Green vs Brown: Analyzing the Stock Market's Response to the COPs' Conclusions

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Abstract

This thesis analyses the impact of the last 11 Conferences of the Parties on the stock returns of 477 companies. It uses an event study methodology with an event window of 11 days, as well as predictive regressions to determine how these events impact the abnormal returns of green and brown companies quoted on American stock exchanges. In differentiating green from brown firms based on Refinitiv's Environmental ESG score, I find evidence that these two groups react quite differently depending on the event and the industry. I however nuance these findings in the second part of my analysis as my regressions fail to find any explanatory power from this classification. The analysis completed in this paper reveals that there are anticipatory effects in the days preceding certain events. These effects were especially pronounced in environmentally vulnerable industries such as mining, indicating higher market sensitivity to changes in regulations. I find however that the measure for the size of a company is consistently significant, highlighting larger businesses' exposure to market fluctuations following COP announcements.

Key Words: Green versus Brown Firms, Conference of the Parties, Event Study, Abnormal Returns

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Resumo

Esta tese analisa o impacto das últimas 11 Conferências das Partes nas rendibilidades das acções de 477 empresas. Utiliza uma metodologia de estudo de eventos com uma janela de eventos de 11 dias, bem como regressões preditivas, para determinar o impacto destes eventos nos retornos anormais das empresas verdes e castanhas cotadas nas bolsas de valores americanas. Ao diferenciar as empresas verdes das castanhas com base na pontuação ESG ambiental da Refinitiv, encontro provas de que estes dois grupos reagem de forma bastante diferente consoante o evento e o sector. No entanto, na segunda parte da minha análise, estas conclusões são matizadas, uma vez que as minhas regressões não conseguem encontrar qualquer poder explicativo nesta classificação. A análise efectuada no presente documento revela que existem efeitos de antecipação nos dias que antecedem determinados acontecimentos. Estes efeitos foram especialmente pronunciados nas indústrias ambientalmente vulneráveis, como a mineira, indicando uma maior sensibilidade do mercado a mudanças na regulamentação. Verifico, no entanto, que a medida relativa à dimensão da empresa é consistentemente significativa, salientando a exposição das empresas de maior dimensão às flutuações do mercado na sequência de anúncios de medidas de proteção do ambiente.

Palavras-Chave: Empresas Verdes versus Empresas Castanhas, Conferência das Partes, Estudo de Eventos, Retornos Anormais

Título: Verde vs Castanho: Análise da reação do mercado bolsista às conclusões dos COPs

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1. Introduction

With rising concerns that our planet is warming up faster than we can prevent it from doing so, policymakers, governments, and companies are rushing to find solutions to ensure a sustainable future for the next generations to thrive in. Amid this context, the United Nations began organizing the annual Conference of the Parties (COP). These events have been of the utmost importance in shaping new environmental policies and corporate behaviors worldwide. With the increasing attention being brought to these events, especially recently, with COP28 being hosted by the leader of one of the world's biggest petroleum firms, many have begun to wonder how these events affect companies. More precisely, how companies of various environmental friendliness react to those occasions.

The importance of understanding how companies react to changes in environmental policies and climate-related events should not be underestimated in today's context. As the attention being paid to climate change and its effects increases, consumers, investors, and regulators are now expecting firms to behave in more environmentally responsible ways. Moreover, with the increasing pressure to change, companies that do not adapt enough may see their financial health hampered as they lose support from crucial stakeholders.

The Conference of the Parties, referred to as COP(s) are recurring events happening yearly since 1995 and held under the United Nations Framework Convention on Climate Change (UNFCCC). These conferences are held in a different country every year and each tackles varying aspects of climate change. The most notable of these conferences to date was COP21 held in 2015 in Paris, lead to the drafting of the Paris Agreement, which aimed at limiting global warming to 1.5 degrees Celsius above pre-industrial temperatures.

Over time and with the introduction of policies resulting from such events, a split has become visible between green and brown firms. Green firms are those who are on the more sustainable side whereas brown firms are on the more polluting side of the spectrum. This classification may bring highly significant implications in the context of the COPs as it could help draw out the good students from the bad.

Despite a growing body of literature on how companies react to climate change-related announcements, some gaps remain. For instance, in understanding how notorious environmental events, such as the COPs, impact green and brown companies. Most papers have thus far focused on isolated general environmental policies or corporate sustainability

initiatives. This leaves a gap in uncovering how recurring, international events focused on solving climate change, influence the reactions of the market as well as the behavior of stocks. This study aims to fill this gap by specifically analyzing the market reaction to COP conclusions, and providing insights into how these events affect green and brown companies. Hence the research question of this paper is the following: *"How do companies react to the conclusions of the conference of the Parties, and how do these reactions differ between green and brown firms?"*

To examine this research question, the paper follows an event study methodology, analyzing companies' abnormal returns as well as their cumulation throughout an event window of 11 days. It will do so for the last 11 COPs from COP17 held in 2011 to COP27 held in 2022. Thereafter, to include further tests and get a better idea of the reactions of the market to these events, the paper will use a set of regressions to predict selected variables. Namely, introducing dummy variables for certain days as well as lags and other control variables. The methodology I follow in this paper draws inspiration from that of Borghesi et al. (2022), who also studied the impact of European climate change policy changes on 100 European stocks.

After completing the analysis based on a sample of 477 companies for 11 events across 11 years, this paper finds evidence that some industries, such as the mining and transport industries have quite strong reactions around those events whereas, for others like retail trade or manufacturing, conclusions are a little murkier and less consistent. Moreover, there seems to be an anticipation shock in the market some days before the event. This shock is carried a few days after the event until it is fully integrated into the markets. It is also interesting to note that the size of a company plays a significant role in predicting its cumulative abnormal returns around the dates of the events. Other control variables, however, were not found to bring any explanatory power to my models. The regressions also revealed that a firm being green, or brown is not significant when it comes to predicting CARs, nonetheless, in certain industries and around certain events, green firms were found to be performing better than their brown counterparts.

The rest of this study will follow the following structure. In section 2, I will review the existing body of literature on the impact of climate change-related policies on stocks. Then section 3 will describe in detail the methodology used in this research, before displaying and analyzing the results in section 4. Thereafter, section 5 will discuss the results of my research as well as look into the limitations and ideas for future research. Lastly, section 6 will conclude this paper.

2. Literature Review

Thus far, the literature on the corporate response to climate change has focused on evaluating how the stock prices of firms react to the announcement of new policies, or, to climate-related news. Another major body of literature has focused on finding out how the carbon emissions or the ESG scores of companies affect their performance, be it reflected in their stocks, bonds, or overall valuations.

Newmann (2021), posits that firms attempting to pursue more sustainable and environmentally friendly strategies, following the release of new sustainability guidelines, are not significantly affected by the environment-profitability trade-offs. Some believe that, by following a more sustainable strategy, the investments required for these actions make little sense as they would not reap the same profits as a firm that follows a more traditional strategy. Instead, Newmann (2021), shows that strategies aimed at balancing social and environmental aspects of their operations seem to be favorable for companies.

2.1 Performance of Low and High Carbon Intensity Portfolios

Much of the research realized thus far has concluded that in many cases, green firms or portfolios composed of green firms tend to outperform brown ones. A pioneer of this theory is Baht (1999) who found evidence that a company's emissions of greenhouse gases hampered its stock returns. He observed that investors would be more willing to invest in less polluting companies as they are subject to lower risks and higher profits. Later research, for example, Garvey et al (2018) and Trinks et al. (2022), show that low carbon-intensity portfolios tend to perform better in an international context. In et al. (2019) and Tripathi and Jham (2020) also show that lower carbon-intensity portfolios outperform their high carbon-intensity competitors in the U.S. and Indian stock markets respectively. Other papers, by Bolton and Kacperczyk (2021), or Tang and Li (2022) also find evidence of a premium, observing that firms with high carbon emissions are often priced at a discount.

This being mentioned, the existence of a carbon premium has at times been contested. Goergen et al (2020), and Reboredo and Ugolini (2022), both found there was no risk premium based on climate risk, with the former underlining that investors may be unaware of the risks associated with brown firms. Likewise, Anderson et al. (2016) and Yook and Hooke. (2023) found there

was hardly any difference in performance between low carbon-emission portfolios and more carbon-savvy ones.

2.2 Environmental Policy Changes and Stock Returns

Risks related to changes in environmental policy have been shown at times to have an impact on the stock prices of companies in various industries. For instance, Diaz-Rainey et al. (2021) analyze how stocks of oil companies move around the Paris Agreement and the United States presidential elections. They find that the former had a largely negative impact on those stocks. Antoniuk and Leirvik (2021) also report similar findings on COP 21, although they note that in their event study, the returns of the oil industry decreased slightly 5 days prior to the concluding announcement of the event, pointing out that the shock was anticipated before the conclusions of the meeting.

Borghesi et al. (2022) analyze how recent changes in climate policy in different European countries have affected green and brown portfolios. They find that for most announcements aiming at allocating resources to mitigate climate change, the general response of both portfolios was positive. Meanwhile, Barnett (2020) finds that when a company is highly exposed to climate risk and the future likelihood of changes in environmental policies is high, the value of these firms often decreases, to reflect their increased exposure. He shows, however, that when the likelihood of new policies being adopted is lower, the values of companies in polluting industries rise (Barnett, 2020).

Antoniuk and Leirvik (2021) find that information arising from climate-related events has an impact on the ETF markets. They show that depending on the event and the sectors, the effects can be positive or negative. For instance, they find that following the Paris Agreement, ETFs comprised of companies in the clean energy sector increased significantly and had a positive effect. Meanwhile, companies operating in the fossil fuel industry saw their returns decrease following the announcement of the new policies.

Lastly, Birindelli and Chiappini (2021) find that new climate-related policies can have varying effects on the valuations of companies. Namely, they find that the announcements of new environmental policies tend to have more negative effects, meanwhile observing that the sole companies to experience positive returns are green firms.

2.3 Investor Behavior

In assessing the differences in reactions to climate transition risk for green and brown firms, Ardia et al. (2022), find that international climate events like the Paris Agreement, or the United Nations Climate Conference, tend to amplify a trend in which one can observe a divestment of brown stocks while observing an increase of investments in green firms. Moreover, Pastor et al. (2021), show that when investors are more concerned about climate change, similar effects are observed. The same authors theorize that two mechanisms explain these reactions. Firstly, an adjustment in the investors' perception and sentiment regarding the plausible future cashflows of firms that are linked to changes in climate-related policies. For instance, if a new policy aiming at taxing carbon emissions was to be adopted, consequences for brown companies would be worse than for green ones (Pastor et al., 2021). Accounting for this change, investors could view enterprises affected by this change as being less likely to maintain their current levels of cash flows, hence decreasing their returns, which in turn increases the trend of divestment from carbon-intensive firms. The second mechanism lies in the assumption that investors do care about ESG metrics and their consequences on firms (Pastor et al., 2021). That is an investor who is mostly concerned about a company's sustainability as a criterion for portfolio composition will be more likely to invest in green firms while neglecting brown ones.

Huynh and Xia (2021) find evidence that investors tend to prefer green bonds. They analyze how the returns on corporate bonds behave relative to different levels of climate change news risk. They see that bonds issued by better environmentally performing companies will often display a higher exposure to climate change news risk (Huynh and Xia, 2021). They find that investors seem to prefer bonds with a higher covariance with a climate change news risk indicator, often green bonds (Baker, Bergstresser, Serafeim, and Wurgler, (2018)), which will be pricier and have lower returns but offer a better hedge against climate news risk.

2.4 Motivations

In studying the effects of the last 11 conferences of the parties on the returns of green and brown stocks, this paper hopes to shed light on the possible reactions of markets to the announcement stemming from these conferences. This study hopes to confirm or contrast the results obtained in previous research. Namely, this study aims to find whether the returns of green firms outperform that of brown firms around these dates.

The reason for studying the COPs, in particular, stems from the fact that they are one of the most important meetings about climate change, where most countries around the world meet and discuss the following steps to be taken to tackle the issue. Being an event in which future environmental policies are discussed and written, the conference of the parties are highly relevant events for the corporate world. The conclusions of these events shape the strategies of firms as they rush to invest in the technologies necessary for this transition. Such conclusions may be anticipated or come as a shock to investors, which is why studying the abnormal returns of stocks around these dates is an interesting exercise.

Moreover, the yearly recurrence of the COP makes it great to establish if there is any trend in the return's evolution throughout the last 12 years. For instance, we could observe that year after year a spread in the returns of brown and green firms is forming, or other effects which make it interesting to study this event over a few years.

3. Methodology

This empirical study aims to research how green and brown companies' stocks react around the dates at which the conclusions of the COPs are announced. To do so, this study is split into two parts. Firstly, an event study will aim at mapping the abnormal returns of green and brown firms. Secondly, regression analyses are performed to gain additional insight into the implications of green and brown stock movements around those dates.

3.1 Event Study Methodology

The goal of this first part of the research is to evaluate whether the returns of companies around these dates differ significantly from their expected returns. For this, I analyze the abnormal returns, which are calculated by subtracting the expected from the actual or realized returns. In the case of this study, the expected returns were calculated first using the capital asset pricing model developed by Sharpe (1964) and Lintner (1965). For the sake of robustness, I compared the resulting expected returns with those obtained using the Fama-French three-factor model developed by Fama and French (1992). The results end up being similar, hence I chose to use the market model for the analysis that will be completed in this paper. Following this, I computed the cumulative abnormal returns, hereafter referred to as CAR, which are obtained using the rolling sum of the abnormal returns over the event window period.

$$CAR_i = \sum_{t=T1+1}^{T2} ARi,t \qquad \text{(Eq. 1)}$$

To evaluate the significance of the abnormal returns, I use a t-test. This is also provided when downloading data from WRDS U.S. daily event study. The t-test's null hypothesis is that ARs are equal to 0, hence the expression is as follows:

$$t = \frac{AR_{i,t}-0}{SAR_i} \qquad \text{(Eq. 2)}$$

3.2 Regression Models

To gain further insight into the market's reaction to the announcement of the COPs' conclusions and to draw potential implications, I perform a series of regression tests on the CARs.

Firstly, I want to understand when exactly the shock is integrated into the stock prices. To do this, the main model of this study will follow a model akin to that developed by Borghesi et al, (2022) albeit with certain tweaks. Like them, my study also uses a proxy of the market return, as well as a dummy variable for the days where the CARs are most significant based on the data obtained from the event study. More precisely, these dummies will be implemented for two and three days before the event, as well as on the event day itself. Furthermore, an additional set of regressions adds robustness by appending a lag of either two, three, or five days on each dummy as well as on the market return. That is, the dummy should capture any immediate reaction on any given day, while the lag serves the purpose of evaluating if that reaction is delayed over the following days. The point of this is to evaluate possible behavioral factors at play around the end of COPs, with investors potentially anticipating a particular outcome before the event's conclusions are released. Moreover, a dummy variable for green firms is included to check for differences in reactions between green and brown companies. Furthermore, I will use the following financial control variables, profit, leverage, liquidity, and size. These will be discussed in more detail in the *Data* section.

Additionally, to test whether my model should use random or fixed effects, I apply the Breusch-Pagan Lagrange test for heteroskedasticity. The null hypothesis of this test is that the variance of the random effect model is 0. Running this test on the previously built regression yields a very low p-value (see Appendix 1.a), meaning I can reject the null hypothesis, and hence, there are no random effects. To further analyze the robustness of this test, I applied Hausman's methodology to the same models, with the null hypothesis that random effects should be used. Once again, the results of this test point to a rejection of the null hypothesis, given a p-value of 0.000 (see Appendix 1.b). Considering these results, my final regressions will use a fixed effects model, controlling for industry and year, so that the equation used for this empirical study is given by the following expression:

$$CAR_{ijt} = \alpha + \beta_1 L_y Rm + \beta_2 L_y Dx + \beta_3 Green_{jt} + \beta_4 Z_{jt} + \varepsilon \qquad \text{(Eq. 4)}$$

3.3 Data

3.3.1 Sample Data

To constitute the sample of firms to be examined in this study, several steps were taken. Firstly, data for the whole market was downloaded using the Center for Research Security Prices' monthly stock return, resulting in an original sample comprising 7,321 companies. After

classifying firms by industries, I used a randomization process assigning a random number to each company in each industry. The next step selected some of these numbers on a random basis, resulting in a sample of around 200 companies for each industry except for the sectors of agriculture, construction, finance, and public services. After the randomization process, the total sample consisted of 1,403 companies spanning 10 industries.

3.3.2 Event Study Data

The events chosen in this study are COPs and more precisely, I chose to look at the last 11 of them, from COP 17 in 2011 until the penultimate one, COP27 in 2022. Each year these events focus on various aspects of the challenges posed by climate change. Moreover, looking at the last 11 COPs allows us to look at the potential evolution in the reactions over the years.

The data for the event study part of the analysis was obtained using WRDS daily U.S. Event Study. This was a very advantageous choice as it gives detailed outputs for the data, such as detailed summaries for each day of the event study as well as several tests, which were used later in the analysis. This database comes with one downfall though, which is that it does not give you the data of the estimation window.

For the data points themselves, I focused on an event window starting 5 days before the events and ending 5 days after, so that the entire event window was 11 days. The estimation window, used to calculate the expected return of each stock, was set to 230 days and ended 50 days prior to the event. As previously mentioned, I selected the Market Model i.e., CAPM to calculate the expected returns.

I should mention that, in downloading this data for all events in all years, certain companies went out of business, therefore only those that that had data for at least 3 years were kept.

3.3.4 Regression Variables

As for the regression part of the analysis, the data for the financial control variables was collected using WRDS Compustat/Capital IQ US firms' yearly data. The variables of choice were total assets and liabilities, current assets and liabilities, net income, and total book value of equity. From this I computed the ratios that would be used, namely profitability given by ROA and calculated by dividing a firm's net income by its total assets, the firm's leverage was obtained from the debt-to-equity ratio, the current ratio was used to calculate the liquidity of the companies while the Size of a company was calculated using the natural logarithm of its

total assets. In the extraction of this information, many observations were lost from the original data set, due to missing data.

To complete my dataset, data on companies' ESG environmental pillar scores was obtained using Refinitiv Datastream Eikon. Once again, many companies lack data. Hence, to avoid reducing the size of the sample and to ensure that I have ample observations, the environmental ESG scores of companies were extrapolated. That is, if a company has a minimum of three observations for the environmental pillar of the ESG score, the missing observation takes the score of the nearest year. This should not pose too much of a problem, since these scores are used only to generate a classification between green and brown firms rather than as a percentage score.

For the green versus brown classification, I created the dummy variable GreenD, which takes the value 1 when a firm is green and 0 otherwise. A firm will take the value 1 when its ESG environmental score is higher than an A-, corresponding to companies in the 75th percentile. This results in 6,677 green observations in a sample counting 54,549.

3.4 Descriptive Statistics

Table 2: Summary statistics

VARIABLE	*OBSERVATIONS*	*MEAN*	*STD. DEV.*	*MIN*	*MAX*
AR	54,549	-.0001289	.0233624	-.4051009	.4220032
CAR	54,549	.0005612	.0577731	-.6745537	.7849583
PROFIT	54,549	.0422389	.0990199	-.4298017	.2899293
LEVERAGE	54,549	1.566595	3.153836	-12.82284	17.54471
LIQUIDITY	54,549	2.021547	1.564157	.3959375	9.546442
SIZE	54,549	8.17782	1.720258	.1423672	13.2207

Table 2 shows the summary statistics for the sample's data after winsorizing the control variables at the 1% level. This was done as the original summary statistics showed that the standard deviations of the control variables were too large because of outliers.

Table 3: correlation matrix

	AR	*CAR*	*Profit*	*Leverage*	*Liquidity*	*Size*
AR	1.0000					
CAR	0.4010	1.0000				
Profit	0.0077	0.0247	1.0000			
Leverage	0.0021	0.0107	-0.0447	1.0000		
Liquidity	-0.0002	0.0029	-0.0711	-0.1611	1.0000	
Size	-0.0073	-0.0436	0.1960	0.1403	-0.4087	1.0000

Table 3 displays the correlation matrix of the variables, in this case, the high correlation coefficient between AR and CAR is normal and is due to CARs being the rolling sum of ARs. Moreover, this table shows that correlations between variables are rather weak, with the highest coefficient being liquidity and size. Hence, there should be no multicollinearity between variables in the regressions.

4. Results

4.1 Event study results

First, it is important to mention that due to certain industries having very few data points for green firms, namely the construction, agricultural, wholesale, services, and financial industries, their results were purposefully omitted as they do not satisfy the minimum number of observations criterion. This can be due to several factors, firstly, the sample might have excluded observations that would have qualified as green firms. Secondly, since these are rather polluting industries, they may simply not be environmentally sustainable, hence the lack of firms qualifying as green. Nevertheless, there are still four industries with complete data, namely manufacturing, mining, retail trade, and transport. The following section will look at each of these industries by year, analyzing the CARs between green and brown firms among them.

Figure 1: CARs for COP17 based on CAPM model for each industry, five days before to five days after the event.

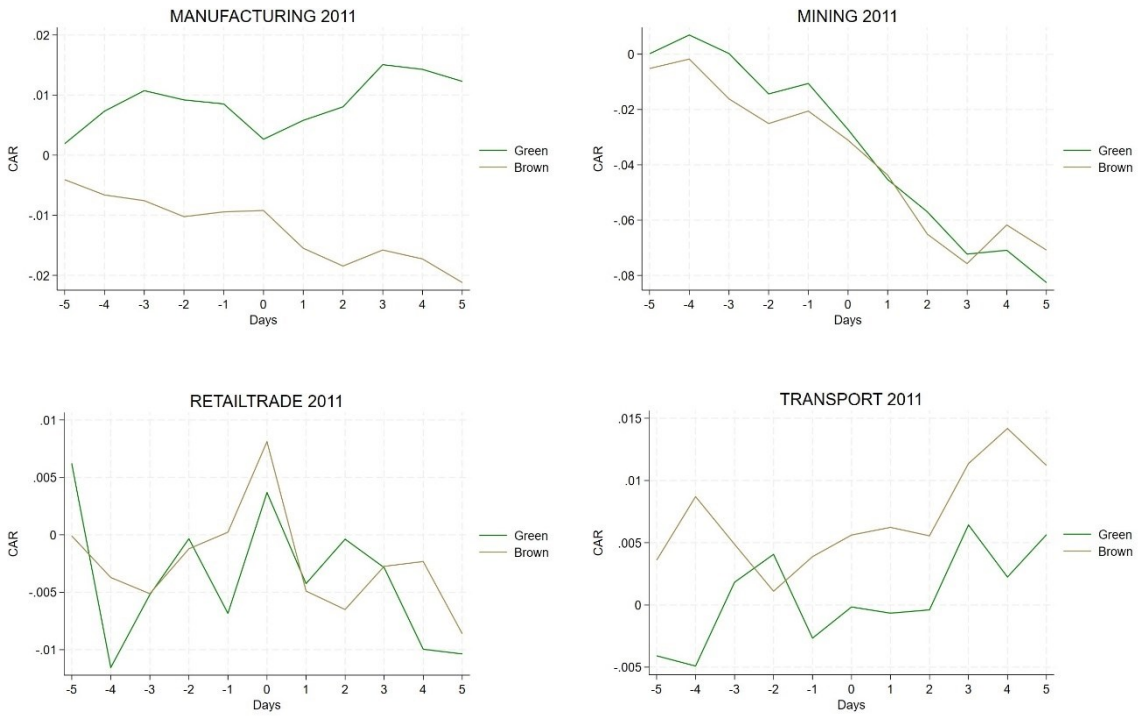


Table 4: Abnormal returns (AR), t-test p values (P T-test) for COP 17, in 2011.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	-0.34%	0.032**	-0.43%	0.053*	0.06%	0.734	0.27%	0.107
-4	-0.16%	0.323	0.40%	0.085*	-0.50%	0.047**	0.44%	0.165
-3	-0.04%	0.816	-1.31%	0.000***	0.01%	0.977	-0.26%	0.135
-2	-0.25%	0.182	-0.99%	0.000***	0.37%	0.026**	-0.31%	0.061**
-1	0.06%	0.741	0.44%	0.039**	0.09%	0.591	0.17%	0.295
0	-0.05%	0.785	-1.15%	0.000***	0.83%	0.000***	0.18%	0.373
1	-0.52%	0.010***	-1.36%	0.000***	-1.28%	0.000***	0.05%	0.744
2	-0.24%	0.370	-1.97%	0.000***	-0.10%	0.639	-0.06%	0.729
3	0.32%	0.131	-1.14%	0.000***	0.34%	0.026**	0.59%	0.010***
4	-0.14%	0.483	1.19%	0.000***	-0.09%	0.614	0.20%	0.393
5	-0.37%	0.039**	-0.95%	0.000***	-0.56%	0.001***	-0.22%	0.230

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 1 presents the results of 2011, one can notice that for the manufacturing industry, the CARS of the green and brown firms follow a nearly opposite line, with green firms seeing an increase in CARs between days 0 and 3. Meanwhile, the CARs for brown firms decrease throughout the event window. Interestingly, after the first day, the mining industry, composed of firms acquiring minerals and fossil fuels, sees its CARS decrease through the rest of the event window for both green and brown businesses. When looking at Table 4, the whole sample for these industries, one can see that the manufacturing industry shows significant ARs 5 days prior to, as well as a day after the event. For the mining industry, however, the results are significant for all days of the event window. This is congruent with the CAR graphs which show generally that the industry seems to suffer heavily around the end of COP17. Meanwhile, the retail trade sector displays negative ARs of 0.83% on the day of the event and -1.28% the following day. The transport industry shows little significance in their return, except for day -2 and day 3.

Looking at the results for the COP18 in 2012, the manufacturing industry shows few signs of significance in the abnormal returns, although one can see that broadly speaking, the green firms observed seem to outperform their brow counterparts. A different story can be told for the mining industry, here, brown firms seem to vastly outperform green ones, which see a drastic decrease in CARs about three days until a day before the event before increasing again. This is visible when looking at the t-test for the whole industry that year. Retail trade shows significant Ars two days prior to the event. Similarly, the AR experienced a significant decrease in the three days following the event date, which is also for both green and brown firms.

In the transport industry, green firms seem to suffer much more in the days leading to the conclusions of COP18. Although the entire industry sees a significant decrease in abnormal

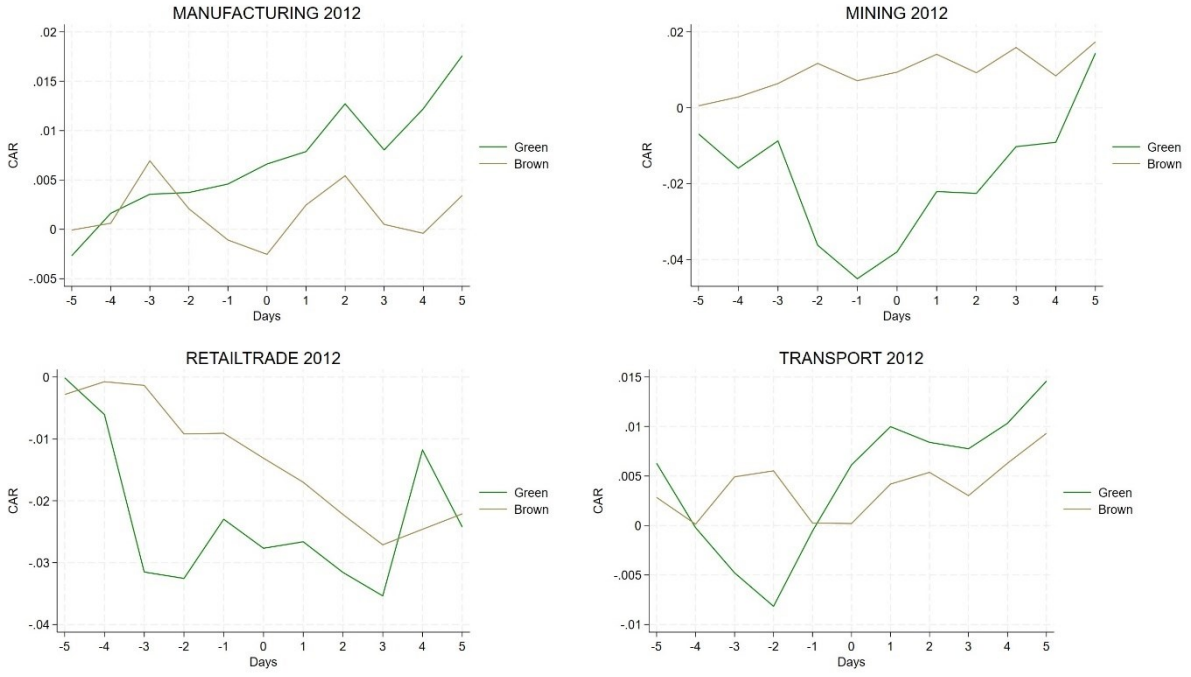
returns of 0.4% a day before the event, thereafter, it follows a generally increasing trend through the rest of the event window.

Table 5: Abnormal returns (AR), t-test p values (P T-test) for COP 18, in 2012.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	-0.03%	0.869	-0.03%	0.863	-0.26%	0.198	0.32%	0.154
-4	0.11%	0.650	0.10%	0.653	0.14%	0.314	-0.31%	0.008***
-3	0.59%	0.002***	0.40%	0.057*	-0.37%	0.189	0.39%	0.008***
-2	-0.43%	0.017**	0.16%	0.686	-0.71%	0.000***	0.02%	0.896
-1	-0.28%	0.092*	-0.50%	0.079*	0.12%	0.359	-0.41%	0.022**
0	-0.11%	0.412	0.28%	0.240	-0.40%	0.012**	0.06%	0.623
1	0.46%	0.009***	0.60%	0.068*	-0.31%	0.067**	0.40%	0.005***
2	0.32%	0.108	-0.44%	0.005***	-0.51%	0.014**	0.09%	0.594
3	-0.49%	0.020**	0.73%	0.001***	-0.56%	0.008***	-0.22%	0.077*
4	-0.04%	0.827	-0.65%	0.001***	0.51%	0.055*	0.32%	0.009***
5	0.40%	0.025**	1.06%	0.000***	0.07%	0.754	0.31%	0.011**

* p < 0.10, ** p < 0.05, *** p < 0.01

Figure 2: CARs for COP18 based on CAPM model for each industry, five days before to five days after the event.



The results of the event study for COP19 in 2013 show that green firms had worse CARs than brown ones in the manufacturing mining and retail trade industries. The manufacturing sector shows significantly negative ARs of 0.4 and 0.6% a day before the event as well as 4 days after it respectively. These negative moments seem to have mostly impacted brown firms as shown in Figure 2. Generally, the mining industry saw negative ARs through the entire event window,

with days -5, -1, 0, 2, and 4 all having significantly negative abnormal returns at the 1% significance level. Namely, the negative values on days -1, 0, and 2 seem to show that firms in this industry did experience a shock due to COP19. The retail trade industry incurred a negative shock of -0.4% on the day prior to the event as well as 4 days after it. Between day -4 and day -3, the transport industry incurs a decrease in ARs statistically significant at the 1% level, with the impact of this decrease mostly noticeable amongst brown companies. On day 0, green stocks seem to be vastly impacted and their CARs fall for the remaining 5 days of the event study, with significant negative ARs for the industry on days 1, 3, and 4.

Table 6: Abnormal returns (AR), t-test p values (P T-test) for COP 19, in 2013.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	-0.33%	0.099*	-1.07%	0.000***	-0.06%	0.783	0.03%	0.846
-4	0.05%	0.757	-0.10%	0.662	-0.33%	0.049**	-0.63%	0.002***
-3	-0.01%	0.954	0.10%	0.654	0.12%	0.357	-0.22%	0.139
-2	0.54%	0.090*	-0.16%	0.517	0.28%	0.210	-0.05%	0.711
-1	-0.35%	0.018**	-0.44%	0.021**	-0.40%	0.009***	-0.07%	0.737
0	0.08%	0.602	-0.83%	0.003***	0.18%	0.128	0.61%	0.006***
1	0.30%	0.140	-0.16%	0.610	0.21%	0.259	-0.10%	0.650
2	0.39%	0.019**	-0.74%	0.002***	0.10%	0.519	0.13%	0.502
3	0.25%	0.064*	0.79%	0.004***	-0.14%	0.175	0.44%	0.006***
4	-0.61%	0.011**	-1.07%	0.003***	-0.43%	0.019**	-0.75%	0.002***
5	-0.14%	0.377	0.22%	0.380	0.21%	0.170	-0.07%	0.672

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In 2014, interesting patterns are observed for the manufacturing firms. Green companies experience negative CARs until a day after the event, while the brown ones follow a less straightforward pattern though the CARs remain positive until two days before the conclusion of COP20. However, for the industry-wide statistics, significantly negative ARs of 0.5% and 0.6% are observed a day before and a day after the event respectively. The mining sector sees significantly negative ARs at the 1% level for all days prior to the event aside from day -3 with sharp decreases of 4% and 2.9% on day -4 and -1 respectively and another 2.9% decrease in AR on the day after COP20. In the days leading up to the event, the retail industry sees growth in its CARs and ARs, which fade off from day 2 onwards. The retail trade industry is also shown to have significantly negative ARs of 0.8% and 0.9% on days 4 and 5 respectively. Firms in the transport industry have mostly negative ARs in the first 4 days of the event window (day -5 to day -2), with green stocks seemingly reacting worse as their CARs keep on falling until the day after the event before stabilizing.

Figure 3: CARs for COP19 based on CAPM model for each industry, five days before to five days after the event.

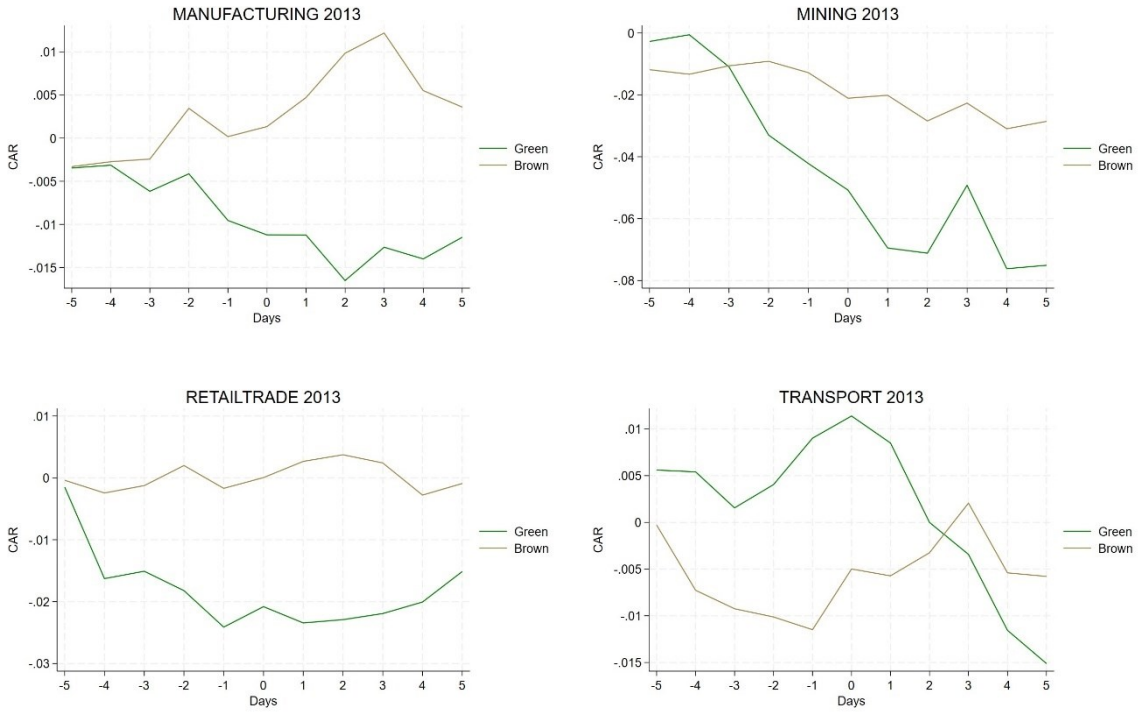
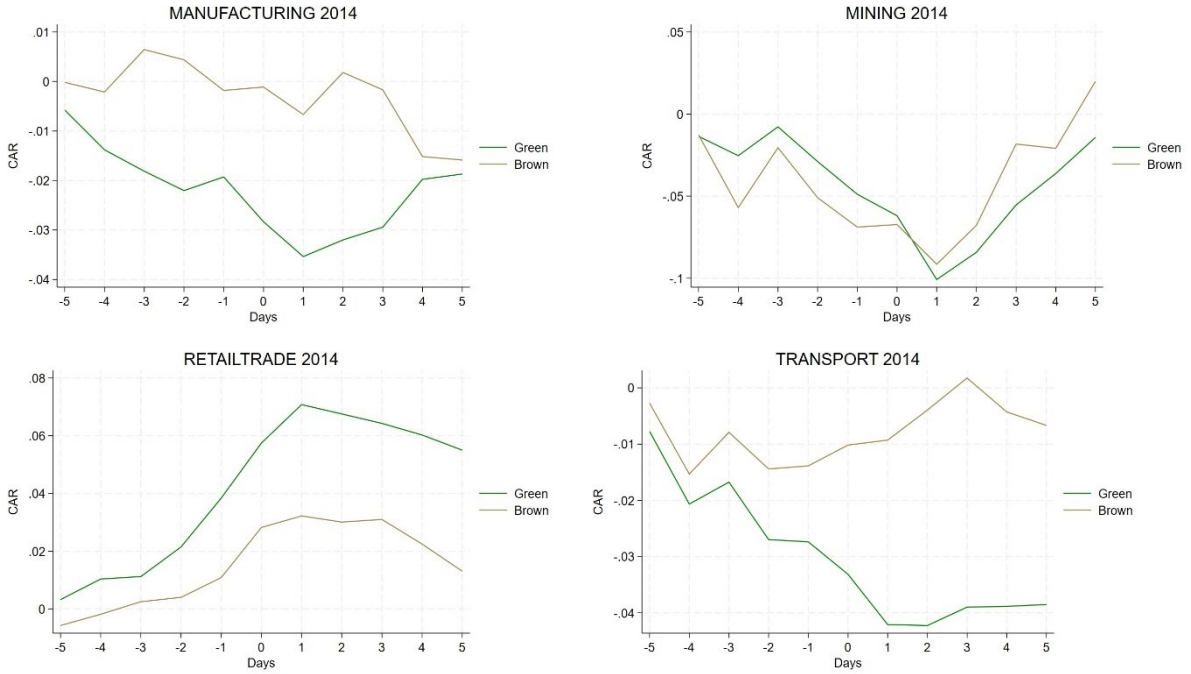


Table 7: Abnormal returns (AR), t-test p values (P T-test) for COP 20, in 2014.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	-0.06%	0.742	-1.28%	0.000***	-0.50%	0.122	-0.34%	0.025**
-4	-0.24%	0.284	-3.95%	0.000***	0.43%	0.010**	-1.26%	0.000***
-3	0.75%	0.000***	3.37%	0.000***	0.44%	0.398	0.70%	0.001***
-2	-0.22%	0.176	-2.91%	0.000***	0.21%	0.338	-0.70%	0.005***
-1	-0.55%	0.014**	-1.82%	0.000***	0.75%	0.003***	0.04%	0.820
0	-0.01%	0.961	-0.06%	0.866	1.75%	0.000***	0.25%	0.415
1	-0.57%	0.007***	-2.64%	0.000***	0.48%	0.038**	-0.04%	0.891
2	0.81%	0.000***	2.27%	0.000***	-0.20%	0.347	0.46%	0.031**
3	-0.30%	0.204	4.64%	0.000***	0.05%	0.803	0.54%	0.025**
4	-1.16%	0.000***	0.06%	0.900	-0.83%	0.000***	-0.52%	0.017**
5	-0.06%	0.746	3.80%	0.000***	-0.86%	0.001***	-0.20%	0.404

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 4: CARs for COP20 based on CAPM model for each industry, five days before to five days after the event.



Looking at Table 8 for the COP21, in 2015, all industries studied displayed a drop in ARs significant at the 1% level. This drop is also visible in Figure 5, in which one can see that in all sectors, green and brown firms see their CARs fall somewhat drastically. The mining industry was badly struck on the day of the event with a negative abnormal return of 3.3%. The same industry also sees significantly negative abnormal returns on days 2 and 3.

Table 8: Abnormal returns (AR), t-test p values (P T-test) for COP 21, in 2015.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	-0.58%	0.018**	-4.70%	0.000***	0.05%	0.884	-0.93%	0.003***
-4	-0.23%	0.308	0.34%	0.341	0.63%	0.013**	0.18%	0.480
-3	-0.30%	0.206	2.49%	0.000***	0.03%	0.879	1.63%	0.000***
-2	0.43%	0.106	1.20%	0.002***	-0.21%	0.112	-0.80%	0.000***
-1	-0.01%	0.954	-0.91%	0.110	-0.04%	0.873	-0.52%	0.050*
0	-0.77%	0.002***	-3.27%	0.000***	-0.94%	0.000***	-0.97%	0.004***
1	0.22%	0.354	0.78%	0.263	-0.29%	0.103	0.34%	0.282
2	0.43%	0.032**	-1.94%	0.003***	0.01%	0.954	0.88%	0.000***
3	0.86%	0.121	-2.54%	0.000***	-0.55%	0.007***	-0.18%	0.524
4	0.62%	0.014**	1.99%	0.001***	0.15%	0.487	0.66%	0.015**
5	0.23%	0.264	-0.85%	0.088*	-0.18%	0.314	-0.07%	0.774

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The retail trade industry also experiences significant negative ARs on the day of the event. Moreover, Green retail firms exhibit more negative CARs than brown ones. The ARs of the transport sector are quite volatile, although they are generally negative in the 2 days preceding the event as well as on the day of the event.

Figure 5: CARs for COP21 based on CAPM model for each industry, five days before to five days after the event.

Around COP 22 in 2016, Figure 6 shows that green firms have lower CARs than brown ones in all industries aside from retail where the picture is not as clear. In the manufacturing industry, firms first see a 1.26% increase in their ARs on day -5, however, they soon begin to drop, especially for brown firms. The industry also displays significantly negative ARs on days -1 and 1. The mining industry experiences varying abnormal returns around the event, with low ARs on day -5. This is followed by a rise in ARs of 1.4 and 1.78% significant at the 1% significance level on days -4 and -3. On days -2 and -1 however, the ARs are significantly negative with values of -1.11 and -2.30% respectively. The retail industry sees mainly significantly positive CARs in the days leading up to the event. Between days -3 and -1, green retail firms' CARs gain nearly 5% before incurring an insignificant decrease on the day of the event as well as on day 1. On days 4 and 5, both green and brown firms experienced significant negative ARs. Brown firms in the transport sector perform rather well, increasing their CARs by 5% throughout the event window, with only a slight decrease in CARs on days – 2 and 3.

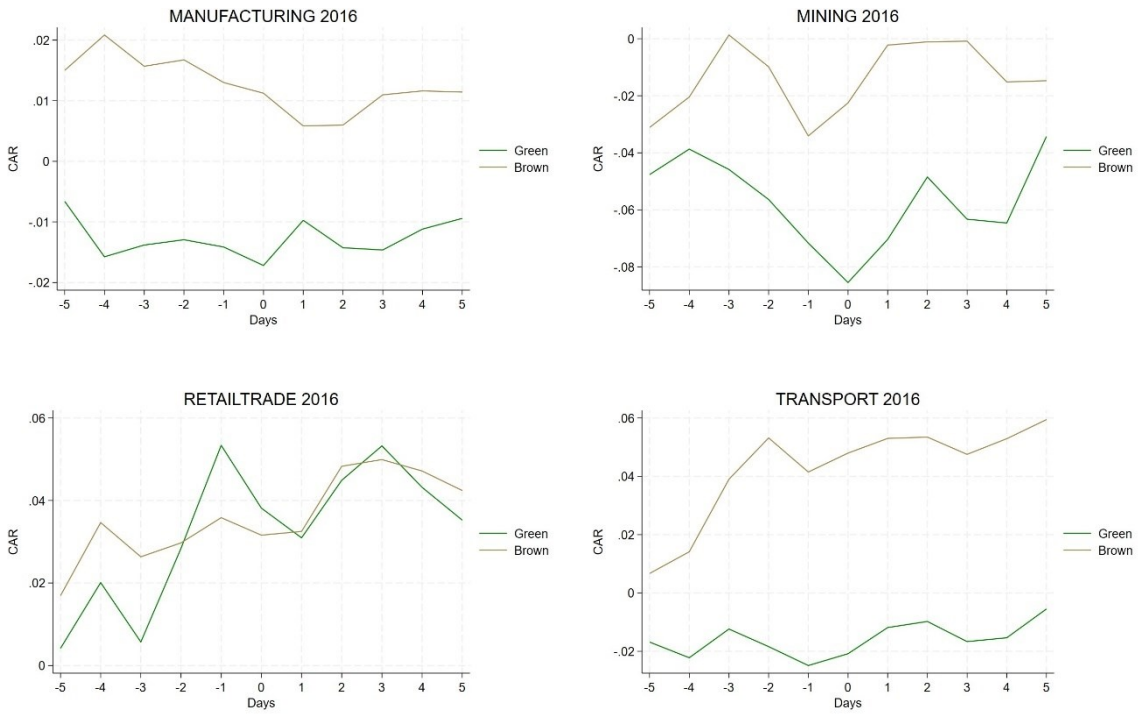
On day -3 both green and brown firms experience a 2.2% AR significant at the 1% level. The AR remains positive on day -2 before decreasing to -1.27% on day -1. Thereafter they keep on increasing until day 3 when ARs become significantly negative again with a value of -0.61%.

Table 9: Abnormal returns (AR), t-test p values (P T-test) for COP 22, in 2016.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	1.26%	0.000***	-3.34%	0.000***	1.54%	0.000***	0.21%	0.481
-4	0.42%	0.221	1.04%	0.004***	1.76%	0.000***	0.50%	0.112
-3	-0.44%	0.037**	1.78%	0.002***	-0.92%	0.011**	2.20%	0.001***
-2	0.10%	0.661	-1.11%	0.000***	0.52%	0.008***	1.03%	0.021**
-1	-0.35%	0.043**	-2.30%	0.000***	0.77%	0.005***	-1.07%	0.033**
0	-0.19%	0.271	0.81%	0.008***	-0.48%	0.132	0.60%	0.017**
1	-0.40%	0.012**	1.96%	0.000***	0.01%	0.946	0.58%	0.010**
2	-0.04%	0.856	0.40%	0.315	1.58%	0.000***	0.08%	0.778
3	0.44%	0.010**	-0.18%	0.688	0.20%	0.375	-0.61%	0.005***
4	0.10%	0.565	-1.25%	0.000***	-0.34%	0.002***	0.46%	0.124
5	0.00%	0.992	0.46%	0.294	-0.50%	0.000***	0.72%	0.000***

* p < 0.10, ** p < 0.05, *** p < 0.01

Figure 6: CARs for COP22 based on CAPM model for each industry, five days before to five days after the event.



On the announcement day of the conclusions of COP 23, in Table 10, one can see that all industries have a positive reaction significant at the 10% level for the transport industry, at the

5% level for the Manufacturing industry, and 1% level for the mining and retail trade. The manufacturing sector sees steadily increasing CARs between days -5 and 1 before declining thereafter. The opposite is true for the mining industry which displays significantly negative ARs and decreasing CARs until day -1. In the following days, the ARs are still negative but on day 3, they suddenly increase to 1.94%. Green and brown firms in the transport sector both have very variable CARs though they mostly move in the same direction, with a sharp rise on the day of the event followed by a drop in ARs on the following days.

Table 10: Abnormal returns (AR), t-test p values (P T-test) for COP 23, in 2017.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	0.41%	0.046**	-0.11%	0.733	1.10%	0.000***	-0.56%	0.015**
-4	0.12%	0.598	-1.10%	0.000***	-0.85%	0.000***	-0.39%	0.051*
-3	-0.35%	0.121	-2.90%	0.000***	0.99%	0.002***	0.02%	0.918
-2	0.00%	0.986	-0.02%	0.939	0.82%	0.005***	0.13%	0.471
-1	0.28%	0.290	-1.13%	0.000***	0.60%	0.013**	-0.33%	0.045**
0	0.30%	0.037**	2.21%	0.000***	2.68%	0.000***	0.37%	0.061*
1	0.42%	0.136	-1.23%	0.000***	0.65%	0.004***	-0.05%	0.738
2	-0.11%	0.577	-0.33%	0.108	-1.68%	0.000***	-0.55%	0.001***
3	-0.21%	0.203	1.94%	0.000***	0.34%	0.086*	0.60%	0.006***
4	0.23%	0.124	-0.27%	0.282	-0.61%	0.000***	0.07%	0.537
5	-0.23%	0.323	-1.45%	0.000***	0.43%	0.026**	-0.13%	0.388

* p < 0.10, ** p < 0.05, *** p < 0.01

Figure 7: CARs for COP23 based on CAPM model for each industry, five days before to five days after the event.

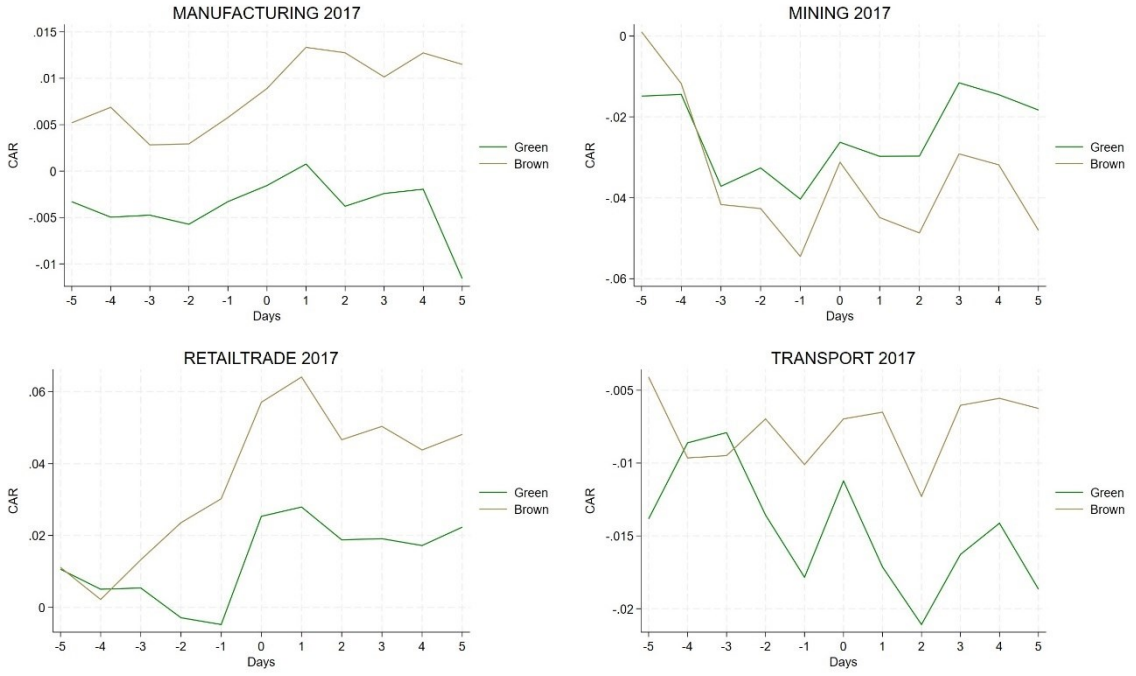


Table 11: Abnormal returns (AR), t-test p values (P T-test) for COP 24, in 2018.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	0.07%	0.806	2.79%	0.000***	-0.96%	0.013**	0.92%	0.000***
-4	-0.40%	0.099*	-3.29%	0.000***	-0.40%	0.072*	-0.58%	0.022**
-3	0.14%	0.475	0.02%	0.944	-0.37%	0.115	0.21%	0.203
-2	0.54%	0.002***	0.85%	0.031**	0.27%	0.177	0.10%	0.638
-1	-0.90%	0.001***	-1.03%	0.007***	-1.39%	0.000***	-0.65%	0.067**
0	0.40%	0.061*	-1.89%	0.000***	0.73%	0.001***	0.23%	0.440
1	0.19%	0.505	0.34%	0.403	0.15%	0.514	-0.83%	0.007***
2	0.22%	0.339	-1.49%	0.000***	0.48%	0.009***	-0.98%	0.003***
3	-0.21%	0.328	-1.23%	0.003***	-0.37%	0.046**	0.44%	0.028**
4	-0.02%	0.950	-0.12%	0.859	-0.54%	0.018**	0.36%	0.225
5	0.01%	0.982	0.08%	0.840	-0.63%	0.058*	0.22%	0.348

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11 shows that the COP24's ARs for manufacturing firms are positively significant on day -2, then become negative on day -1 and day 0, hinting at a potential anticipation. Moreover, after the event, from day 2 onwards, green stocks' CARs increase whereas brown ones decrease until the end of the event window. For the mining industry graph shown in Figure 8, one can see that despite significantly negative ARs on day -4, the green firms tend to overall increase their CARs throughout the window, whereas that of brown companies tend to decrease. Especially, the negative ARs for the mining industry in Table 11 are mostly integrated within brown firms and do not appear to impact green ones much. The retail sector has negative significant ARs on day -1 of -1.39% but is significantly positive again on the day of the event with a value of 0.73%. In the transport industry, green firms show positive CARs throughout the entire event window while those of brown companies are negative and decreasing. The industry shows no significance in ARs on the day of the event, although on days 1 and 2, they are significantly negative, meaning the industry may be reacting with a bit of delay.

Figure 8: CARs for COP24 based on CAPM model for each industry, five days before to five days after the event.

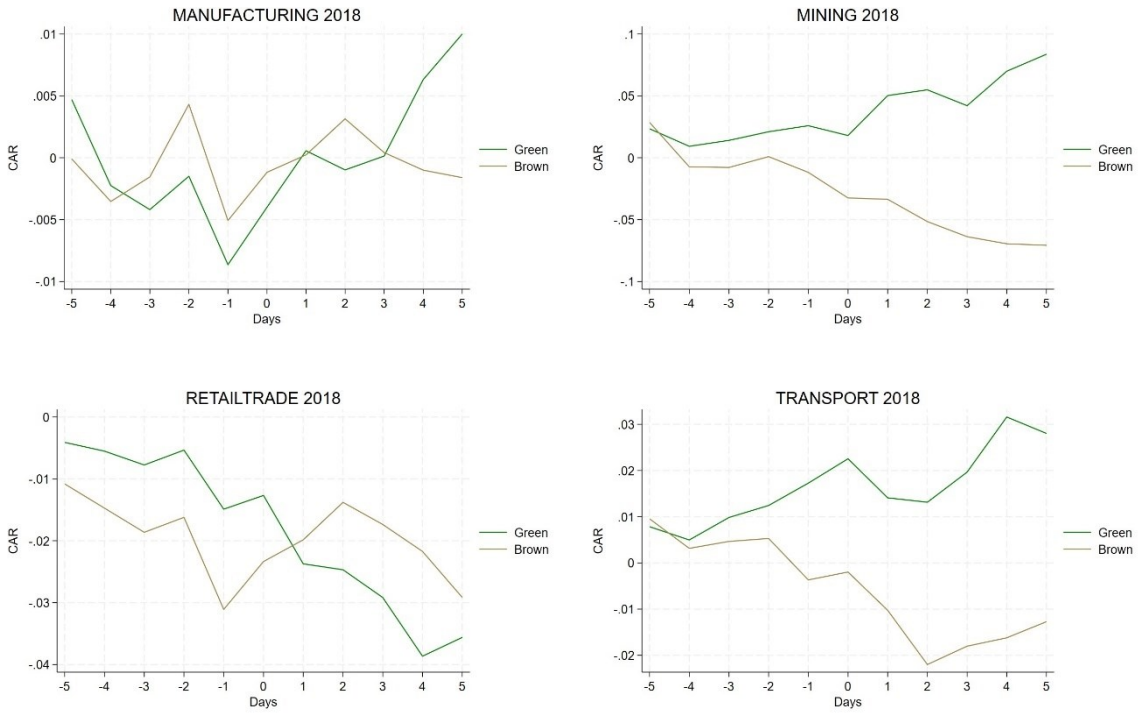


Table 12: Abnormal returns (AR), t-test p values (P T-test) for COP 25, in 2019.

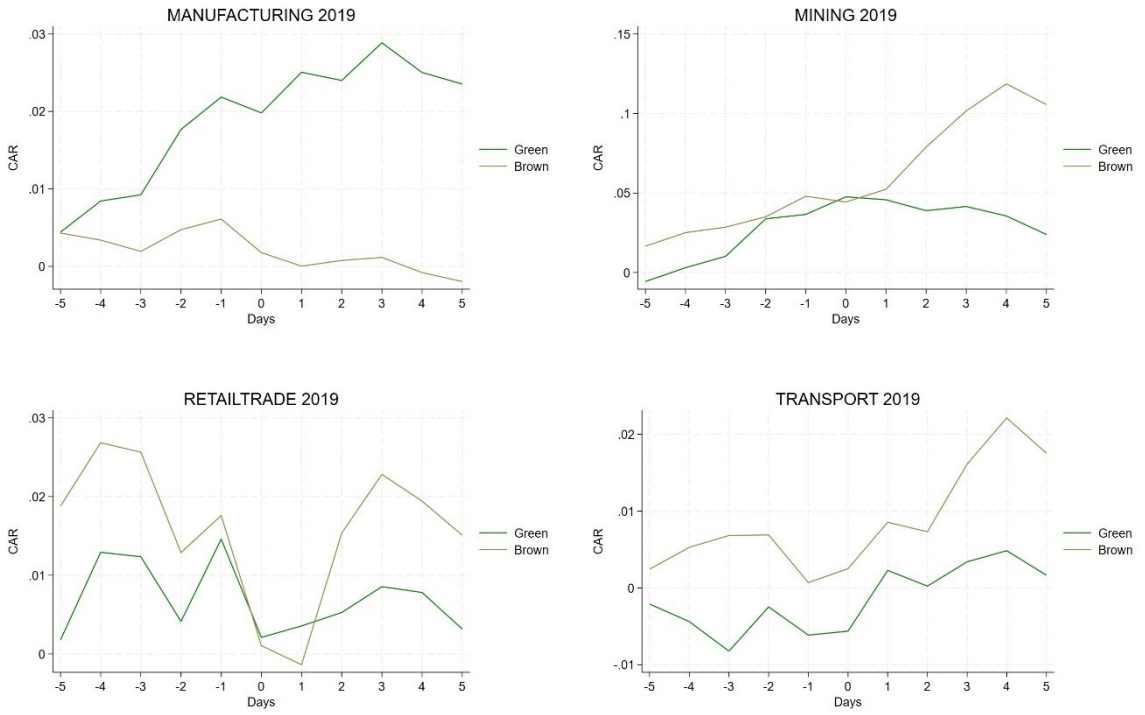
	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	0.07%	0.806	1.31%	0.015**	1.62%	0.009***	0.17%	0.272
-4	-0.40%	0.099*	0.86%	0.021**	0.87%	0.003***	0.20%	0.224
-3	0.14%	0.475	0.40%	0.068*	-0.14%	0.774	0.07%	0.697
-2	0.54%	0.002***	0.92%	0.006***	-1.20%	0.004***	0.10%	0.585
-1	-0.90%	0.001***	1.14%	0.011**	0.57%	0.032**	-0.58%	0.002***
0	0.40%	0.061*	-0.13%	0.727	-1.58%	0.000***	0.16%	0.458
1	0.19%	0.505	0.65%	0.141	-0.15%	0.692	0.63%	0.001***
2	0.22%	0.339	2.14%	0.002***	1.42%	0.000***	-0.14%	0.369
3	-0.21%	0.328	1.96%	0.000***	0.66%	0.001***	0.79%	0.000***
4	-0.02%	0.950	1.34%	0.007***	-0.31%	0.074**	0.53%	0.015**
5	0.01%	0.982	-1.28%	0.000***	-0.47%	0.019	-0.44%	0.022**

* p < 0.10, ** p < 0.05, *** p < 0.01

Table 12 shows the results for COP25, here one can see that the manufacturing industry shows growing CARs for green companies while browns ones are generally decreasing. Significant movements in ARs are also observed between day -2 and day 0. The ARs for mining stocks are mostly positive and significant between day -5 and 0. After the midpoint of the event window, brown mining firms keep on increasing CARs while green ones steadily decline. The retail industry is observed to have varying ARs, with a significantly negative value on the day of the

event, impacting both green and brow firms, which is followed by a significant increase in ARs and hence CARs. Brown firms perform better than green ones in the transport industry, though both see positively significant ARs in the days after the event.

Figure 9: CARs for COP25 based on CAPM model for each industry, five days before to five days after the event.



Looking at Table 13 and Figure 10 for COP26, the manufacturing industry showed positive and significant ARs on days -2 and -1. From day 0 onwards, the ARs become negative, though they are only significant on day 4. In the first two days of the event window, the mining industry shows significant positive ARs, that is until day -2 when the AR is significantly negative with a value of -1.43%. The value is positive again for day -1 at 1.64% but then falls significantly on the day of the event with ARs of -2.18%. Thereafter, the ARs remain negative yet significant and seem to impact brown firms more. The retail industry shows positive and significant returns on days -5 and -3, which are cut by a negatively significant AR of 0.59% on day -4. However, on day 0 it experiences a decrease in AR to 0.8% significant at the 1% level. Thereafter, ARs remain negative except for day 4 where they are positive with a value of 1.26%. In Table 13, one can see that the ARs for the transport industry are mostly positive between day -5 and day -1. After this, they are negative and significant for the rest of the event window, leading to a downward-slopping CAR line.

Figure 10: CARs for COP26 based on CAPM model for each industry, five days before to five days after the event.

Table 13: Abnormal returns (AR), t-test p values (P T-test) for COP 26, in 2021.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	0.16%	0.795	2.18%	0.000***	1.20%	0.000***	0.36%	0.239
-4	0.54%	0.133	1.64%	0.000***	-0.59%	0.044**	-0.10%	0.612
-3	-0.35%	0.321	0.31%	0.480	1.00%	0.000***	0.53%	0.002***
-2	0.55%	0.015**	-1.43%	0.004***	-0.42%	0.114	0.27%	0.192
-1	0.72%	0.011**	1.64%	0.000***	0.23%	0.448	-0.04%	0.858
0	-0.23%	0.237	-2.18%	0.000***	-0.80%	0.000***	-0.62%	0.000***
1	-0.13%	0.487	-0.61%	0.050*	0.24%	0.505	-0.30%	0.163
2	-0.34%	0.201	-2.14%	0.000***	-0.17%	0.536	-1.44%	0.000***
3	-0.25%	0.134	-0.93%	0.012**	-1.76%	0.000***	-0.37%	0.016**
4	-0.77%	0.000***	-1.55%	0.001***	1.26%	0.001***	-0.81%	0.000***
5	-0.30%	0.243	-3.73%	0.000***	-2.21%	0.000***	-0.42%	0.024**

* p < 0.10, ** p < 0.05, *** p < 0.01

Figure 11: CARs for COP27 based on CAPM model for each industry, five days before to five days after the event.

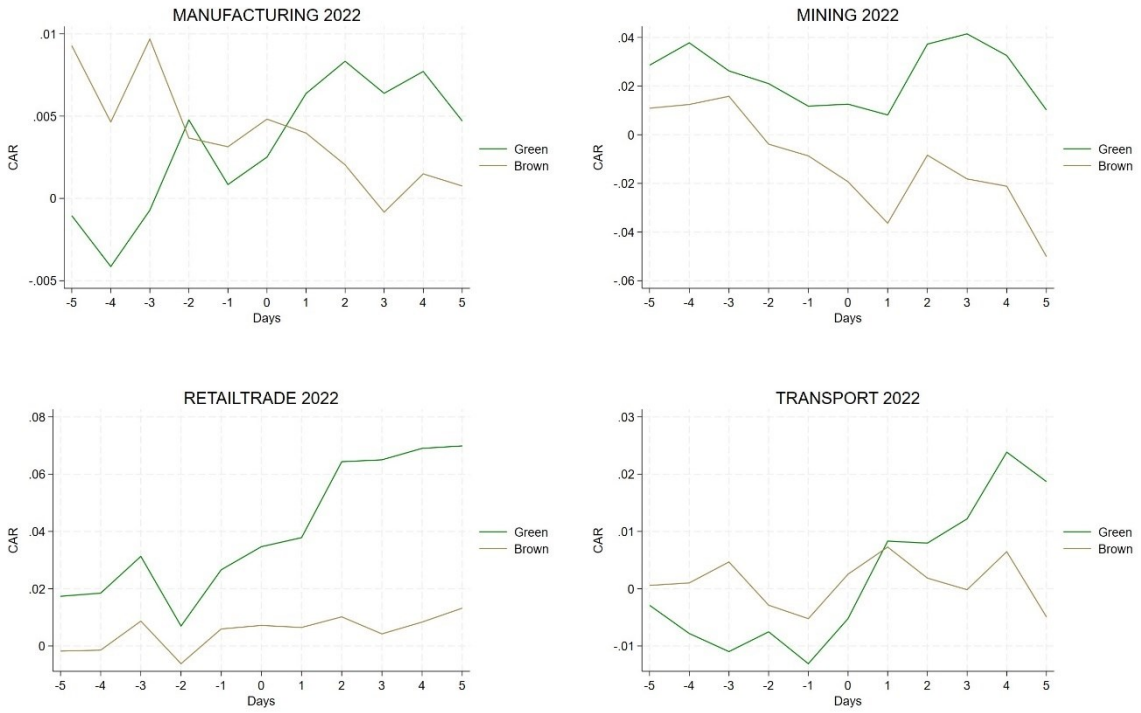


Table 14: Abnormal returns (AR), t-test p values (P T-test) for COP 27, in 2022.

	Manufacturing		Mining		Retail		Transport	
Days	AR	P T-test	AR	P T-test	AR	P T-test	AR	P T-test
-5	0.68%	0.094*	1.58%	0.001***	0.22%	0.552	-0.03%	0.905
-4	-0.43%	0.129	0.36%	0.284	0.01%	0.979	-0.09%	0.622
-3	0.47%	0.107	-0.07%	0.856	1.08%	0.000***	0.19%	0.296
-2	-0.33%	0.138	-1.57%	0.000***	-1.63%	0.000***	-0.47%	0.029**
-1	-0.13%	0.518	-0.60%	0.005***	1.33%	0.000***	-0.32%	0.203
0	0.17%	0.382	-0.75%	0.005***	0.25%	0.390	0.78%	0.000***
1	0.03%	0.903	-1.36%	0.000***	0.00%	0.991	0.70%	0.001***
2	-0.10%	0.695	2.83%	0.000***	0.85%	0.111	-0.41%	0.052*
3	-0.27%	0.107	-0.59%	0.075	-0.49%	0.039**	-0.04%	0.791
4	0.21%	0.115	-0.46%	0.139	0.39%	0.017**	0.79%	0.000***
5	-0.13%	0.453	-2.71%	0.000***	0.41%	0.038**	-0.98%	0.000***

* p < 0.10, ** p < 0.05, *** p < 0.01

The results of the last event, COP27, given in Table 14, show no significant abnormal returns for manufacturing firms aside for day -5 where the industry has ARs of 0.68% significant at the 10% significance level. The mining industry has positive and significant ARs of 1.58% on day -5, then from day -3 onwards, the ARs are negative and significant between days -2 and 1. On day 2, the ARs jump to 2.83% before decreasing again until the end of the event window. The retail trade industry sees a significant drop in ARs on day -2, although they increase again

through the rest of the event window. Lastly, the transport industry shows mostly negative ARs in the first part of the studied timeline, on days 0 and 1 however, its ARs are significantly positive. A drop down to 0.41% on day 2 precedes an increase in ARs and CARs in the last two days of the event window. When looking at Figure 11, it is also interesting to note that after the conclusion of this COP27 green firms are outperforming brown ones across each industry studied, this may imply that investors are investing more in green firms around that date.

4.2 Regression Results

Table 15: Regression with dummy variable for the event day with a lag of 5 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L5.rm	0.00565	-0.00157	-0.00157	-0.00157	-0.00157	-0.00157	-0.00157
	(0.0120)	(0.0123)	(0.0123)	(0.0123)	(0.0123)	(0.0123)	(0.0123)
L5.d0		-0.00168***	-0.00168***	-0.00168***	-0.00168***	-0.00168***	-0.00168***
		(0.000427)	(0.000427)	(0.000427)	(0.000427)	(0.000427)	(0.000427)
GrnD			-0.000129	-0.000133	-0.000142	0.000143	0.00185
			(0.00263)	(0.00262)	(0.00262)	(0.00265)	(0.00281)
Profit.				0.000532	0.000583	0.0000189	0.00380
				(0.0167)	(0.0167)	(0.0166)	(0.0170)
Leverage					0.0000427	0.0000678	0.000108
					(0.000298)	(0.000298)	(0.000299)
Liquidity						0.000996	0.000625
						(0.000899)	(0.000946)
Size							-0.00220**
							(0.000891)
_cons	0.000517	0.000797	0.000793	0.000773	0.000699	-0.00100	0.0139**
	(0.00233)	(0.00233)	(0.00233)	(0.00241)	(0.00243)	(0.00292)	(0.00703)
R^2	0.0437	0.0438	0.0438	0.0438	0.0438	0.0440	0.0453
N	29754	29754	29754	29754	29754	29754	29754

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

In Table 15, one can notice that the coefficients are insignificant and small. For instance, L5.rm, the proxy for the S&P 500 lagged by five days, only has a coefficient ranging between 0.00565 and 0.00157 percentage points, meaning that when the SP500 varies by 1%, will result in an increase in CAR of 0.00565% five days later and when analyzed with other variables that effect decreases to 0.00157. The dummy for the day of the event L5.d0, however, shows that there seems to be a significant negative effect on the dependent variable causing the CAR to decrease by 0.00165% on the event day. This implies a delay in the market's reaction 5 days after the day of the event.

Moreover, the dummy that accounts for green and brown firms, GrnD, is insignificant in all models. This implies that a firm being green does not affect the CAR. It is interesting to note, despite the insignificance of this coefficient, that a green firm seems to react negatively only when factoring in the profitability (ROA) and leverage of a firm, this tendency is then inverted when controlling for liquidity and size.

As for the rest of the control variables, their coefficients are mostly insignificant, hinting at the fact that neither the profitability nor the leverage or the liquidity of a firm influence the cumulative abnormal returns of their stock. Nonetheless, controlling a company's size proves to be significant. In this case, the negative coefficient of 0.00222 is significant at 5%. This is interesting as it means that with a 1% increase in a firm's size, the CAR decreased by 0.0022%, meaning larger firms are still suffering a slight decrease in CAR from the event day five days after it.

Table 16: Regression with dummy variable for the event day with a lag of 3 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L3.rm	-0.0940***	-0.0924***	-0.0924***	-0.0924***	-0.0924***	-0.0924***	-0.0924***
	(0.0175)	(0.0182)	(0.0182)	(0.0182)	(0.0182)	(0.0182)	(0.0182)
L3.d0		0.000375	0.000375	0.000375	0.000375	0.000375	0.000375
		(0.000370)	(0.000370)	(0.000370)	(0.000370)	(0.000370)	(0.000370)
GrnD			-0.000759	-0.000746	-0.000757	-0.000536	0.000916
			(0.00244)	(0.00244)	(0.00244)	(0.00247)	(0.00259)
Profit.				-0.00263	-0.00256	-0.00317	0.000108
				(0.0156)	(0.0156)	(0.0155)	(0.0158)
Leverage					0.0000612	0.0000810	0.000117
					(0.000267)	(0.000266)	(0.000267)
Liquidity						0.000881	0.000566
						(0.000855)	(0.000892)
Size							-0.00215**
							(0.000867)
_cons	0.00160	0.00156	0.00154	0.00164	0.00153	0.0000323	0.0145**
	(0.00206)	(0.00206)	(0.00207)	(0.00213)	(0.00216)	(0.00263)	(0.00672)
R^2	0.0394	0.0394	0.0394	0.0394	0.0394	0.0395	0.0406
N	39672	39672	39672	39672	39672	39672	39672

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

Table 16 presents a different picture. In this case, the market return has a strongly significant effect on the CAR three days after, with the effect of a 1% increase in the SP500 return decreasing it by 0.0940% when considered alone and 0.0924% when put in conjunction with other variables. When considering a lag of three days, the dummy variable for the day of the

event loses its significance and its coefficient drops to 0.00375%. This implies that three days after the event, there is no concluding evidence of a change in CAR if not for a slight positive effect. A similar point can be made for the dummy for green firms, its coefficient being insignificant in all models with values ranging from -0.000759 to 0.000916. Similarly, the variables for profitability, leverage, and liquidity have small and insignificant coefficients, meaning they only have a marginal effect on the dependent variable. Still, the variable for size, given by the natural logarithm of a firm assets displays an effect of -0.00215% on CAR, which is significant at the 5% confidence level. This finding points out once again not the fact that larger firms incur a larger negative effect than their smaller counterparts.

Looking at Table 17, all models lose statistical significance for the coefficients of the market index and the dummy for the event day when these variables are lagged by two days. This means the market reaction is not yet integrated after two days, just as would be the conclusions of the COPs when looking at the L2.d0 coefficient. In this case, I notice a slightly negative, though insignificant coefficient, indicating no substantial effect is measured two days after the event. For the remaining variables, GrnD and ROA also display negative coefficients, in contrast with leverage and liquidity control variables which are positive. The size control, however, remains significant at the 5% confidence level. This confirms the size effect, by which larger firms seem to see their cumulative abnormal returns decrease by a significant 0.00217% around the event date.

The results of Table 18 are akin to those shown in Table 15. Namely, the return for the S&P500 lagged by five days shows no sign of being statistically significant aside when looked at on its own in model 1 where it is slightly higher. Looking at the dummy for two days before the event, (this dummy was created based on the results of the event study, in which one can observe that CAR were significant 2 days before the event at a 1% significance level) we see a positive reaction when this variable is lagged by 5 days. This implies that there is a positive shock resulting in a 0.000992% increase in the CAR 2 days before the release of the COP's conclusions and that this shock is still being integrated into the stocks 5 days afterward, or two after the event date. Once again, controlling for green firms reveals no effect, implying that green firms do not react differently from brown ones aside from a slight insignificant variation depending on the other variables it is considered with. Unless analyzed in conjunction with liquidity and size, green stocks seem to incur a slightly negative effect on their CAR. Control variables also do not display major effects on the dependent variable, with coefficients

remaining insignificant and close to 0 aside for the Size variable, significant at the 1% significance level.

Table 17: Regression with dummy variable for the event day with a lag of 2 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L2.rm	0.0114	0.0102	0.0102	0.0102	0.0102	0.0102	0.0102
	(0.0130)	(0.0131)	(0.0131)	(0.0131)	(0.0131)	(0.0131)	(0.0131)
L2.d0		-0.000355	-0.000355	-0.000355	-0.000355	-0.000355	-0.000355
		(0.000373)	(0.000373)	(0.000373)	(0.000373)	(0.000373)	(0.000373)
GrnD			-0.00107	-0.00105	-0.00107	-0.000896	0.000504
			(0.00233)	(0.00233)	(0.00233)	(0.00235)	(0.00246)
Profit				-0.00378	-0.00367	-0.00419	-0.00101
				(0.0148)	(0.0148)	(0.0148)	(0.0150)
Leverage					0.0000857	0.000101	0.000136
					(0.000249)	(0.000248)	(0.000249)
Liquidity						0.000706	0.000403
						(0.000824)	(0.000857)
Size							-0.00217***
							(0.000841)
_cons	0.00172	0.00175	0.00173	0.00187	0.00172	0.000522	0.0152**
	(0.00193)	(0.00194)	(0.00194)	(0.00200)	(0.00203)	(0.00249)	(0.00650)
R^2	0.0378	0.0378	0.0378	0.0378	0.0378	0.0379	0.0390
N	44631	44631	44631	44631	44631	44631	44631

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

Table 18: Regression with dummy variable for 2 days prior to the event day with a lag of 5 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L5.rm	0.00565	0.00497	0.00497	0.00497	0.00497	0.00497	0.00497
	(0.0120)	(0.0120)	(0.0120)	(0.0120)	(0.0120)	(0.0120)	(0.0120)
L5.d-2		0.000992***	0.000992***	0.000992***	0.000992***	0.000992***	0.000992***
		(0.000267)	(0.000267)	(0.000267)	(0.000267)	(0.000267)	(0.000267)
GrnD			-0.000129	-0.000133	-0.000142	0.000143	0.00185
			(0.00263)	(0.00262)	(0.00262)	(0.00265)	(0.00281)
Profit				0.000533	0.000584	0.0000191	0.00380
				(0.0167)	(0.0167)	(0.0166)	(0.0170)
Leverage					0.0000427	0.0000678	0.000108
					(0.000298)	(0.000298)	(0.000299)
Liquidity						0.000996	0.000625
						(0.000899)	(0.000946)
Size							-0.00220**
							(0.000891)
_cons	0.000517	0.000352	0.000349	0.000329	0.000254	-0.00145	0.0134*
	(0.00233)	(0.00233)	(0.00233)	(0.00240)	(0.00243)	(0.00292)	(0.00703)
R^2	0.0437	0.0437	0.0437	0.0438	0.0438	0.0440	0.0452
N	29754	29754	29754	29754	29754	29754	29754

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

Table 19: Regression with dummy variable for 2 days prior to the event day with a lag of 3 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L3.rm	-0.0940***	-0.0943***	-0.0943***	-0.0943***	-0.0943***	-0.0943***	-0.0943***
	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0175)
L3.d-2		-0.000592**	-0.000592**	-0.000592**	-0.000592**	-0.000592**	-0.000592**
		(0.000279)	(0.000279)	(0.000279)	(0.000279)	(0.000279)	(0.000279)
GrnD			-0.000759	-0.000746	-0.000757	-0.000536	0.000916
			(0.00244)	(0.00244)	(0.00244)	(0.00247)	(0.00259)
Profit.				-0.00263	-0.00256	-0.00317	0.000108
				(0.0156)	(0.0156)	(0.0155)	(0.0158)
Leverage					0.0000612	0.0000810	0.000117
					(0.000267)	(0.000266)	(0.000267)
Liquidity						0.000881	0.000566
						(0.000855)	(0.000892)
Size							-0.00215**
							(0.000867)
_cons	0.00160	0.00168	0.00166	0.00176	0.00165	0.000150	0.0147**
	(0.00206)	(0.00206)	(0.00207)	(0.00213)	(0.00216)	(0.00262)	(0.00671)
R^2	0.0394	0.0394	0.0394	0.0394	0.0394	0.0395	0.0406
N	39672	39672	39672	39672	39672	39672	39672

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

Table 19 shows that the return of the S&P500 has a considerable influence on the CARs, implying that the returns of the market three days prior do have a negative effect on the CARs, decreasing them by about 0.094% for every % increase in the returns of the independent variable. Similarly, the dummy variable taking the value 1 two days before the event also displays a coefficient significant at 5%. This shows that there seems to be a negative shock, potentially due to anticipation of the announcement of the conclusions two days prior to the event, whose ripples are still observed three days later. The dummy for green firms is shown to have a negative effect on the CARs in most models, though it is insignificant. Profitability, leverage, and liquidity have very little effect on the CARs. Profitability, measured by ROA seems to decrease CARs as it increases, unless when considered with size where the effect switches to positive, though these effects are too small to be considered. Similar conclusions can be drawn for leverage and liquidity while size is an important factor with a 5% significance level, implying that a 1% increase in the size of a company decreases the CARs by 0.00215%.

Table 20: Regression with dummy variable for 2 days prior to the event day with a lag of 2 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L2.rm	0.0114	0.0114	0.0114	0.0114	0.0114	0.0114	0.0114
	(0.0130)	(0.0130)	(0.0130)	(0.0130)	(0.0130)	(0.0130)	(0.0130)
L2.d-2		-0.000337	-0.000337	-0.000337	-0.000337	-0.000337	-0.000337
		(0.000331)	(0.000331)	(0.000331)	(0.000331)	(0.000331)	(0.000331)
GrnD			-0.00107	-0.00105	-0.00107	-0.000896	0.000504
			(0.00233)	(0.00233)	(0.00233)	(0.00235)	(0.00246)
Profit.				-0.00378	-0.00367	-0.00419	-0.00101
				(0.0148)	(0.0148)	(0.0148)	(0.0150)
Leverage					0.0000857	0.000101	0.000136
					(0.000249)	(0.000248)	(0.000249)
Liquidity						0.000706	0.000403
						(0.000824)	(0.000857)
Size							-0.00217***
							(0.000841)
_cons	0.00172	0.00176	0.00173	0.00187	0.00172	0.000523	0.0152**
	(0.00193)	(0.00193)	(0.00194)	(0.00200)	(0.00203)	(0.00248)	(0.00650)
R^2	0.0378	0.0378	0.0378	0.0378	0.0378	0.0379	0.0390
N	44631	44631	44631	44631	44631	44631	44631

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

When considering a lag of two days, all coefficients previously significant become irrelevant and the effect from the market as well as that of an anticipated shock two days prior faint. Meanwhile, the coefficient for the control variables also remains insignificant except for Size which displays again a negative effect of -0.00217% on the CAR with a 5% significance level.

When analyzing the results from Table 21, the coefficients for the market return are positive across all models but not statistically significant, implying that CARs are not significantly impacted by past market performance. Looking at the dummy variable controlling for a potential shock three days before the event, the coefficients are not statistically significant and remain constant across models indicating there is no significant shock three days prior to the event, nor does it carry any influence five days later. Profitability also plays little to no role in influencing CARs. Likewise, leverage and liquidity have also proven not to affect the dependent variable significantly. That is unlike the size variable which remains relevant at the 5% significance level.

Table 21: Regression with dummy variable for 3 days prior to the event with a lag of 5 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L5.rm	0.00565	0.00732	0.00732	0.00732	0.00732	0.00732	0.00732
	(0.0120)	(0.0125)	(0.0125)	(0.0125)	(0.0125)	(0.0125)	(0.0125)
L5.d_3		0.000251	0.000251	0.000251	0.000251	0.000251	0.000251
		(0.000284)	(0.000284)	(0.000284)	(0.000284)	(0.000284)	(0.000284)
GrnD			-0.000129	-0.000133	-0.000142	0.000143	0.00185
			(0.00263)	(0.00262)	(0.00262)	(0.00265)	(0.00281)
Profit.				0.000533	0.000584	0.0000192	0.00380
				(0.0167)	(0.0167)	(0.0166)	(0.0170)
Leverage					0.0000427	0.0000678	0.000108
					(0.000298)	(0.000298)	(0.000299)
Liquidity						0.000996	0.000625
						(0.000899)	(0.000946)
Size							-0.00220**
							(0.000891)
_cons	0.000517	0.000476	0.000473	0.000452	0.000378	-0.00132	0.0136*
	(0.00233)	(0.00233)	(0.00233)	(0.00240)	(0.00243)	(0.00292)	(0.00703)
R^2	0.0437	0.0437	0.0437	0.0437	0.0437	0.0439	0.0452
N	29754	29754	29754	29754	29754	29754	29754

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

Table 22: Regression with dummy variable for 3 days prior to the event day with a lag of 3 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L3.rm	-0.0940***	-0.0967***	-0.0967***	-0.0967***	-0.0967***	-0.0967***	-0.0967***
	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0175)
L3.d_3		-0.000433	-0.000433	-0.000433	-0.000433	-0.000433	-0.000433
		(0.000346)	(0.000346)	(0.000346)	(0.000346)	(0.000346)	(0.000346)
GrnD			-0.000759	-0.000746	-0.000757	-0.000536	0.000916
			(0.00244)	(0.00244)	(0.00244)	(0.00247)	(0.00259)
Profit.				-0.00263	-0.00256	-0.00317	0.000108
				(0.0156)	(0.0156)	(0.0155)	(0.0158)
Leverage					0.0000612	0.0000810	0.000117
					(0.000267)	(0.000266)	(0.000267)
Liquidity						0.000881	0.000566
						(0.000855)	(0.000892)
Size							-0.00215**
							(0.000867)
_cons	0.00160	0.00165	0.00163	0.00173	0.00163	0.000127	0.0146**
	(0.00206)	(0.00206)	(0.00207)	(0.00213)	(0.00216)	(0.00262)	(0.00672)
R^2	0.0394	0.0394	0.0394	0.0394	0.0394	0.0395	0.0406
N	39672	39672	39672	39672	39672	39672	39672

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

In the case of Table 22, the past market returns do seem to influence the CAR notably at the 1% statistical significance level. This implies that the CAR decreased by 0.094% (in model 1) or 0.0967% (in other models) when the S&P500 increased by 1% three days prior. This hints at a slight delay in the reaction to the market movements. The dummy variable taking 1 three days prior to the event and lagged by three days also proved to be insignificant in all seven models. The profitability, leverage, and liquidity of the companies also do not impact their CAR too much, or at least not in any significant proportion. Size is again the most significant predictor, with a coefficient of -0.00215 displaying a significance level of 5%. This shows again that larger firms tend to have more negative effects than small ones.

Table 23 shows that with only two days of lag, the market's return does not impact the CAR at all. The rest of the variables also do not have any impact, except for size which, this time is significant at the 1% level. This conclusively confirms that larger companies struggle more around the dates of the events, with a 1% increase in fir size leading its CAR to decrease by 0,00217%.

Table 23: Regression with dummy variable for 3 days prior to the event day with a lag of 2 days

	(1) CAR	(2) CAR	(3) CAR	(4) CAR	(5) CAR	(6) CAR	(7) CAR
L2.rm	0.0114	0.0117	0.0117	0.0117	0.0117	0.0117	0.0117
	(0.0130)	(0.0132)	(0.0132)	(0.0132)	(0.0132)	(0.0132)	(0.0132)
L2.d_3		0.0000472	0.0000472	0.0000472	0.0000472	0.0000472	0.0000472
		(0.000404)	(0.000404)	(0.000404)	(0.000404)	(0.000404)	(0.000404)
Grnd			-0.00107	-0.00105	-0.00107	-0.000896	0.000504
			(0.00233)	(0.00233)	(0.00233)	(0.00235)	(0.00246)
Profit.				-0.00378	-0.00367	-0.00419	-0.00101
				(0.0148)	(0.0148)	(0.0148)	(0.0150)
Leverage					0.0000857	0.000101	0.000136
					(0.000249)	(0.000248)	(0.000249)
Liquidity						0.000706	0.000403
						(0.000824)	(0.000857)
Size							-0.00217***
							(0.000841)
Cons.	0.00172	0.00171	0.00169	0.00183	0.00168	0.000482	0.0151**
	(0.00193)	(0.00194)	(0.00194)	(0.00200)	(0.00203)	(0.00248)	(0.00650)
R^2	0.0378	0.0378	0.0378	0.0378	0.0378	0.0379	0.0390
N	44631	44631	44631	44631	44631	44631	44631

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

As for observations common to all these sixty-three models, I notice that when the lag is five days, the explanatory power of the models is highest. That is, all 21 models where the market return and the day dummy variable are lagged by five days display R^2 between 0.0437 and 0.0453 (Tables 15, 18, 21). When decreasing the lag, however, the R^2 drops by around 40 basis points when the lag is three days and by a further 16 basis points when the lag is two days. This would show that the companies studied in the sample take a few days to integrate the information arising from the market as well as that from the shocks in the event window.

5. Discussion

This paper aims at discussing the research question: "How do companies react to the conclusions of the conference of the Parties, and how do these reactions differ between green and brown firms?"

From the event study, we learned that some of the events examined show statistical significance. I found that the Paris Agreement (COP21) had a mostly negative impact on the markets, which contradicts the findings from Antoniuk and Leirvik (2021) who saw a positive effect in the markets after the announcements. My findings, however, are akin to those of Birindelli and Chiappini (2021) who find that the asset values of U.S. and European firms decreased around the days of COP 21. Furthermore, my analysis demonstrated that COP19, COP22, COP24, and COP26 did have significantly negative abnormal returns on the day before the event, implying that there is an anticipation effect the day before the event as investors expect the conclusions of these events to negatively impact the markets. Interestingly however, COP23 showed an opposite reaction with significantly positive abnormal returns on the day of the event implying that the event was positively received by investors. However, there may also be confounding events that could have spurred a positive market reaction.

In most events studied, the mining industry displays quite strong reactions, often showing a downward-sloping CAR line. This would imply that this industry is significantly hampered by these conferences. Yet, this should come as no surprise given that it is one of the most polluting industries in the world, as it is constituted of firms extracting minerals and petroleum and whose prime activities are highly polluting. Hence, this result would also be congruent with the findings of Sun et al. (2018) who showed that the mining industry is highly sensitive to climate change risks in both positive and negative ways.

Furthermore, in the first years being studied, there is a visible trend in which brown firms tend to outperform green ones. However, in the most recent years, green firms are visibly stronger after the event, displaying higher CARS, this was especially noticeable within COP27. These findings would imply that in recent years, investors have been increasingly willing to invest in green stocks as they are less likely to be impacted by changes in climate-related policies. Nonetheless, this is to be taken with caution as the results from the regression analysis showed that in general, a firm being green, or brown has very little influence on the CARs when looking at the entirety of the sample. The trend of seeing brown firms performing better than green ones is congruent with the findings of Bolton and Kacperczyk (2021). They find that due to their

higher exposure, investors of brown firms tend to require a higher return to compensate for accrued risks.

Another interesting finding revealed in the regression analysis is the role of a firm's size in the reactions. My models have consistently shown that, as a firm is larger, based on its asset base, it will have a more negative reaction to the announcements. This could be due to investors seeing large firms as logically more polluting due to their larger size. This is a crucial finding for managers, as larger firms may have to adopt more preemptive environmental strategies if they want to mitigate negative reactions.

The regressions also showed that there is the presence of a delay in the reactions to the events. That is when considering days -3 -2 and 0, with the former two capturing the anticipation of the COPs conclusions and day 0 being that very shock, the results revealed that the effect occurring on these days was still impacting the market 3 and 5 days afterward but did not show impact when considering 2 days of lag. This would imply that it takes at least three days for investors and companies to fully understand the implications.

5.1 Limitations and Future Research

After applying a randomization procedure to my initial sample, it was further shrunk due to missing data or missing observations. This lack of observations was also the cause as to why I had to omit industries for the event study. Perhaps additional data for those industries may uncover certain patterns of reaction among them. For instance, given that the agricultural, construction, service, and wholesale industries are highly polluting, my sample of firms counted only a few green firms. Nevertheless, with more data points for those green firms, I may have found interesting reactions and the resulting implications specific to those industries. Hence, future research could expand my findings by replicating a similar study with a larger sample. Moreover, further analyses could focus on expanding this study to other regions of the world, for instance, by focusing on the European, or Asian markets.

The event window would also be a limitation. Although the one taken in this study does give a decent amount of information in the short term, I do believe that studying the same events over a longer term would be beneficial. Especially after the event, once companies and investors understand how the policies resulting from the COPS will affect the market, industries, and firms. It would therefore be wise, in future research, to investigate those events with an event

window starting 10 days prior and ending 20 days after each event. This could help to further understand how the market reacts to those events.

It is important to mention that there may be confounding events happening simultaneously in the market at the time of the event. These simultaneous occurrences may falsify the results of my analysis. Thus, future research should produce an extensive review of other events happening around the studied dates, which would allow for more precise results and implications.

Moreover, it would be interesting to look exactly at what aspects of climate change are targeted by each COP. That is certain years may be targeting certain aspects of climate change that will impact one industry more than another. Further research could focus on classifying the conclusions and reporting their impact in a more precise manner.

As a last limitation, the classification between green and brown firms is never fully clear. My study used the Environmental ESG score from Refinitiv Eikon, with companies in the 75th percentile or higher being considered as green. Future research could look into different ways to classify green and brown companies, perhaps they could do so by creating an index that accounts for other types of emissions or assessments of a company's innovations.

6. Conclusion

This paper attempted to find out how the market reacts to the conclusions of the last 11 COPs, with a particular focus on distinguishing the different responses of green and brown stocks. This was done through an event study over a period of 11 days for each event and multiple regression analyses based on the same data. My findings show a nuanced picture of the relationship between environmental events and a firm's performance on the stock market.

The event study showed statistically significant shocks in the market associated with the conclusions of the COP themselves, while other events showed evidence of anticipation. This suggests that investors do adjust their expectations of the outcomes of such events even after they take place.

Analyzing each industry separately, revealed that the mining industry, known to be a polluting sector, was shown to consistently react negatively to the concluding day of the COPs. This observation shows that heavily polluting industries are sensitive to environmental policy changes. Moreover, when looking at the evolution of these reactions over the years, I find that green companies have begun to perform better than brown firms in more recent years. This brings hope that investors' preferences are shifting to a higher willingness to invest in sustainable business. However, this finding was lessened by the regression analysis which revealed no significant influence of the green versus brown classification on the CARs. I also find that firm size plays an important role in predicting CARs. Larger firms, regardless of their greenness, tend to react more negatively to COP conclusions. This indicates that large firms are somewhat more vulnerable to changes in environmental policy.

Lastly, this study contributes to closing the gap in the literature by shedding light on the market reactions to environmental policy changes in an international context. The findings previously discussed highlight the need for further investments in green companies to ensure a future that is respectful of the environment in which future generations will evolve. Although this paper provides insights to be used by investors, companies, and policymakers, much is still to be researched in the field of green policy announcements and their effects on the stock market. To address this, researchers could evaluate the same events, with a larger sample size, making sure to have an even distribution across industries. Moreover, they could focus on a larger event window, allowing them to uncover implications in the longer term. Most importantly, however, they should investigate potential confounding events that may distort the effects of the COPs.

Appendix

Appendix 1a. Breusch Pagan Lagrange multiplier test for OLS regression

CAR	Var	SD = sqrt(Var)
CAR	.0046665	.0683118
e	. 0041896	.0647274
u	.0002713	.0164704

Test: Var(u) = 0
Chi^2 = 3272.63
Prob > Chi^2 = 0.0000

Appendix 1.b : Hausmann test for OLS regression

	(b)	(B)	Difference
	RE	FE	(b - B)
GrnD	.0018517	.0010659	.0007858
L5.rm	-.0015688	.2992856	-.3008544
L5.d0	-.0016753	-.0010215	-.0006538
Profit	.0038042	-.0072988	.011103
Leverage	.0001081	.0001151	-7.03e-06
Liquidity	.0006247	.0005803	.0000444
Size	-.0021963	-.0003942	-.0018021

b = Consistent under H0 and Ha; obtained from xtreg.
B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic
Chi^2 (7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 487.49
Prob > Chi^2 = 0.0000
(V_b-V_B is not positive definite)

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