0,233

Score<70

Day	AR	t-test	Patel	BMP	Corrado
0	0,00057	0,862	0,327	0,707	0,537
1	0,00087	1,109	0,334	0,695	0,732
2	0,00010	0,123	-0,180	-0,145	-0,454
3	-0,00069	-0,988	-0,088	-0,171	-0,218
4	0,00148	1,817	1,077	1,814	1,430

Level of significance: yellow: 10%; blue: 5%; green: 1%

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Results (ARs): subsamples (sectors)

Emission intensive sectors

Day	AR	t-test	Patel	BMP	Corrado
0	-0,00021	-0,377	-0,144	-0,222	0,203
1	0,00041	0,758	0,507	1,174	0,796
2	0,00065	0,991	-0,109	0,062	0,066
3	-0,00001	-0,011	0,163	0,428	0,362
4	0,00127	1,928	0,937	1,864	0,668

Low-emissions sectors

Day	AR	t-test	Patel	BMP	Corrado
0	0,00060	1,190	0,166	0,419	0,082
1	0,00166	2,963	0,597	0,993	0,796
2	0,00010	0,180	-0,139	0,051	-0,140
3	-0,00148	-2,812	-0,486	-1,196	-0,672
4	-0,00073	-1,305	-0,138	-0,520	0,017

Level of significance: yellow: 10%; blue: 5%; green: 1%

Results (CARs): subsamples (geography)

EU27

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00219	0,784	-0,275	-0,382	0,389
1	0,00221	0,800	-0,211	-0,297	0,214
2	0,00186	0,630	-0,356	-0,663	-0,039
3	0,00099	0,330	-0,483	-0,809	0,292
4	0,00144	0,470	-0,143	-0,176	0,234

non-EU27

Day	CAR	t-test	Patel	BMP	Corrado
0	-0,00051	-0,431	-0,823	-0,983	0,003
1	0,00100	0,826	-0,061	-0,119	0,644
2	0,00160	1,227	0,058	-0,100	0,359
3	0,00079	0,573	-0,151	-0,314	0,002
4	0,00083	0,573	0,043	-0,090	0,002

Level of significance: yellow: 10%; blue: 5%; green: 1%

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Results (CARs): subsamples (rating)

Rating AB

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00067	0,408	-0,687	-0,933	-0,005
1	0,00162	0,978	-0,255	-0,386	0,375
2	0,00129	0,738	-0,405	-0,674	0,040
3	0,00043	0,235	-0,580	-0,848	-0,004
4	0,00054	0,290	-0,364	-0,505	-0,003

Level of significance: yellow: 10%; blue: 5%; green: 1%

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Results (CARs): subsamples (disclosing)

Score >=70

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00057	0,862	0,327	0,707	0,537
1	0,00087	1,109	0,334	0,695	0,732
2	0,00010	0,123	-0,180	-0,145	-0,454
3	-0,00069	-0,988	-0,088	-0,171	-0,218
4	0,00148	1,817	1,077	1,814	1,430

Score<70

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00097	0,460	0,132	0,098	0,537
1	0,00184	0,856	0,433	0,431	0,634
2	0,00194	0,867	0,362	0,251	0,226
3	0,00125	0,531	0,308	0,165	0,403
4	0,00273	1,102	0,959	1,242	0,322

Level of significance: yellow: 10%; blue: 5%; green: 1%

Results (CARs): subsamples (sectors)

Emission intensive sectors

Day	CAR	t-test	Patel	BMP	Corrado
0	-0,00045	-0,252	-0,939	-1,308	0,203
1	-0,00004	-0,023	-0,558	-0,801	0,500
2	0,00061	0,300	-0,488	-0,910	0,247
3	0,00060	0,290	-0,400	-0,747	0,152
4	0,00187	0,882	0,219	0,190	0,122

Low-emissions sectors

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00075	0,509	-0,176	-0,243	0,082
1	0,00241	1,628	0,291	0,355	0,439
2	0,00251	1,623	0,230	0,216	0,162
3	0,00103	0,636	-0,165	-0,268	0,062
4	0,00030	0,177	-0,260	-0,405	0,049

Level of significance: yellow: 10%; blue: 5%; green: 1%

Results: digression on the DJSI

- We checked for the disclosure by **Dow Jones S&P RobecoSam** of the additions/deletions to the **Dow Jones Sustainability Index (DJSI)** due the same days as our event date

- **DJSI global indices** track the financial performance of leading **sustainability-driven companies** worldwide (since 1999).
- Integrated assessment of economic, environmental and social criteria with a strong focus on long-term shareholder value:
  - ✓ Corporate governance
  - ✓ Risk & crisis management
  - ✓ Customer relationship management
  - ✓ Environmental policy/management system
- Focus on **best-in-class companies**. Yearly review of component selection and continuous monitoring of companies.

- Specific for **environmental issues** (less companies involved in fossil fuels and more companies with a limited carbon footprint):
  - ✓ **The S&P fossil fuel free index family** which excludes companies owning fossil fuel reserves from the respective underlying S&P benchmark index.
  - ✓ **The S&P fossil fuel free carbon efficient index family** which excludes companies owning fossil fuel reserves and reallocates the index components overweighting carbon-efficient companies.

Results: digression on the DJSI

Assessment 2015 – Industry Group Leaders (1)

As of September 21, 2015

Automobiles & Components	Volkswagen AG	Germany
Banks	Westpac Banking Corp	Australia
Capital Goods	CNH Industrial NV	United Kingdom
Commercial & Professional Services	SGS SA	Switzerland
Consumer Durables & Apparel	LG Electronics Inc	Republic of Korea

Volkswagen esce dal gruppo degli Industry leader solo a ottobre 2015 poche settimane dopo lo scandalo!!!!

Results (ARs): subsamples (DJSI)

DJSI 'good' (entry or continuing in)

Day	AR	t-test	Patel	BMP	Corrado
0	-0,00054	-0,775	-0,540	-1,051	-0,517
1	0,00037	0,696	0,338	0,783	0,442
2	0,00036	0,442	-0,379	-0,308	-0,126
3	0,00011	0,196	0,220	0,488	0,351
4	0,00013	0,178	0,272	0,548	0,040

DJSI 'bad' (exit or staying out)

Day	AR	t-test	Patel	BMP	Corrado
0	0,00013	0,269	-0,134	-0,265	0,086
1	0,00006	0,129	0,308	0,568	0,267
2	0,00072	1,162	-0,045	0,455	0,358
3	-0,00016	-0,312	-0,025	-0,090	0,139
4	-0,00049	-0,884	0,071	-0,027	-0,308

Level of significance: yellow: 10%; blue: 5%; green: 1%

Results (CARs): subsamples (DJSI)

DJSI 'good' (entry or continuing in)

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00309	1,404	-0,363	-0,551	-0,517
1	0,00345	1,591	-0,148	-0,211	-0,037
2	0,00381	1,541	-0,285	-0,591	-0,120
3	0,00392	1,585	-0,158	-0,370	-0,388
4	0,00405	1,697	-0,018	-0,098	-0,310

DJSI 'bad' (exit or staying out)

Day	CAR	t-test	Patel	BMP	Corrado
0	0,00111	0,741	-0,444	-0,596	0,086
1	0,00117	0,732	-0,211	-0,286	0,176
2	0,00190	1,060	-0,113	-0,333	-0,072
3	0,00174	0,957	-0,122	-0,355	0,065
4	0,00125	0,689	-0,114	-0,284	0,052

Level of significance: yellow: 10%; blue: 5%; green: 1%

Results: regressions

Dep variable: CAR(0,2)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
log(market value)	-0.000587	-0.000793	-0.000424	-0.000807	-0.000853	-0.00128*	-0.000888
	(0.000631)	(0.000897)	(0.000650)	(0.000700)	(0.000663)	(0.000712)	(0.000648)
ROE	-0.0000524	-0.0000532	-0.0000458	-0.0000404	-0.0000345	-0.0000306	-0.0000303
	(0.0000309)	(0.0000405)	(0.0000308)	(0.0000318)	(0.0000282)	(0.0000301)	(0.0000276)
D2012	0.00422		0.00486	0.00518	0.00479	0.00490	0.00482
	(0.00351)		(0.00352)	(0.00384)	(0.00383)	(0.00399)	(0.00381)
D2013	0.00282	-0.00146	0.00341	0.00261	0.00312	0.00255	0.00317
	(0.00276)	(0.00315)	(0.00282)	(0.00297)	(0.00299)	(0.00310)	(0.00306)
Consumer Discretionary	-0.0112	-0.0158	-0.0115	-0.0126	-0.0118	-0.0108	-0.0113
	(0.00840)	(0.0104)	(0.00846)	(0.00881)	(0.00962)	(0.00969)	(0.00926)
Consumer Staples	-0.0271***	-0.0316***	-0.0272***	-0.0304***	-0.0284***	-0.0293***	-0.0276***
	(0.00835)	(0.00985)	(0.00837)	(0.00856)	(0.00889)	(0.00890)	(0.00858)
Energy	-0.0138	-0.0149	-0.0144	-0.0151	-0.0131	-0.0133	-0.0123
	(0.00910)	(0.0101)	(0.00914)	(0.00946)	(0.00889)	(0.00885)	(0.00858)
Financials	-0.0120	-0.00734	-0.0114	-0.0127	-0.0116	-0.0100	-0.0102
	(0.00846)	(0.0102)	(0.00852)	(0.00879)	(0.0110)	(0.0112)	(0.0106)
Health Care	-0.0243***	-0.0291***	-0.0245***	-0.0248***	-0.0263***	-0.0244**	-0.0256***
	(0.00885)	(0.0102)	(0.00888)	(0.00911)	(0.00998)	(0.0102)	(0.00972)
Industrials	-0.0164*	-0.0153	-0.0168*	-0.0169*	-0.0187**	-0.0181*	-0.0184**
	(0.00861)	(0.0111)	(0.00867)	(0.00900)	(0.00934)	(0.00951)	(0.00914)
Information Technology	-0.00549	-0.0111	-0.00602	-0.0100	-0.00797	-0.00702	-0.00698
	(0.00921)	(0.0111)	(0.00920)	(0.00938)	(0.0104)	(0.0107)	(0.0101)
Materials	-0.00208	0.00846	-0.00200	-0.00321	-0.00401	-0.00468	-0.00425
	(0.00902)	(0.0114)	(0.00905)	(0.00952)	(0.00883)	(0.00906)	(0.00860)
Telecommunications	-0.00874	-0.00733	-0.0122	-0.0147	-0.0121	-0.0126	-0.0115
	(0.00921)	(0.0111)	(0.00910)	(0.00917)	(0.0101)	(0.0102)	(0.00987)
Utilities							

Results: regressions (con't)

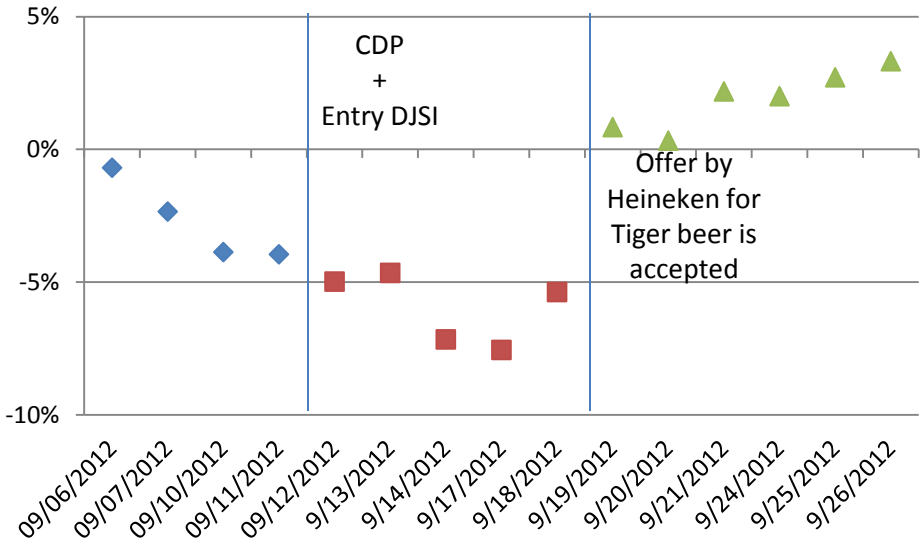
Dep variable: CAR(0,2)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EU27	-0.00102	-0.00303	-0.000404	-0.000769	-0.000659	-0.000890	-0.000909
	(0.00318)	(0.00417)	(0.00326)	(0.00331)	(0.00340)	(0.00355)	(0.00353)
DJSI 'entry' or 'continuing'		0.000766					
		(0.00332)					
Score CDP (0-100)			-0.0000530				-0.000735**
			(0.0000662)				(0.000362)
Rating CDP (A or B)				0.000506		-0.00895	
				(0.00273)		(0.0126)	
log(CO2)					-0.0000336	-0.000137	-0.00430*
					(0.000944)	(0.00113)	(0.00222)
Rating CDP (A or B) x log(CO2)						0.000836	
						(0.00100)	
Score CDP x log(CO2)							0.0000558**
							(0.0000269)
R squared	0.0420	0.0787	0.0427	0.0453	0.0448	0.0486	0.0484
N	962	641	940	858	835	795	833

Robust standard errors in parenthesis. * p<0.1, ** p<0.05, *** p<0.01. Specification in column 2 does not include year 2011 as DJSI and CDP don't coincide.

NB: Stiamo sempre controllando per market value, dummy anno e settore riportate nella precedente slide ma parte della stessa tabella.

Results: example of outlier

- Heineken NV entered the DJSI on the 14th September 2012 (together with other 25 top 500 companies)
- In the same days, Heineken was on its way (with many troubles) in acquiring Tiger Beer for $4.5bn (and a large share of the Asian market for beer). This process was blocked by a Thai billionaire…
- Finally the deal was signed on the 19th September 2012



Heineken wins support of Thai billionaire for Tiger bid

19 September 2012 | Business

Dutch brewer Heineken has ended the stand-off over control of the maker of Tiger beer, by garnering the support of a Thai billionaire.

Analyst said a major hurdle for Heineken's bid for Asia Pacific Breweries had been cleared

Charoen Sirivadhanabhakdi's ThaiBev and TCC Assets have agreed to back the sale of Singapore-based Fraser and Neave's (F&N) stake in Asia Pacific Breweries (APB) to Heineken.

Heineken has offered 5.6bn Singapore dollars ($4.6bn; £2.8bn).

Analysts said chances of Heineken's bid being accepted by F&N were now higher.

The news sent Heineken's shares as much as 5.4% higher in morning trading.

CONTENTS

Conclusions

NO REACTION

- Our analysis **does not find evidence** of any reaction to CDP disclosure in stock markets in the years considered (2011-2013).
- The result is **robust** when we consider the different subsamples.

Voluntary second level environmental disclosure (CDP) does not affect significantly firms' stock markets returns

OUR EXPLANATION

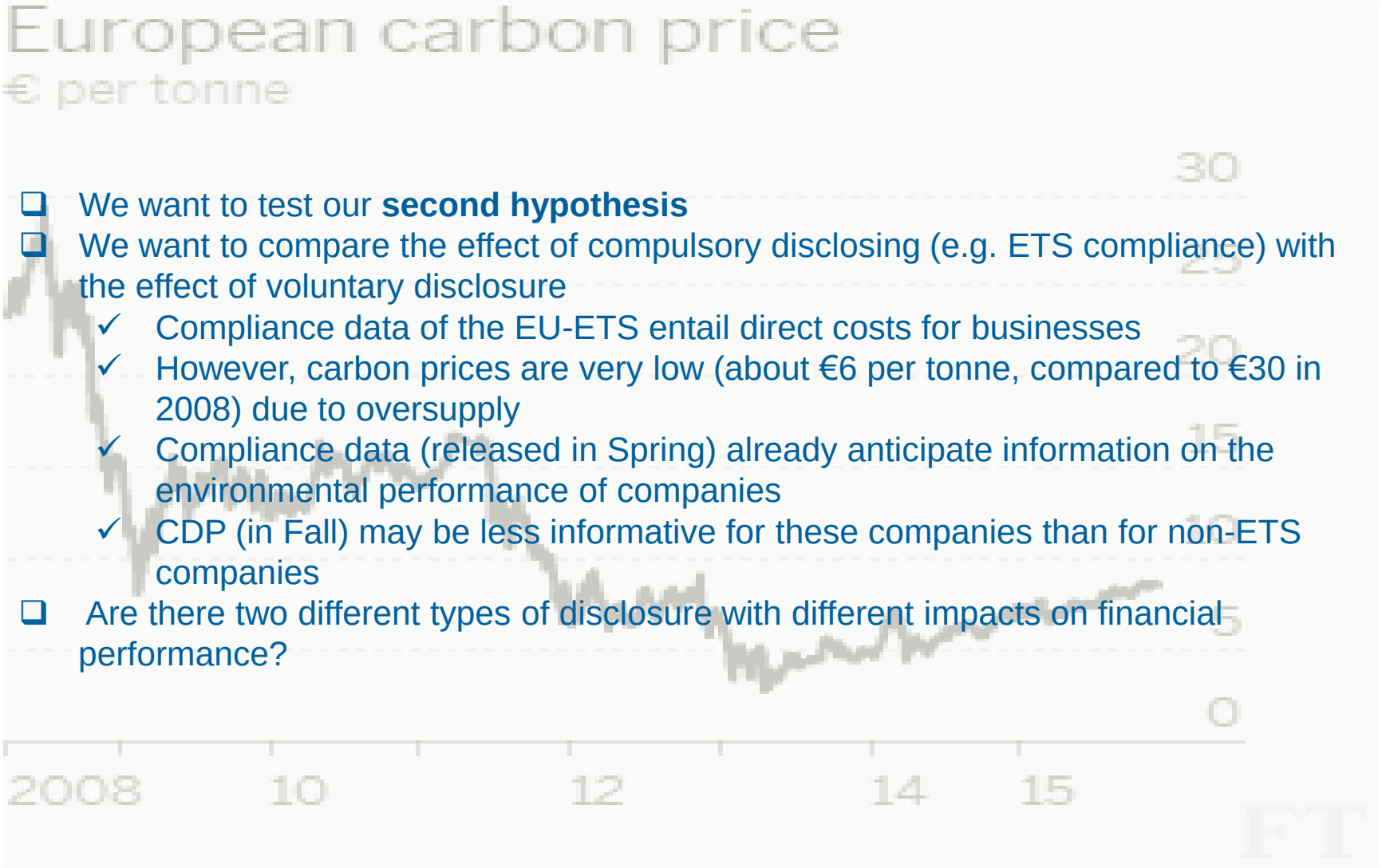
First of all: no result is a result

Under the hypothesis of markets efficiency, the result of no reaction may be due to:

a) **Information is not new** and markets already incorporated and discounted it (for example for those companies who publish social balance sheets/annual environmental reports [only 20% of companies do it and with hardly comparable quantitative data] or disclose any other way environmental related information);
b) **Markets do not deem relevant** for the financial/economic performance of firms the type of voluntary second level disclosure we examined.

CONTENTS

Next steps



- We want to test our **second hypothesis**
- We want to compare the effect of compulsory disclosing (e.g. ETS compliance) with the effect of voluntary disclosure
  - ✓ Compliance data of the EU-ETS entail direct costs for businesses
  - ✓ However, carbon prices are very low (about €6 per tonne, compared to €30 in 2008) due to oversupply
  - ✓ Compliance data (released in Spring) already anticipate information on the environmental performance of companies
  - ✓ CDP (in Fall) may be less informative for these companies than for non-ETS companies
- Are there two different types of disclosure with different impacts on financial performance?

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Thank you!

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