



Analysis of environmental and social responsibility events and their impact in oil companies performance.

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Abstract

This paper examines how an environmental and social event can impact the performance of oil companies, using the event study methodology. The market efficiency, in its semistrong form, is tested by assuming that all publicly information referred to environmental and social responsibility is reflected in asset prices, through damages to reputation or imposed fines for the accidents.

A qualitative analysis is performed in order to evaluate the conditions that the capital markets uses this information, or not, to pricing assets.

The analysis of the eight events demonstrated that only two of them presented the expected result, in other words, these two cases had a significant and negative impact due to the negative event.

The other cases presented a significant impact as well, but in a positive way. This is contrary to the expected result. For these events, an additional research was made, in order to investigate the causes for this occurrence. Each of these cases presented a different context that could explain the reasons for positive impact, such as governmental agencies punishment for the companies, exogenous events or even a potential strategy for positive information publication in order to neutralize negative impacts caused by the environmental or social damages.

Keywords: Event Study, Corporate Social Responsibility, Corporate Finance.

1. Corporate Social Responsibility and Corporate Sustainability: considerations about Oil Sector

Since Brundtland Report, issued in 1987, many companies have applied sustainability concepts in production, processes, and structures and mainly in their strategies (Porter and Kramer, 2002). The concept of Sustainable Development is basically referred as a humanity ambition for development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987), but many companies have been part of this process when they are aiming their own sustainability. So, Sustainability and Corporate Social Responsibility are primary concepts for long term business (Almeida, 2002).

Sustainability concept should not be restricted to environmental issues, as well as social responsibility is not only related to social actions or investments in social projects (Maimon, 1996). Corporate Social Responsibility corresponds to understand and respond to this new demand of the society, showing that the companies’ value added can be reflected as benefits not only for their shareholders, but also for their stakeholders, causing a positive impact for the parties affected by companies’ activities, such as employees, suppliers, clients, environmental and communities, through respecting their own cultures and acting in an transparent and ethical way. A company that looks for a long term business should adopt a strategy that considers the **triple bottom line**, or the three dimensions of sustainability: economical, social and environmental (Almeida, 2002).

From a strategic point of view, literature argues that sustainability and social responsibility expenditures should be considered as investments, not costs (Almeida, 2002). Considering this argument, many studies have been proposed in order to analyze the real impact of sustainability and corporate social responsibility issues in companies financial performance.

The research questions that drive this study are: how negative events associated to weak social and environmental management affect the companies’ asset prices? What are the conditions that companies can be penalized (or not) for their negative environmental and social impacts through reduction in their financial results?

This study identifies some cases linked to environmental and social damages caused by oil companies and checks how their asset prices have changed after the spread of relevant news related to the negative occurrence. In this way, environmental and social responsibility will be considered as Social Responsibility and Sustainability.

To respond to these questions, an event study was applied to oil companies. A specific sector was chosen to control external and relevant influence. The social and environmental scope can be limited by: environmental regulation degree, media and some specific stakeholders’ scrutiny degree, environmental standards and common practices for environmental management (Sharma and Vredenburg, 1998). For general scope, external influence can be limited by companies’ size, relevant economic factors (such as oil prices) and sector regulation. The oil sector was selected because the those companies have been involved in relevant and well known events, such as oil spills, explosions, fire and even political conflicts. This means that environmental and social risks are present in all their value chain, since upstream activities (exploration and extraction) until downstream activities (production, refine and distribution). The distribution activity considers product transportation, mainly oil products, and is responsible for significant maritime accidents, due to spills and leakages. Exploration and extraction processes, as well as production and refine, are responsible for social and environmental incidents due to their high level of atmospheric emissions (pollutants that cause damages in local communities and pollutants that contribute to global warming), liquid and solid emissions that cause soil and water contamination. Another

relevant issue is the natural resource exploitation, petroleum, which is non renewable natural resource, thus finite..

The choice of this sector also allowed the selection of listed companies, which is important to collect data (asset prices) from New York Stock Exchange and Bovespa. Besides, these big companies usually have worldwide operations and present higher communication influence of relevant events considered in this study.

The research proposition is that: if capital market responds to negative impacts caused by weak social and environmental management, so capital market can be considered efficient. In other words, bad news related to social and environmental negative impacts are considered by capital markets through negative asset pricing as well. It is also possible to suppose the contrary, from well being point of view; companies still need to consider social and environmental impacts in their actions and strategies.

2. Social and Environmental Responsibility and Performance

Empirical evidence is still limited in considering facts that can influence social and environmental actions adopted by companies and also to illustrate how corporate social responsibility issues affect financial performance.

According to Melo Neto and Froes (apud Guedes, 2000), possible benefits from corporate social responsibility can be “institutional social return”. Return, in this case, is built from image and selling benefits through strengthening and fidelity to brand and product. Other gains can be reflect in increased value among stakeholders, marketing return from spontaneous media, taxes reduction, productivity increase, employees satisfaction and social benefits for society (Guedes, 2000). For environmental point of view, return can be measured by eco-efficiency and cost reduction (Almeida, 2002).

Nevertheless, some empirical research has showed that there is not a significant relationship between corporate social responsibility and business performance. McWilliams and Siegel (2000) alleged that data inconsistency can be explained by problems related to empirical analysis. The authors mentioned that some studies present a positive, negative or neutral relationship between social and environmental performance and financial performance (Abowld et. al, 1990; Warrell et. al, 1991; Clinebell and Clinebell, 1994; Posnikoff, 1997; Wright and Ferris, 1997; Teoh et. al, 1999). These divergent results can be explained by wrong definition of some control variables, such as exclusion of Research and Development. This factor can be relevant for some companies’ performance. The authors mentioned also two methodologies applied: event study that financial impacts are analyzed in the short term (abnormal returns) when companies are socially engaged; and studies that evaluate the nature of relationship between corporate social responsibility indicator and financial result in the long term, through account or yield indicators. Cochram and Wood (1984) present methodological failure in some studies, such as small samples and short period.

The concept of corporate social responsibility is very wide, so Aupperle, Carroll and Hatfield (1985) identified difficulties when defining reliable indicators. Still, there are difficulties in defining if corporate social responsibility actions really impact positively companies’ performance, in terms of increased yield and growth.

The approach used by Abbot and Monsen (1979) was to explore indicators used by 500 Fortune companies: social accountability, reputational level and corporate publication. The authors mentioned that environmental issues are still the main focus of these companies.

Some economic evidences were found, as increased reputational capital (Machado, 2002). There are some studies about the optimum level of social responsibility actions. According to McWilliams and Siegel (apud Machado, 2002), companies maximize profit when marginal increased income resulted from corporate social responsibility actions is equal to the highest resource costs used to apply these actions. It is a cost-benefit analysis. Literature indicates other studies that showed, under specific conditions and limitations, that corporate social responsibility actions can positively impact financial performance, defining specific hypothesis. Stakeholders Theory, proposed by Freeman (2004), assumes that values are part of business and for value creation, it is necessary to know stakeholders needs. Clarkson (1995) considered social and environmental stakeholders needs in a research, during 10 years (from 1983 to 1993), and proposed a methodology to analyze and evaluate corporate social responsibility performance, through a structure for stakeholders relationship. According to this model, companies' economic and social purpose is to create value and wealth to their stakeholders at all, not only for their shareholders. The author proposed wealth and value added indicators not only related to income and profit to their shareholders, but to stakeholders involved in companies' activities as well.

3. How to measure the impact? Market efficiency and its implication for social and environmental responsibility.

A crucial concept for this study is related to market efficiency. According to Haugen (1997):

“If new information related to a company is known, how fast capital markets participants will absorb this new information and then will act through buying and selling assets of this company? How fast asset prices will adjust, reflecting completely this new information? If asset prices respond quickly to all relevant information, so capital market can be considered efficient.” (Haugen, 1997, p. 641).

According to Haugen (1997), it is possible to measure market efficiency through available information and how this reflects companies' asset pricing. There are three types of market efficiency. These types were previously proposed by Fama (1970) and for each one it is assumed that different information available reflect asset prices.

Market efficiency hypothesis in a weak form: asset prices reflect any historical past price series information.

Market efficiency hypothesis in a semistrong form: it is supposed that all publicly information will reflect asset prices. Includes all publicly past price series information, as well as financial reports, competitors reports, economic reports and any other relevant publicly information.

Market efficiency hypothesis in a strong form: all information is reflected in asset prices. Includes publicly and private information (insider information).

The hypothesis to be tested in this study is that if market is efficient, in a semistrong form, so all publicly information should reflect asset prices, including social and environmental impacts. In addition, if public information is available for capital markets, allowing then to discipline companies' behavior, so their market value (or asset prices) should reflect accordingly all information, when some negative event related to social and environmental issues occurs. If a company is punished (through imposed fines or restrictions to operations), or even subject to a reputational damage (through clients or consumers retaliation), so asset prices should decrease.

In this study, market efficiency hypothesis – public information related to social and environmental damage caused by oil companies affect their asset prices – will be tested through considerations that companies will be punished when negative impacts occur (through reputation loss or imposed fines). It will be possible to verify if social and environmental responsibility actions are considered by capital markets and if negative events

have a negative impact in asset prices, inducing companies to adopt good practices. A similar study proposed by Godfrey, Merrill and Hansen (2008) used 178 negative events related to legal and regulatory actions during 1993 to 2003. The objective of this study was to analyze if, when companies adopt corporate social responsibility good practices, their market value will be, under specific conditions, “protected” when negative events occur.

4. Data and Methods

This study used data collected from companies’ reports, independent parties’ reports, as well as non-governmental and governmental public information. Asset prices series were collected from DataStream.

4.1 Data

Events information was collected from reports issued by oil companies and non-governmental and governmental reports from United States, France and United Kingdom. The reports were consulted: non-governmental organization reports: *Friends of the Earth (Behind the Shine – The other Shell report 2003, Lessons not learned – the other Shell Report 2004, Use your profit to clean up your mess 2007, Some common concerns 2002, The Erika Oil Spill 2000)*, from American non-governmental organization: *US Public Interest Research Group (Dirty Four: The case against letting BP Amoco, ExxonMobil, Chevron and Phillips Oil Drill in the Arctic Refuge, 2001)*, from American governmental report: *National Transportation Safety Board (Pipeline special investigation report – Evaluation of accident data and Federal oversight of oil product pipelines)*, from non-governmental organization *The International Tanker Owners Pollution Federation Ltd.*, and oil companies websites, local websites as *Ambiente Brasil* and transport and environmental department websites from countries involved in the researched accidents.

Based on this research, it was prepared a list that contains the events related to social and environmental damages described in these reports. It is important to note that all these events were publicly available, through newspapers or internet, in order to test market efficiency latter. The events listed considered, besides environmental and social negative impacts, imposed fines to these companies.

From the events listed, 12 events were randomly selected, based on the stratification: 4 cases from American companies, 4 cases from European companies and 4 cases from Petrobras (Brazilian company). This stratification looks for a better country diversification. It was checked the exactly date of public available information for these 12 events, in order to define latter the event date for event study.

Few cases were selected because a qualitative analysis will be made after econometric study. Each occurrence will be evaluated, in order to check under what conditions the negative impact affected asset prices of involved companies.

The detailed analysis of these conditions is important to identify the circumstances capital markets use corporate social responsibility information to price assets of oil companies listed in this study.

Table 1 identifies randomly selected cases from complete list of environmental and social accidents (negative events).

Table 1. Randomly selected cases to econometric analysis: social and environmental accidents from oil companies.

Selected cases
American companies

Company	Location	Type	Occurrence date
1 Exxon	Australia	Explosion	09/25/1998
2 Chevron	California	Fine	08/23/2000
3 Chevron	Gulf of Mexico	Oil spill	10/04/1998
4 Chevron	Nigeria	Political conflict	05/28/1998

European companies			
Company	Location	Type	Occurrence date
1 Shell	Vila Carioca	Justice notification	04/02/2004
2 BP	Prudhoe Bay	Lubricant leakage	03/06/2001
3 BP	Indiana	Fine	01/18/2001
4 Shell	Ogoniland	Fire	08/14/2006

Empresa brasileira			
Company	Location	Type	Occurrence date
1 Petrobras	São Sebastião	Leakage	11/07/2000
2 Petrobras	Curitiba	Leakage	02/16/2001
3 Petrobras	Rio de Janeiro	Explosion	03/15/2001
4 Petrobras	Bahia	Fine	08/11/2001

After cases selection, price series were collected, as well as oil price series, from DataStream database. The event study proposed in this study requires price series from a specific time series. In this case, the methodology applied requires price series from at least two years before the event date and at least 60 days after event date. Oil price series were used to estimate normal return.

BP – British Oil was excluded from selection, because the criterion for time series was not attended. It was not possible to collect, from DataStream database, two years price series before event dates. Chevron case, from 10/04/1998 and Petrobras, from 08/11/2001, were also excluded from selection, because these two cases presented failures during E-Views program execution. In these cases, price series after event date were not completed, causing problems during regression analysis.

It was considered that the eight cases were enough for this study analysis, once the objective of this it to verify how negative impact can affect asset prices and how these impacts can change depending on specific characteristics evolving the cases selected. For a more detailed analysis of this mechanism, the quantity of cases was restricted, in order to prepare a deeply study of each case. So, this study includes quantitative analysis – from event study and its econometric analysis combined to qualitative analysis – from a detailed research of these cases.

4.2 Qualitative analysis

The objective of an event study is to check the existence, or not, of a significant reaction from financial market when a specific event occurs, that can affect asset prices of the company involved in the event (Campbell, Lo e MacKinlay, 1997).

This type of study is very important to test the hypothesis of financial markets efficiency, analyzing that the asset prices will immediately reflect the event occurrence. (MacKinlay, 1997). Specifically in this study, the hypothesis to be tested is the market efficiency in a semistrong form, associated to the hypothesis that there are damages (reputational or from imposed fines), when companies are involved in negative social and environmental accidents.

Campbell, Lo e MacKinlay (1997) proposed 7 steps to prepare an event study:

Event definition

Selection criteria

Normal and abnormal returns

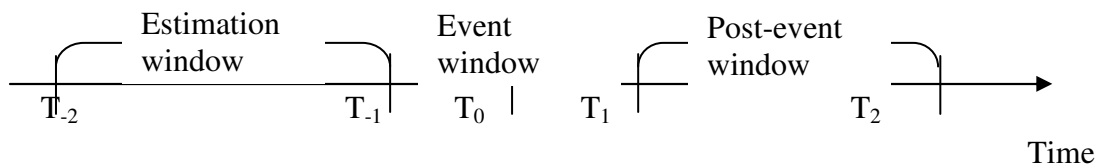
Estimation procedure
Test procedure
Empirical results
Conclusions

4.3 Event definition

In this study the event it was defined as a negative social or environmental accident, publicly available to stakeholders, mainly to investors, governmental organism, environmental agencies and communities around companies' activities.

Public announcement of the event is defined as zero-data and from this point, it is possible to define estimation and post-event windows, as following:

Timeline – event study:



Where: T_0 corresponds to event date (public announcement)
 T_1 to T_2 correspond to post-event window
 T_{-2} to T_{-1} correspond to estimation window

Estimation and event windows cannot have intersections, in order to guarantee that estimated normal return will not be influenced by the event itself. It is supposed that the occurrence of the event is exogenous to asset returns.

In this study, the event window was the date of the public announcement of the negative impact occurrence. Estimation window corresponds to two years before the event and post event window corresponds to 60, 45 and 30 days after the event.

A variable post-event window was defined to evaluate the event impact. It was suggested that small post-event window will have more significant impact in asset pricing. This resource was used to check, besides significance, the impact during a determined period over asset pricing of the companies studied.

4.4 Selection criteria

Some criteria were defined to collect basic information for event study:

Companies should be listed and price series should be at least two years before event occurrence and 60 days after the occurrence. Price series from NYSE (*New York Stock Exchange*) were used to Chevron, Exxon and Shell. Bovespa (Bolsa de Valores de São Paulo) was used to Petrobras.

The events were immediately announced after the occurrence, in order to allow the use of occurrence date as event window.

4.5 Normal and abnormal returns, estimative and test procedures

Normal return estimative is based on estimation window, through market model application. This study used Fama-French factors model (Fama & French, 1995). Fama-French model considers, besides excess return from CAPM (*Capital Asset Pricing Model*), two additional factors – size (obtained from market value) and book-to-market (account value/market value).

So if CAPM was used individually, the model would be incorrect, resulting in an estimation bias and consequently abnormal returns would also be incorrect. It was added to this model the variation of oil prices. This factor, as well as other factors (size and book-to-market), were significant in the estimation of all companies. This model proposes a correlation between a specific asset returns to a market portfolio returns, reducing the abnormal returns variance. Campbell, Lo and MacKinlay (1997) mentioned that this can increase the ability to detect isolated events effects.

MacKinlay (1997) describes that the abnormal return is the difference between effective return ex-post and the normal return, estimated by the proposed factors model, using data from estimation window:

$$AR_{i\delta} = R_{i\delta} - E(R_{i\delta} | X_{\delta})$$

Where $AR_{i\delta}$ corresponds to abnormal return, $R_{i\delta}$ corresponds to the effective return and $E(R_{i\delta} | X_{\delta})$, the normal return for time period δ . X_{δ} is the conditional information for normal return model.

Market model is a statistic model, which correlates the return of a specific asset to the market return and other specific variables, according to the equation:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i SMB_{it} + \zeta_j HML_{it} + \eta_i P_{it} + \varepsilon_{it}$$

$$E[\varepsilon_{it}] = 0 \quad \text{Var}[\varepsilon_{it}] = \sigma_{\varepsilon_{it}}^2$$

Where R_{it} e R_{mt} are returns, during period t , from asset i and market asset, respectively. SMB_{it} represents company size (measured by market value), HML_{it} represents *book-to-market* and P_{it} , oil prices variation (obtained from data collected in DataStream). For Petrobras, it was used specific factors (size and book-to-market) for Brazil. Variables α_i , β_i , γ_i e η_i are regression parameters, obtained from estimation window.

The estimation is obtained from Least Square Method, and this equation corresponds to normal model estimation. The abnormal return is the estimated normal return less effective return (ex-post measure). If abnormal return is significantly, so the event had a significant impact over asset prices.

According to Campbell, Lo and MacKinlay (1997), after abnormal return estimation, it is suggested to obtain cumulated abnormal return (CAR), in order to check the occurrence of atypical returns after the event.

O cumulated abnormal return (CAR) is $N(0, \sigma_i^2)$. But σ_i^2 is non observable, it is necessary to use an estimator $\hat{\sigma}_i^2$. The significance of cumulated abnormal returns can be tested through statistic t-student:

$$SCAR_i = \frac{CAR_i}{\hat{\sigma}_i}$$

Estimation and test procedures were performed according to these concepts and applied to a E-Views program. The results of regressions considered corrections for heterocedasticity and autocorrelation (Newey-West HAC).

4.6 Qualitative analysis

After quantitative analysis, a detailed qualitative analysis of each event will be made, in order to explain potential different results. The objective is to prepare small “case studies”, which allow to describe what are the mechanisms involved in each event (Yin, 1994). Each event presents specific characteristics, such as location (country), company profile, case type (damage announcement or imposed fine), among others. It is important to mention that the objective of this analysis is not to obtain generalizations from the results, but to propose a better understanding of some mechanisms involved in the events studied.

The information and data used to the research were collected from database Lexis Nexis Academic. A research considering the announcement date was made, including latter information like location, time period and event type.

5.0 Econometric results: the market response to social and environmental event

Econometric results were presented in Table 2. This table shows the cumulated abnormal returns, t-student results and significance level. The parameter referred to the cumulated abnormal return shows if the effective return was higher or lower than the expected return estimated from the model. If it is positive and the statistic is significant, so the effect was positive due to the event occurrence, which means that the effective return was higher than expected, reflecting a positive effect, contrary to the expected behavior.

Otherwise, if the parameter is negative and the statistic is significant, so the expected result is obtained. In other words, the market responds negatively to a social or environmental negative event occurrence. In this case, the effective return (real, ex-post return) is lower than the estimated return, according to the market model.

And if the statistic is not significant, so asset prices do not reflect the event occurrence. The effect of the event is null,

Table 2. Events analysis: results

Company (event date)		Post-event window		
		60 observations	45 observations	30 observations
Exxon (09/25/1998)	CAR	3,1039	3,4942	5,1336
	(t statistic)	(3,7727)*	(3,3792)*	(4,7943)*
Chevron (08/23/2000)	CAR	-1,1074	0,3641	1,285
	(t statistic)	(-1,4120)	(0,6034)	(3,1257)*
Chevron (05/28/1998)	CAR	2,0503	1,4832	1,3513
	(t statistic)	(3,1646)*	(2,0259)**	(1,7040)***
Shell (04/02/2004)	CAR	9,8919	8,5561	7,4932
	(t statistic)	(11,1381)*	(10,1089)*	(6,9468)*
Shell (08/14/2006)	CAR	-6,6317	-6,5001	-4,9394
	(t statistic)	(-8,6091)*	(-6,4006)*	(-4,3683)*
Petrobras (11/07/2000)	CAR	360,4726	409,5647	319,3463
	(t statistic)	(7,5328)*	(7,2451)*	(5,5721)*
Petrobras (02/16/2001)	CAR	187,8375	207,0027	177,3897
	(t statistic)	(10,3320)*	(10,1451)*	(7,7028)*
Petrobras (03/15/2001)	CAR	-87,8252	-52,0327	-8,9924
	(t statistic)	(-3,9883)*	(-2,5845)**	(-0,7381)

For each event is presented cumulated abnormal return CAR in the first line and t-student result in the second line. The signal of parameter CAR shows a positive return or negative return, if compared to the expected return estimated by market model.

* Significant level 1%

** Significant level 5%

*** Significant level 10%

Table 3 presents a summary of the results. It can be noted that the event occurrence impacted the asset prices, if t statistic is significant, and this indicates that null hypothesis – there is no market efficiency in a semistrong form – can be rejected. But most of the cases indicate a positive CAR parameter, which means that the real return post-event was **higher** than the estimated return. Most of the cases are consistent to the market efficiency hypothesis (once prices do react to new information), but surprisingly most of them indicates that, due to social and environmental negative event announcement, asset prices reacted positively.

Most of the results obtained are not consistent to the hypothesis that reputational losses or imposed fines, due to negative social or environmental impacts, could be negative for asset pricing as well. Qualitative analysis will be useful to make a deeper research to obtain additional explanations.

Table 3. Summary of results

Selected cases					
	Location	Type	Occurrence date	Conclusion	
American companies					
Exxon	Australia	Explosion	09/25/1998	Significant positive	and
Chevron	California	Fine	08/23/2000	Significant positive ^a	and
Chevron	Nigeria	Political conflict	05/28/1998	Significant positive	and
European companies					
Shell	Vila Carioca	Justice notification	04/02/2004	Significant positive	and
Shell	Ogoniland	Fire	08/14/2006	Significant negative	and
Brazilian company					
Petrobras	São Sebastião	Leakage	11/07/2000	Significant positive	and
Petrobras	Curitiba	Leakage	02/16/2001	Significant positive	and
Petrobras	Rio de Janeiro	Explosion	03/15/2001	Significant negative ^b	and

^a Significant only for 30 days post-event window.

^b Significant only for 45 and 30 days post-event window.

6. Discussion

This section presents each case individually analyzed, in order to collect additional information about the event, based on Lexis Nexis Academic research.

Case 1 – Exxon explosion – Australia

This accident occurred in Australian Exxon plant, on September 25th, 1998. The event was announced after the accident, in agencies like *Deutsche Presse Agentur*¹. Initially it was announced the plant explosion and two workers missing. Gas supply in the state of Victoria was knocked out, causing many problems to other companies and people that live around the region.

In the following days, news agencies reported big financial losses due to many operations shut down, consequence of problems in natural gas supply. But Victorian Premier Jeff Kennett said the catastrophe showed it was a mistake to have just one natural gas plant supplying 98 per cent of the state's needs².

According to the results of this event, there is, in fact, a market reaction due to this occurrence – significant statistic – but in a positive way, contrary to the expected result. Therefore, despite the event occurred in Exxon plant and caused two workers death, the market reaction was not negative for the company.

Additional research was made and does not explain or contributed with relevant information that could justify such behavior. There is not enough public information available to explain appropriately why Exxon asset prices increased after the negative event.

Case 2 – Imposed fine to Chevron – California, USA

The announcement was first public by CBS *MarketWatch*³, on August 23, 2000. The Environmental Protection Agency (EPA) and Department of Justice announced a record \$7 million settlement agreement regarding alleged Clean Air Act violations at its El Segundo marine terminal. Part of the settlement was announced the month before and consisted of two supplemental environmental projects. The projects include a \$500,000 upgrade to refinery valve components to further reduce emissions and another \$500,000 to fund a community project at a harbor-area free clinic in Los Angeles County. The second half of the settlement, announced Wednesday, requires Chevron to pay \$6 million to the federal government for the alleged Clean Air Act violations, valuing the settlement at a total of \$7 million.

The EPA and Justice Department said the \$6 million penalty is the highest ever paid under the Clean Air Act for a single facility. Despite of all these facts, the market reacted positively.

A possible explanation is that this information confirmed an agreement previously settled. Probably, governmental agencies decisions were considered positive, increasing asset prices after the event. The settlement could be considered positive to Chevron operations and to its reputation.

Additionally, this event can only be considered significant for 30 days post-event window, which can indicate a quick reaction to the event.

¹ Deutsche Presse-Agentur. Inferno at Australian Gas Plant, 25/09/1998.

² Deutsche Presse-Agentur. Gas outage devastates Australian economy, 30/09/1998.

³ CBS MarketWatch. Chevron in \$7 million settlement pact, 23/08/2000.

Case 3 – Political conflict – Chevron Nigeria

This political conflict occurred on May 28, 1998. Two Nigerian activists were killed on a Chevron oil platform. The attack was carried out by the Nigerian Navy and the Nigerian Mobile Police. Chevron spokesperson Sola Omole admitted that the company transported Nigerian soldiers, via Chevron-leased helicopters, to their Parabe oil platform as part of a campaign to have Chevron contribute more to the development of the impoverished Niger Delta region. The spokesperson revealed that Chevron management authorized the use of the military.

This case shows the relationship between communities around the region and military. When a company has operations in regions that are strongly economic dependant and even politically, their responsibility for this region increases.

The effect on asset prices was significant and positive, there is, in fact, a reaction for the event, but positively. The involvement of the company in a political conflict denotes a strong negative social impact, the people and employees were both affected.

More detailed information was obtained, and a fact seems to be relevant and could be responsible for increased asset prices during this period. On June 8, 1998, CNN⁴ announces the death of Nigerian dictator Sani Abacha, political leader responsible for many conflicts in Nigeria. It is possible that the dictator death caused a positive reaction, considering the possibility of a new government, more democratic and more opened to private companies installed in the country, such as Chevron.

On June 10, 1998, *New York Times*⁵ published that “The death this week of Sani Abacha, the corrupt and abusive Nigerian military dictator, is an opportunity for an African giant to begin to lift itself from poverty, fear and decay. General Abacha so discredited military rule that in recent months even many officers began to join ordinary Nigerians in clamoring for a civilian government. Gen. Abdulsalam Abubakar, who has taken over the Government, was one of those officers. He should put those ideas into practice.” Additionally, they have published that “Outsiders can help with a clear call for democratic, civilian rule. A high-level American delegation bearing such an unambiguous message would be useful. Companies like Mobil, Chevron and Shell, which profit from Nigerian oil, have done little in the past to promote democratic rule. Mr. Abacha's death offers them a chance to use their considerable influence to discourage continued dictatorship. The one favor that Mr. Abacha may have done his country is to clarify that military rule is misrule.”

This fact could be influenced a positive reaction for Chevron assets, during this period. The results also show an increased significant level in post-event windows, indicating a possible positive reaction after the dictator’s death.

Case 4 – Brazilian Justice Notification – Shell Vila Carioca.

Pesticides production and storage of dangerous products are potentially pollutants activities. These products can cause soil and water contamination, people that live around these regions present a higher concentration of metals in their blood.

In 2000, Shell pesticides production in Paulinia was sold to Basf, under a condition imposed to Shell to be legally responsible for decontamination. Since 2001, Exxon has been a commercial partner in Vila Carioca terminal. Nowadays, both of the companies’ productions were shut down, but the soil contamination persists.

⁴ CNN. Sani Abacha's Death Leaves a Leadership Vacuum in Nigeria. 08/06/1998.

⁵ The New York Times. Nigeria’s Opportunity, 10/06/1998.

On April 2, 2004, Shell was officially notified by Brazilian Federal Agency (Ministerio Publico Federal)⁶, for the damages caused by their operations in Vila Carioca.

According to *Gazeta Mercantil*⁷, April 14, 2004, the Agency has denounced ANP – Agência Nacional de Petróleo – as responsible for environmental damages, due to lack of inspection of Shell activities.

Additionally, Shell was not attending the environmental local agency – Cetesb (Companhia de Tecnologia em Saneamento Ambiental), and some requirements for decontamination were not followed.

Event study applied to this case showed a significant and positive reaction. The official notification, clearly defining responsibilities, specifically for Shell operations in Vila Carioca, affected significantly their asset prices, but not in a negative form.

Additional research was made, but no relevant information was found that could explain the reason for such behavior. Facts associated to clearly definition of responsibilities were not considered enough to justify asset prices increasing, unless an expected punishment considered by markets was even higher than real. But evidences that could prove this were not detected.

Case 5 – Shell fire plant – Ogoniland

Shell fire plant in Ogoniland was reported in August 14, 2006. The fire caused pollutants emissions during three months, harming people that live around this region.

Due to this accident, local authorities discussed the possibility to revoke Shell's oil license in Ogoni. According to *Africa News*⁸ September 24, 2006, an Assistant Director at the Department of Oil Resources (DPR), Mrs. Bamidele Ogedengbe as telling newsmen at an energy conference that: "We are going to revoke Shell's license to operate in Ogoniland."

The reason for the planned revocation of Shell's drilling rights in Ogoni according to Ogedengbe "is the inactivity by Shell to do anything with its license."

This occurrence affected potential investors in Ogoni. When they realized that Shell's license to operate could be revoked, many of them reconsidered their investments in the company and in the region. This fact clearly affected Shell asset prices in New York Stock Exchange.

The result of this event is according to the expected, it is significant and negative, the asset prices of the company during this period was lower than the expected return estimated by market model. In this case, it could be observed a clearly reputational loss: investors were not interested in Shell operations in Ogoni, and this was priced by capital market.

Case 6 – Petrobras leakage – São Sebastião, São Paulo

On November 7, 2000, Petrobras caused 86.000L of oil leakage, and touristic beaches located in São Sebastião and Ilhabela were completely polluted. This leakage was announced by many foreign agencies, such as *Lloyd's List International*, on November 7⁹, 8¹⁰ and 13¹¹, 2000, indicating many other leakages caused by Petrobras em Brazil, including Baía de Guanabara, in Rio de Janeiro.

⁶ Ministério Público Federal, 02/04/2004, issued by Mr. Sérgio Gardenghi Suiama.

⁷ *Gazeta Mercantil*. Procurador-geral denuncia Shell e Agência do Petróleo por crime ambiental, 14/04/2004.

⁸ *Africa News*. Nigeria: Government to Revoke Shell's Oil License in Ogoni, 24/09/2006.

⁹ *Lloyd's List*. Beleaguered Petrobras hit by latest crude spill, 07/11/2000.

¹⁰ *Lloyd's List*. Brazil Petrobras oil spill hits tourist resort, 08/11/2000.

¹¹ *Lloyd's List*. Watchdog attacks Petrobras over spill, 13/11/2000.

Oil leakages caused by Petrobras are common practices, as checked in *website Ambiente Brasil*¹².

Despite the significance of the event, showing that there is a real reaction due to the occurrence, the cumulated abnormal return was positive, indicating a higher real return if compared to estimated market model.

Additional research was made and does not explain or contributed with relevant information that could justify such behavior. There is not enough public information that can be used to explain appropriately why Petrobras asset prices increased after the negative event.

It is important to note that Petrobras has an important economic value in Brazilian scenario, and this fact can be extremely relevant, and higher profits can probably overcome environmental negative events.

Case 7 – Petrobras leakage – Curitiba, Paraná

This case is related again to leakage oil caused by Petrobras' operations, which occurred on February 16, 2001, in Curitiba. A pumping fault on an oil pipeline caused oil leakage and approximately 4.000L of diesel oil have discharged to Córrego Caninana, part of Rio Nhundiaquara, in an environmentally protected area. Fauna and flora were contaminated, and Ibama has forbidden fishing in the region. Petrobras was fined latter for the damages, about R\$150.000.

*World Market Analysis*¹³, on February 20, 2001, has published the fine applied to Petrobras (about USD75.000) for latest oil spill. *Lloyd's List International*¹⁴, on February 20, 2001 has published that "Petrobras is not capable of protecting the environment". This same article mentioned Greenpeace negative reaction.

But, as the latest case, the results presented a significant and positive reaction, indicating a real reaction from market, but in a positive way. Many other publications mentioned, besides this accident, the good economic results obtained by Petrobras. Nevertheless, it is not possible to conclude that these negative events have been neglected. It is possible that their negative effect were not considered relevant if good economic results were presented by the company.

Case 8 – Petrobras explosion – Rio de Janeiro

On March 15, 2001, many explosions in P-36 platform in Bacia de Campo – RJ – caused 12 workers death. This accident was widely published by international media and, according to CNN¹⁵, the Company is considered a leading operator of deep sea platforms but has been plagued by series of accidents and oil spills in recent years. However much oil escapes from P-36, the damage to Petrobras' reputation and its revenues will be more lasting.

This event study showed that 45 and 60 days post-event window were significant, which means that it was not an immediate impact. Cumulated abnormal return was negative, according to the expected result, which means that effective returns were lower than estimated returns. This accident really caused an asset pricing effect, mainly due to widely media repercussion.

¹²

<http://www.ambientebrasil.com.br/composer.php3?base=../energia/petroleo/index.html&conteudo=../energia/petroleo/vazamentos.html>. Assessed in 18/08/2008.

¹³ World Market Analysis. Petrobras Fined US\$75m for Latest Oil Spill, 20/02/2001.

¹⁴ Lloyd's List. Petrobras: "not capable of protecting the environment". Last year's oil spill in Rio de Janeiro has been followed by another in Parana, which has landed the company another RDollars 150m fine. Greenpeace attacks Petrobras, 21/02/2001.

¹⁵ CNN International. Brazil's Petrobras Downplays Environmental Impact Of Oil Rig Accident, 21/03/2001.

7. Conclusion

The event study is an effective tool to analyze how social and environmental negative accidents impact companies' performance. Many results were not according to the expected results, even all of them were significant, and most of these cases presented a higher return if compared to the estimated return modeled by the market factor equation. It was expected that real return was lower than the estimated one, after negative event occurred.

Qualitative analysis was important to search for additional information that could explain the scenario of each case studied. Some cases presented relevant information that could be considered as information that caused a positive impact during the same period the negative event occurred (for example, good news related to economic results are widely published during negative event period). Future studies can be made in order to examine if companies strategically uses good announcements to "neutralize" negative events, specially social and environmental accidents. In other cases, higher return was obtained after negative events associated to fines and punishment imposes. In these cases, it can be suggested that when governmental agencies have clearly defined responsibilities and fine values, the market usually responds positively. Probably a higher government monitoring and control can induce good practices for environmental and social issues. This is recognized by the market as lower risk for reputational losses or futures punishments. These conclusions can also be examined in future studies.

Cases that showed an expected result, or presented lower effective returns after a negative event, were widely explored by international media, which demonstrated to be crucial to influence specific stakeholders and result in a negative impact on asset pricing. These cases showed also a clearly positioning of media about reputational losses¹⁶ and investments losses¹⁷.

It is still possible to explore deeply the occurrences collected in this study in order to evaluate the impact of social and environmental events in asset pricing. This study limited the number of occurrences analyzed, because one of the objectives was to prepare small case studies of each event selected. Besides this, the sector was limited to oil sector. Other critical economical sectors could be analyzed as well, such as textile, energy, mining, steel, agribusiness, among others. A higher number of events and sectors can be explored in further studies.

Event study application for social and environmental occurrences can be better explored also. This tool is appropriated because it is possible to connect corporate social responsibility actions to financial results.

It is interesting to evaluate not only negative events, but also positive events. If companies are really engaged to corporate social responsibility actions, how these actions can positively impact asset prices? This study could be especially interesting to contribute for the debate about the optimal level of investments for corporate social responsibility and sustainability issues and how these drivers can be connected to companies' strategies.

¹⁶ CNN International. Brazil's Petrobras Downplays Environmental Impact Of Oil Rig Accident, 21/03/2001.

¹⁷ Africa News. Nigeria: Government to Revoke Shell's Oil License in Ogoni, 24/09/2006.

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