Environmental news and stock markets performance: Further Evidence for Argentina

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More and more firms tend nowadays to adopt environment-friendly attitudes. Their motivation originates in local environmental regulations or requirements of foreign markets to which firms export (both induced by consumers and investors´ valuation of pro-environment initiatives). There is a well-established literature capturing the impact on stock prices of environmental information releases using the event study methodology. Studies are usually based on information environmental regulation (i.e., the regulator announcement of emissions or compliance status with respect to standards) or on simple media coverage of environmental news. Dasgupta, Laplante and Mamingi (2001) is one of the few references to show that public information on environmental behavior has impact on stock prices in the developing world. It includes Argentina in its analysis together with Chile, Mexico and the Philippines. In this manuscript, we focus specifically on Argentina. We find that positive environmental news have no impact, while negative news do have an effect on average rates of return a few days following its appearance. But, when focusing on different types of positive news, we find that ISO certification has no effect whatsoever, while investment decisions do have some positive significant influence on returns. On the other side, negative news influence on stock returns is particularly significant for events linked to citizen complaints and government rulings (confirming other studies results) and for media coverage of oil company issues. However, we find abnormal returns of a much smaller magnitude than other studies for developing countries. We believe that is readonable because there seem to be no reason why the level of abnormal returns (not its volatility) should be larger for environmental news in developing countries than in developed ones.

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I. Introduction

The environmental economics literature recognizes three "waves" of environmental regulation: the "Command and Control" (CAC) approach consisting mainly of establishing standards (i.e., on emissions or effluents on environmental quality or, indirectly, on inputs or goods), the "Incentives-based" regulations (also called "market based instruments") as the establishments of taxes, tradable permits or deposit-refund systems, and the information-based regulations (see Tietenberg, 1998).[1] The latter implies making public information regarding firms´ environmental behavior, relying (in part) on community and investors for the monitoring and enforcement of environment-friendly behavior. The cooperation of those two additional actors is not a minor point, especially for governments with weak regulatory power and scarce funding for control as those of developing countries.

There are numerous examples in the world of explicit establishment of regulations based on information diffusion. The main ones are the Toxics Release Inventory (TRI) in the United States (that provides information to the public on releases of toxic substances to the environment) and the Canada´ s National Release Inventory. In developing countries, there are two leading cases: the one of Indonesia with PROPER (Program for Pollution Control, Evaluation and Rating) and the one of Philippines with ECOWATCH (see WB, 2000).[2] These last two programs consist in releasing not concrete information of firms´ emissions (as in the TRI), but rather a rating assigning different colors to firms according to their compliance with standards. Other (less direct, but with the same objective) policies of this kind are the "voluntary agreements" between firms and regulator and the creation of environmental quality awards given to the cleanest industries. Finally, even in countries where environmental regulation is virtually absent, some firms tend to adopt environment-friendly attitudes (e.g., norms as ISO 14.000, for example) because of the requirements of foreign markets they export to, or simply to maintain a certain image they perceived is valued by the public, by possible investors or even by financial institutions.

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[1] In fact, this "last wave" is also "market-based" since it allows informed citizens to decide by themselves which firm to buy from and invest in.

[2] There are other experiences throughout the world. For example, the *UK´s Pollutant Inventory*, *Australia´s National Pollutant Inventory*, *Mexico´s Registro de Emisiones y Transferencia de Contaminantes*, *Czech Republic´s Pollutant*

The idea behind regulating via information dissemination (or voluntarily promoting a pro environment image) is that consumers would punish a polluter by buying less of its products as a way of sanctioning it and investors would reduce its interest in that firm (because they weigh future losses from expected regulatory penalties, liability settlements, and eventually cleaning up costs, as well as from consumers´ behaviour). Both (pressure by consumers and by investors) would give polluting firms the incentives to improve its behavior.

Argentina´ s environmental regulation is mainly of the "first wave" type (i.e., CAC), and there is no explicit policy in the line of regulator releases of firms´ environmental behavior. Moreover, although it is known that data on firms´ environmental behavior is available (for example, for hazardous waste generation), authorities are reluctant to provide it. However, even in this context, Argentina´ s firms do generally have some environmental directives, and, as shown by Chudnovsky, López and Freylejer (1997), the bigger and the more open to the rest of the world are the firms, they tend to undertake more environmentally-friendly actions. This finding could imply that the most important local firms respond to investors and consumers pressure and to foreign regulations (which in turn, at least in part, correspond to foreign consumers´ demands). However, while local newspapers and television networks assign a non marginal place to environmental news, there is no measurement of the existence and the extent of the implicit impact.

At the international level, there is a well-established literature on capturing the impact on stock prices of environmental information releases based on information regulation and on media coverage of general environmental news using the event study methodology.[3] In general, this literature finds significant impacts of environmental news in stock prices (both though information releases by a regulatory program and through any environmental news in the media), though their magnitude depends on the type of news. These papers differ in the database they deal with, but also on some technical aspects. Those are: the model selected for the event study (i.e., constant mean model, market model, CAPM, etc.), the window size utilized, the type of

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Release and Transfer Register, and more recent ones as the *China´s Greenwatch Program* Several of these programs are undertaken under World Bank Projects (see www.worldbank.org/nipr).

[3] Another related line in the literature is that of management with, for example, Hendricks and Singhal (1996) that investigate the impact of quality awards for manufacturing firms in the US, and more recently Przasnyski and Tai (2002) that examine the impact on stocks of the Malcolm Baldrige National Quality Award in the U.S. and Beirão and Sarsfield Cabral (2002) which study the effect of ISO 9000 certification on Portuguese stock market. There are also a few papers on the impact on stock prices of major environmental accidents (see citations in Hong and Hwang 2001).

events compared (i.e., lawsuits filing versus settlements, foreign versus local firms, etc.) and the test performed to assess the significance of the results (i.e, parametric or non parametric ones).

With respect to the type of database used, there are two lines of studies. On the first hand, based on information regulation, Hamilton (1995) studies the impact due to news appearing in Nexis database and Wall Street journal based on media coverage of the Toxic Release Inventory information, Lanoie, Laplante and Roy (1998) examine the effects of announcements of the list of "complying" and "of concern" polluters in Canada, and Gupta and Goldar (2005) analyze the impact of the announcement of the "green leaf rating" in India. On the other hand, based on general media coverage of environmental news, Muoghalu, Robinson and Glascock (1990) examine the capital market impacts of hazardous waste mismanagement lawsuits filing and settlements announced in the Wall Street Journal, Lanoie and Laplante (1994) assess the impact of different type of environmental news appearing in the Financial Post and Globe and Mail of Canada, and Klassen and McLaughlin (1996) report the stock prices effect of U.S. environmental media coverage on the Nexis database. Appendix A reports briefly the main characteristics of the published paper in this field of the literature, as well as their main results.

Finally, within this latter line of research (i.e., that based on media coverage), a direct precedent of analyzing how environmental news impact on Argentinean firms stock prices is the paper by Dasgupta, Laplante and Mamingi (2001). That paper analyzes how environmental news alter asset returns of tradable firms in Argentina, Chile, Mexico, and Philippines from 1990 to 1994 and conclude that: "markets react positively (increase in firms´ market value) to the announcement of rewards and explicit recognition by the government of superior environmental performance", and "capital markets react negatively (decrease in firms´ value) to citizens´ complaints targeted at specific firms.".

The paper by Dasgupta, Laplante and Mamingi (DLM) is taken (together with Gupta and Goldar 2005, cited above) as the main reference that releasing information on environmental behavior could also be effective in the developing world. Moreover, DLM find significant market values impacts from 4 to 20% while Gupta and Goldar find impacts of up to 30%, in both cases, much larger than those in developed countries publications on this type of studies.

In this manuscript, we select a less turbulent period in the Argentinean economy as was the second half of the 90´ s, we take information based purely on local sources for asset (and market) returns, we use an internet systematic searcher for environmental news, and we perform various

sensistivity analysis which show that our results are robust to different estimation periods and models.[4] This paper is organized as follows. In the next Section, we describe the methodology and the data we used to capture the impact of environmental news on the capital market. Our results are presented in Section III. And, Section IV summarizes our conclusions from this study.

II. Methodology and data

It is broadly acknowledged that firms´ stock prices reflect theirfuture cash flow. The idea behind the methodology of event studies is that, given rationality in the marketplace, any event affecting a specific firm is reflected immediately on its asset price. There are numerous cases in which this method has been applied: to capture the effect of releasing macroeconomic information, to value mergers and acquisitions, etc. (see Campbell, Lo and Mac Kinlay 1997 for more references). While the use of this method began with a 1933 paper, the more well-known methodological works are those of Ball and Brown (1968) and Fama et al (1969). The steps to perform this type of studies are: 1) Define what is an event (and its "window"), 2) Select the model for estimation of "Normal" (or expected) returns, 3) Select the criteria to inc lude firms. Search their "Actual" returns, and 4) Follow testing procedures on "Abnormal" returns (i.e., the difference between "Actual" and "Normal" returns). In this section, we will describe with some detail the steps we followed and the data we used in each stage.

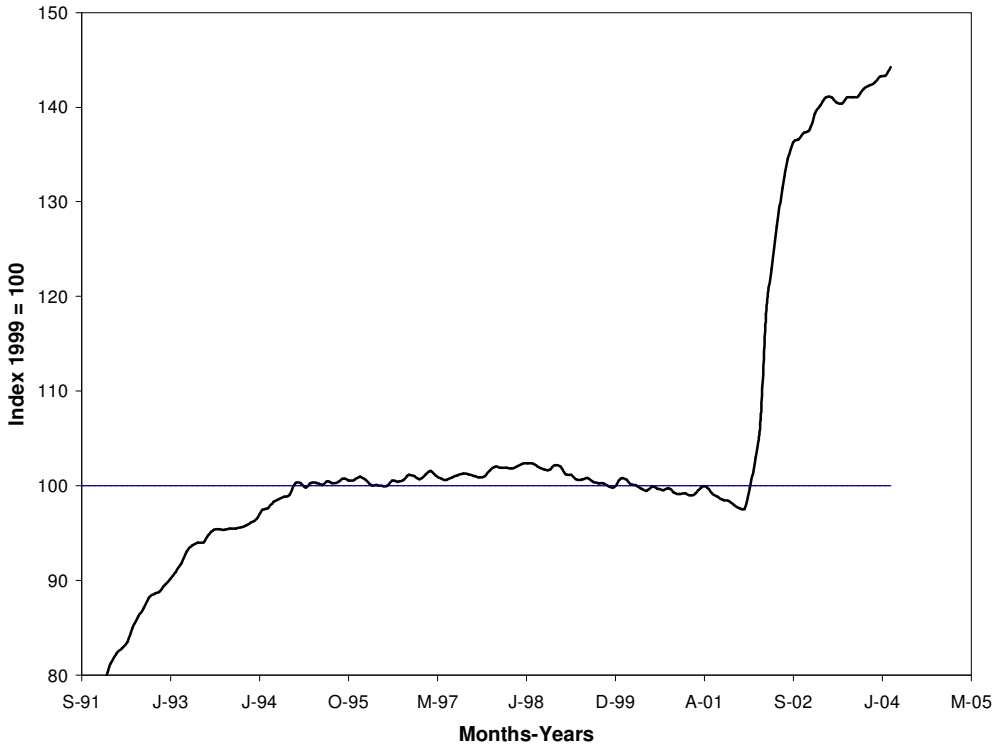
II. 1. *Definition of event*

It is important to differentiate the number of newsclips from the number of events since an "event" is an "environmental new" providing novel information. The base of our choice can be corroborated by looking at the consumer price index from 1990 to nowadays, as a proxy of

[4] Note that DLM do use the "market model" when data was available, but they do not make explicit if that was or not the case of Argentina (see footnote 19 of their work).

country´ "turbulence" (see Figure 1).[5] Relative "stability" began seriously after Argentina entered in the "convertibility of one peso = one dollar" (on April 1 st 1991 by law 23.928) and ended some time before that convertibility was abandoned by the devaluation of the peso (on January 6th 2002 by law 25.561).[6] All these historical events lead us to choose as the period of analysis the relatively more quiet years going from 1995 to the year 2000.

Figure 1. Consumer Price Index for Argentina (1999=100)



Source: Own elaboration based on Instituto Nacional de Estadísticas y Censos web .

As MDL, we chose news appearing on the second newspaper in terms of daily circulation in Argentina: la Nación. In fact, for the period 1996-2000 la Nación had a daily circulation of

[5] This does not mean that the consumer price index is *the* measure of instability, but it is one that has been important in Argentina´ s history.

[6] It does not follow that capital markets were quiet during that period. For example, in 1998 the Argentine stock recorded a significant decline, a trend recorded since October 1997, at the time of the outbreak of the crisis in Asia. The Russian default in August 1998 gave it a further downward push, and although a recovery began subsequently, in January 1999 the devaluation in Brazil led to renewed volatility in the prices of Argentine stocks.

approximately 160,000 from Monday to Saturday and 250,000 for Sundays (INDEC, 2001). Our data collection was made using a web search mechanism for older editions called "La Nación online" (www.lanacion.com.ar). We did not choose Clarín (the top newspaper in terms of circulation) because the Clarín web search is newer than that of La Nación (and so covers contain a shorter period), and because we believe environmental news appearing in those newspapers can not be so distinct among both newspapers.

II. 2. *Model selected for estimation*

There are three main statistical models available for estimation in event-studies: the constant mean model, the market model and the factor model.

The simplest one is the "Constant-Mean Return Model" (CMM), which relates linearly the return of any given security to a constant and a disturbance term. More precisely, expected returns are estimated from:

$$R_{it} = \mu_i + \zeta_{it}, \tag{1}$$

with $E(\zeta_{it}) = 0$ and $Var(\zeta_{it}) = \sigma^2_{\zeta_i}$.

Then, the so-called "Market Model" (MM), is potentially an improvement over the constant mean return model since it relates linearly the return of any given security to the return of the market portfolio. So, since it removes a portion of the return that is related to the market portfolio return, the variance of the abnormal return is reduced.

More precisely, for any asset *i*,

$$R_{it} = \alpha_i + \beta_i \cdot R_{mt} + \varepsilon_{it} \tag{2}$$

where R_{it} and R_{mt} are the period t returns on security *i* and the market portfolio, respectively, and ε_{it} is a disturbance term with mean and variance given by:

$$E[\varepsilon_{it}] = 0 \qquad Var[\varepsilon_{it}] = \sigma^2_{\varepsilon_i}$$

Finally, another possibility is to add other factors to the right hand-side of equation (2) beyond the market return. For example, use as independent variables the rate of return on a risk-free asset in addition to that of the market in order to estimate the Capital Asset Pricing Model (CAPM), or add other factor that may determine asset returns. However, as shown in Campbell, Lo and Mac Kinlay (1997) in practice there are limited gains of using multifactor models in event studies. The related literature generally uses in general the constant mean and market models (when data on market returns is available), except, for Lanoie and Laplante (1994) and Lanoie, Laplante and Roy (1998) who employ the CAPM model. Hence, we run here estimations based on the CMM and MM.

Coming back to the methodology, using any of the described models it is possible to estimate, over *the period previous to the event window*, the expected return for each event window for each firm. The commonly used estimation method is Ordinary Least Squares. The estimation period includes generally between 120 and 210 trading days (see Campbell, Lo and MacKinlay, 1997). Here, we report results for an "intermediate" estimation window of 165 working days (and we run sensitivity analysis for 120 and 210 working days).

Hence, having estimated the expected returns, it is straightforward to predict a "Normal" return, during the days covered by the event window. The difference between the "Actual" and the "Normal" return during the event window is the so - called "Abnormal" return and can be depicted by the following equations ((1´) and (2´) for the CMM and MM respectively):

$$\underbrace{AR_{it}}_{\text{"Abnormal"}} = \underbrace{R_{it}}_{\text{"Actual"}} - \underbrace{\overline{R}_{it}}_{\text{"Normal"=Mean}R_i(\text{EstimationPeriod})} = \zeta_{it} \qquad (1´)$$

$$\underbrace{AR_{it}}_{\text{"Abnormal"}} = \underbrace{R_{it}}_{\text{"Actual"}} - \underbrace{\left[\hat{\alpha}_i + \hat{\beta}_i \cdot R_{mt}\right]}_{\text{"Normal"}} = \hat{\varepsilon}_{it} \qquad (2´)$$

The idea of the MM is that while stock returns tend to move with the market, unexpected firm-specific events also affect the returns. Hence, the market valuation and significance of an event

can be estimated by measuring any abnormal change in the stock return. The same is true from the CMM, but expected returns are not related with the market return but rather with the mean of the return in the period previous to the event. Those "Abnormal" returns (AR_{it}) are calculated for each event (for each firm) at each point in time within the event window.[7]

However, in order to derive conclusions about the effect of events in capital markets in a broader sense, it is important to analyze three extra concepts: "Average Abnormal" returns (AAR_t, across events for the same moment in time), "Cumulated Abnormal" returns (CAR_i, along time within the event window of a single event), and "Average Cumulative Abnormal" returns ($CAAR$, along time and across events). Their respective formulas are:

$$AAR_t = \frac{1}{N} \cdot \sum_{i=1}^{N} AR_{it} \tag{3}$$

where N is the number of events of similar nature in a full set of event.

Similarly, for CAR and CAAR:

$$CAR_i = \sum_{t=\underline{t}}^{\bar{t}} AR_{it} \tag{4}$$

where $\underline{t}$ and $\bar{t}$ are the lower and upper limits within the event window (i.e., they can be the limits of the window themselves or some other days within the window), and,

$$CAAR = \frac{1}{N} \cdot \sum_{i=1}^{N} CAR_i \tag{5}$$

[7] We leave the discussion of their distribution for Subsection II. 4.

II. 3. *Criteria to define events (firms) and their returns*

Coming back to environmental news and the underlying events, it remains to be checked which of the events found in the La Nación database are related to firms trading their assets in the market during the time around the event (those firms have to be included in the index chosen as the reference for the market, since we perform estimations based on the CMM but also on the MM). And, there should be also sufficient data available (pre event) for the estimation of "Normal" returns ($\hat{R}_{it}$).

In this case, market returns (R_{mt}) are based on the MERVAL (Mercado de Valores) index. There are five market indices in the Buenos Aires stock market (MERVAL and MERVAL 25, Burcap, Indice Bolsa de Comercio de Buenos Aires and the new MERVAL Argentina – M.AR-). The M.AR. and MERVAL 25 are discarded because they began in year 2000 and 2003 respectively, while the Indice Bolsa de Comercio de Buenos Aires is a too broad index since it represents the evolution of all traded stocks. MERVAL weighting are based on traded volume and its base is 1986, while BURCAP weightings are based on market capitalization. We chose the MERVAL for being the most publicly known (and older) index for the market.[8] The stocks included are up to 80% of the participants in the market and the weights are updated every 3 months.

Finally, we used the software *Economatica* to search stock prices (i.e., those adjusted by dividend payment) in order to construct "Actual" (daily) returns (R_{it}) of the firms selected as $R_{i,t} = \left(P_{i,t} - P_{i,t-1}\right) \cdot 100 / P_{i,t-1}$.[9]

[8] However, we have also estimated equation (2) based on BURCAP and we find similar results. In particular, those events for which βs are not significant under the MM using MERVAL are the same that are not relevant using BURCAP.

[9] The Economatica database covers over 5,000 companies in Latin America (countries included are: Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela). The data starts as early as 1986, depending on the country. It includes quarterly company balance sheets and daily market data (stock prices, ADRs, indexes, currency exchange rates, inflation rates, net asset value per share for mutual funds, etc), financial and trading ratios.

II. 4. *Testing procedures*

First of all, we test abnormal returns significance for each event at each moment in time within the event window. To do so, according to the fact that abnormal returns are the disturbance term of the CMM and MM we rely on (1´) and (2´). Hence, under the null hypothesis, abnormal returns will be distributed for MM (and similarly for CMM) as $N(0,\sigma^2(AR_{it}))$, where (see Campbell, Lo and MacKinlay 1997 for a complete derivation)

$$\sigma^2(AR_{it}) = \sigma^2_{\varepsilon_i} + \frac{1}{L}\cdot\left[1+\frac{(R_{mt}-\bar{R}_m)^2}{\sigma^2_m}\right] \tag{6}$$

This variance has an additional component (in brackets) that is the sampling error in the estimation of the two parameters based on regression (2). But, if L (the estimation period) is large (here, at least 120 trading days), then, the second term vanishes.

Having calculated cumulative abnormal returns as in (4), we test for their significance using the relatively easy to derive fact that CAR are distributed $N(0,\sigma^2(CAR_i))$, where

$$\sigma^2(CAR_i) = (\tau - \underline{\tau} + 1)\cdot\sigma^2_{\varepsilon_i} \tag{7}$$

Note that the parenthesis indicates the number of days returns are accumulated.

We also calculate average abnormal returns, and tested them to infer significance of abnormal returns of similar events. To do so, it is also straightforward (from (3) and (6) and for L large) that AAR are distributed $N(0,\sigma^2(AAR_t))$, where

$$\sigma^2(AAR_t) = \frac{1}{N^2}\cdot\sum_{i=1}^{N}\sigma^2_{\varepsilon_i} \tag{8}$$

Finally, based on (5), tests on the cumulative average abnormal returns can be derived from the fact that CAAR are distributed $N(0,\sigma^2(CAR_i))$, where

$$\sigma^2(CAAR) = \frac{1}{N^2} \cdot \sum_{i=1}^{N} \underbrace{(\overline{\tau} - \underline{\tau} + 1) \cdot \sigma_{\varepsilon_i}^2}_{\sigma^2(CAR_i)} \tag{9}$$

III. Results

In this particular case, as can been seen in Table 1, we have 61 environmental news by publicly traded companies for the period 1995-2001.

Table 1. Environmental Newsclips in Argentina: 1995-2001

Name of firm	Sector of activity	Nature and number of newsclips	
		Positive	Negative
ACINDAR	Metal	4	0
ALUAR	Metal	1	0
ASTRA	Oil	0	1
ATANOR	Chemical	1	5
BAESA	Food	1	0
CELULOSA	Pulp and paper	0	1
INDUPA	Chemical	0	5
PEREZ COMPANC	Oil	2	6
SIDERAR	Metal	2	0
SIDERCA	Metal	1	0
TELECOM	Communication	1	0
TELEFÓNICA	Communication	1	0
YPF	Oil	3	26
Total		17	44

Source: own elaboration based on La Nación online.

Two of the positive events (Acindar 12/23/2001 and Baesa 07/25/1999) were discarded for the analysis because there were no traded prices around the event window. Environmental news that are mere follow-ups or repetitions of previous news cannot be selected as "events". [10]

[10] Note that the events are exogenous with respect to the change in firms´ return, since environmental events cannot be said to be triggered (at least not in the short and medium run) by the change in the market value of a security.

Hence, after "cleaning up" the dataset for these two types of issues, there were 15 positive events and 17 negative events remaining. The final lists of events are detailed in Table 2 and Table 3.[11]

Table 2. Description of positive events

Name of firm	Date	Nature of event
ACINDAR	12/27/98	Company ISO for environmental performance
	6/5/99	Company ISO for environmental performance
	11/18/01	Company reward for environmental performance by US representative in Argentina
ALUAR	9/23/98	Investment in plant expansion
ATANOR	9/16/97	Shutdown removal by government
	12/9/98	Court action against Greenpeace for complaint
PEREZ C.	9/6/99	Company ISO for environmental performance
	10/22/99	Company reward for environmental performance by an environmental group
SIDERAR	3/13/99	Agreement with Loma Negra to produce ecology cement
SIDERCA	5/23/00	Announcement: agreement to construct the first waste hard metal treatment platform
TELECOM	4/12/97	Investment in technology to preserve environment
TELEFÓNICA	4/12/97	Agreement with Aguas Argentinas, Edenor y Edesur on environmental protection wor
YPF	4/4/98	Investment in construction of two sulphur treatment plants
	6/5/99	Company ISO for environmental performance
	12/10/99	Waste water treatment plant inauguration

Source: Own elaboration based on La Nación online.

Table 3. Description of negative events

Name of firm	Date	Nature of event
ASTRA	3/25/00	Dock Sud plant ordered to shut down
ATANOR	8/14/97	Temporary shutdown
CELULOSA	12/9/97	Greenpeace complaint
INDUPA	12/17/98	Greenpeace complaint in Bahía Blanca
	8/25/00	Shutdown: chlorine escape
	12/14/00	Citizens complaint about air pollution in Ingeniero White
PEREZ C.	3/9/97	Accidental oil spill in Neuquén
	6/25/98	Mapuches complaint against Mega project
YPF	10/17/96	Accident: hydrocarbon spill
	3/9/97	Accidental oil spill in Neuquén
	5/25/97	Court action against the company
	12/13/97	Accident: oil tank got burnt
	8/12/98	Mapuches complain against the construction of gas pipes
	9/14/99	Partial shutdown: toxic emissions suspicion
	12/19/00	Greenpeace complaint for canals contamination
	3/5/01	Mapuches complaint against environmental policies
	6/25/01	Government intimation

Source: Own elaboration based on La Nación online.

[11] When events appear in newspapers on days where the stock market is close (i.e., Saturdays, Sundays, or public holidays), the immediate following day of trading is used as day 0.

On one side, we find that positive environmental events appearing in the media are related to two kind of news: announcements (or inaugurations) of investments and ISO norms approval and other "voluntary rewards". And, on the other side, we find that negative events are mainly associated with two types of news: environmental accidents, and court/government rulings or citizens/ONG complaints. Another characteristic of our dataset is that the proportion of negative versus positive events is almost 50%. And, finally, it seems important to note the persistence in the large number of environmental news for Argentina´s main oil company (YPF), which accounted for 12 of the 32 events (37.5%).

In terms of the estimation of the "Normal" returns, as is shown in Appendix B, the β coefficients (in the case of the market model) have the expected positive sign in all cases and are significant except for a few events, which are then omitted from the analysis.[12] The resulting "Abnormal" returns (AR) are in all cases of the expected sign. Using the mean model, 5 of the 15 positive events (i.e., 33%) and for 12 of 17 negative events (i.e., 70%) turned out to be significant and have the expected sign at least some day t within the window (see Appendix C). Similar percentage of significant events occurs with the alternative market model and alternative estimation periods.[13] With respect to the estimated CAR (from day –5 to each relevant day in the window), they are significant (and are of the expected sign) in 2 of the 15 positive events, and in 6 of the 17 negative events (CAR results are also reported in Appendix C).

As the literature in the field, we follow our analysis to a comparison between events (and between events and across time) to better interpret the reason and average magnitude of the impacts. First of all, we aggregate positive and negative events. We find that positive news have no effect, while negative events have an impact on average stock returns on days +1 and +3 (see Table 4 for CMM and n=165). The same pattern is maintained for the alternative MM and estimation periods (see in that respect Table 5), with day +3 being consistently significant for negative news while positive news have no significance. In addition, the consistency of results extends to the magnitude of AAR, which is in all cases around a 1 % impact.

[12] No significant coefficients appear in the last YPF negative news, varying according to the lenght of the estimation period. Hence, for n = 120, we discarded the last 3 YPF news, for n= 165 we rejected YPF 03/05/01, and for n = 210 we took off the sample YPF 03/05/01 and 06/25/01.

Table 4. Positive versus negative events

	Day -5	Day -4	Day -3	Day -2	Day -1	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
						Positive events					
AAR	0.9470	-0.1117	0.2918	-0.2527	-0.3075	-0.3375	-0.0289	-0.1031	-0.1237	-0.0427	-1.2044
Z-stat	0.8535	-0.1006	0.2630	-0.2277	-0.2771	-0.3041	-0.0260	-0.0929	-0.1115	-0.0384	-1.0854
CAAR	0.8794	0.7757	1.0466	0.8120	0.5265	0.1890	0.1622	0.0665	-0.0572	-0.0999	-1.3043
Z-stat	0.8190	0.5109	0.5628	0.3781	0.2193	0.0719	0.0571	0.0219	-0.0178	-0.0294	-0.3663
						Negative events					
AAR	-0.4385	0.4822	-0.1750	0.8950	0.0001	0.0581	-1.0575	-0.1337	-1.2372	0.4943	-0.5541
Z-stat	-0.8040	0.8840	-0.3208	1.6409	0.0002	0.1065	-1.9389 **	-0.2451	-2.2684 ***	0.9062	-1.0159
CAAR	-0.4127	0.0127	-0.1519	0.7430	0.7431	0.8012	-0.1941	-0.3121	-1.4765	-1.0113	-1.5329
Z-stat	-0.7567	0.0165	-0.1608	0.6811	0.6093	0.5997	-0.1345	-0.2023	-0.9024	-0.5863	-0.8474

*Note: Results are for CMM and n= 165. ***, ** and * denote significance at 1%, 5% and 10% respectively (one-tail test).*

Table 5. Positive versus negative events with alternative models and estimation periods

Model*	Estimation period		Day -5	Day -4	Day -3	Day -2	Day -1	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
								Positive events					
Mean	**120 days**	**AAR**	0.9399	-0.0994	0.3040	-0.2404	-0.2953	-0.3360	-0.0167	-0.0908	-0.1223	-0.0412	-1.2029
		Z-stat	0.7895	-0.0835	0.2554	-0.2020	-0.2480	-0.2822	-0.0140	-0.0763	-0.1027	-0.0346	-1.0105
	210 days	**AAR**	0.9782	-0.0941	0.3094	-0.2351	-0.2899	-0.3055	-0.0113	-0.0855	-0.0918	-0.0107	-1.1724
		Z-stat	0.9143	-0.0880	0.2891	-0.2197	-0.2710	-0.2856	-0.0106	-0.0799	-0.0858	-0.0100	-1.0959
Market	**120 days**	**AAR**	0.8869	0.1222	0.0291	-0.4434	0.1986	-1.0209	0.0621	0.0913	-0.3857	-0.2510	-1.1224
		Z-stat	0.9228	0.1272	0.0303	-0.4613	0.2066	-1.0622	0.0646	0.0950	-0.4013	-0.2611	-1.1678
	165 days	**AAR**	0.8457	0.1324	0.0380	-0.3986	0.2125	-0.9991	-0.0330	0.0950	-0.3369	-0.2456	-1.0718
		Z-stat	0.9917	0.1553	0.0445	-0.4675	0.2492	-1.1716	-0.0387	0.1114	-0.3951	-0.2880	-1.2569
	210 days	**AAR**	0.8358	0.1001	0.0346	-0.3082	0.1965	-0.9078	-0.1116	0.0323	-0.3338	-0.2782	-1.0721
		Z-stat	1.1113	0.1331	0.0459	-0.4097	0.2613	-1.2070	-0.1484	0.0430	-0.4438	-0.3699	-1.4254
								Negative events					
Mean	**120 days**	**AAR**	-0.4289	0.4974	-0.1657	0.8994	0.0045	0.0625	-1.0479	-0.1287	-1.2375	0.5039	-0.5445
		Z-stat	-0.7983	0.9259	-0.3084	1.6741	0.0084	0.1163	-1.9505 **	-0.2396	-2.3036 ***	0.9380	-1.0135
	210 days	**AAR**	-0.4384	0.4783	-0.1864	0.8878	-0.0071	0.0509	-1.0574	-0.1442	-1.2549	0.4944	-0.5540
		Z-stat	-0.8140	0.8882	-0.3461	1.6486	-0.0132	0.0945	-1.9635 **	-0.2678	-2.3302 ***	0.9181	-1.0287
Market	**120 days**	**AAR**	-0.3504	0.7893	0.5143	0.8842	0.5795	-0.1209	-0.5611	-0.1330	-1.1845	0.5514	-0.6176
		Z-stat	-0.7089	1.5970	1.0406	1.7889	1.1725	-0.2447	-1.1353	-0.2692	-2.3966 ***	1.1156	-1.2496
	165 days	**AAR**	-0.3544	0.7053	0.4465	0.6492	0.4356	-0.1076	-0.5769	-0.1381	-1.1656	0.2222	-0.5330
		Z-stat	-0.7600	1.5122	0.9573	1.3920	0.9340	-0.2307	-1.2369	-0.2961	-2.4992 ***	0.4765	-1.1428
	210 days	**AAR**	-0.4040	0.7320	0.4490	0.8067	0.4633	-0.1040	-0.4806	-0.0508	-1.0503	0.4451	-0.6174
		Z-stat	-0.9161	1.6599	1.0182	1.8293	1.0505	-0.2359	-1.0898	-0.1151	-2.3817 ***	1.0094	-1.3999 *

*Note: ***, ** and * denote significance at 1%, 5% and 10% respectively (one-tail test).*

[13] Those results are not presented for space reasons, but are available from the authors upon request.

Then, we deepen our analysis to see if we could make conclusions based on the type of news included in positive and negative aggregations. It might be the case that some kinds of positive news have an impact, even if on the average positive news have no effect. Hence, we divide positive news in those linked to ISO certification issues, and those related with pro-environment investments (separated in announcements *and* inaugurations). We find that announcing having received ISO in the family of 14.000 has no impact whatsoever, and this is also the case for *all* news related to pro-environment investments (see Table 6). However, *announcements* of investments in favor of the environment do have an effect on day +3, while *inaugurations* of new plants with special provisions toward the environment are anticipated by the market and do have a significant positive correspondence on days –5 and –3. The magnitude of the effect is indeed larger than that of negative news (going from 1.95 to 3.47%).

Table 6. Disaggregation of Positive events

	Day -5	Day -4	Day -3	Day -2	Day -1	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
Positive events: ISO certification news											
AAR	1.1053	1.4455	0.4961	0.3875	0.6419	-1.3188	-0.3710	-0.4582	-1.0556	-0.9390	-0.3321
Z-stat	0.5771	0.7548	0.2590	0.2023	0.3352	-0.6886	-0.1937	-0.2392	-0.5512	-0.4903	-0.1734
CAAR	1.1053	2.5509	3.0469	3.4344	4.0763	2.7576	2.3865	1.9283	0.8727	-0.0663	-0.3984
Z-stat	0.5771	0.9418	0.9185	0.8966	0.9519	0.5878	0.4710	0.3560	0.1519	-0.0109	-0.0627
Positive events: related to pro-environment investments											
AAR	1.3240	-1.1534	0.5071	-1.2856	-1.2674	-0.5350	0.9875	1.2321	0.3531	0.0491	-2.7282
Z-stat	0.7989	-0.6960	0.3060	-0.7757	-0.7648	-0.3228	0.5959	0.7435	0.2130	0.0296	-1.6462
CAAR	1.3240	0.3354	0.7700	-0.3319	-1.4183	-1.9533	-1.1069	-0.0508	0.3023	0.3514	-2.3768
Z-stat	0.7989	0.1431	0.2683	-0.1001	-0.3827	-0.4812	-0.2524	-0.0108	0.0608	0.0671	-0.4324
Positive events: *announcements* of pro-environment investments											
AAR	0.4650	-0.5879	-0.2160	-1.9001	-1.0197	0.0604	1.0331	2.5148	0.2876	0.1540	-3.6739
Z-stat	0.3765	-0.4761	-0.1749	-1.5386	-0.8257	0.0489	0.8365	2.0363 **	0.2329	0.1247	-2.9749
CAAR	0.4650	-0.0054	-0.1782	-1.6982	-2.5140	-2.4536	-1.6272	0.3846	0.6722	0.8263	-2.8477
Z-stat	0.2054	-0.0017	-0.0454	-0.3751	-0.4966	-0.4425	-0.2717	0.0601	0.0990	0.1154	-0.3793
Positive events: *inauguration* pro-environment investments											
AAR	3.4715	-2.2843	1.9533	-0.0566	-1.7628	-2.0235	0.8964	-1.3332	0.5167	-0.2132	-0.3639
Z-stat	2.7345 ***	-1.7993	1.5386 *	-0.0446	-1.3886	-1.5939	0.7061	-1.0502	0.4070	-0.1679	-0.2866
CAAR	3.4715	1.1872	3.1405	3.0839	1.3210	-0.7025	0.1939	-1.1393	-0.6226	-0.8358	-1.1996
Z-stat	2.7345 ***	0.6613	1.4282 *	1.2146	0.4654	-0.2259	0.0577	-0.3173	-0.1635	-0.2082	-0.2849

*Note: ***, ** and * denote significance at 1%, 5% and 10% respectively (one-tail tests).*

We perform a similar disaggregation for negative events. We find (as shown in Table 7) that day +1 and +3 negative impact is directly linked to court/government rulings or citizens/ONG complaints, following the same results as the aggregation of negative events. We also detect that oil companies (highly represented in the sample) are those for which there is particular impact.[14] Here, again, the magnitude of the impacts are small (around 1%).

Table 7. Disaggregation of Negative events

	Day -5	Day -4	Day -3	Day -2	Day -1	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
Negative events: citizen complaints and rulings											
AAR	-0.5893	0.6324	0.2839	1.3996	0.2296	-0.5834	-1.1839	-0.0835	-1.1634	0.6163	-0.4858
Z-stat	-0.8778	0.9420	0.4229	2.0849	0.3421	-0.8691	-1.7637 **	-0.1244	-1.7331 **	0.9181	-0.7236
CAAR	-0.5439	-0.0089	0.2532	1.6527	1.8824	1.2990	0.2061	0.1355	-0.9384	-0.3695	-0.8179
Z-stat	-0.8103	-0.0093	0.2177	1.2310	1.2541	0.7900	0.1161	0.0713	-0.4660	-0.1741	-0.3674
Negative events: related to oil companies											
AAR	-0.6802	0.0330	-0.7249	0.0332	-0.3447	0.7045	-0.7441	0.0787	-1.2110	0.2717	-0.5850
Z-stat	-1.3425 *	0.0652	-1.4307 *	0.0655	-0.6803	1.3905	-1.4686 *	0.1554	-2.3901 ***	0.5363	-1.1547
CAAR	-0.6235	-0.5960	-1.2604	-1.2273	-1.5720	-0.8674	-1.5495	-1.4773	-2.6883	-2.4392	-2.9755
Z-stat	-1.2306	-0.8318	-1.4363 *	-1.2111	-1.3875 *	-0.6989	-1.1559	-1.0309	-1.7686 **	-1.5224 *	-1.7707 **

*Note: ***, ** and * denote significance at 1%, 5% and 10% respectively (one-tail tests).*

IV. Conclusions

Our conclusions can be stated on the base of the signs and the magnitude obtained, being the second issue the most innovative finding of this paper. With respect to the sign of the impact, we confirm that markets react negatively to court/government rulings or citizens/ONG complaints. But, we are not able to show that positive environmental news have any impact. This result is intuitive to us since Argentina´ s society is very skeptical of firm´ s behavior.

[14] We do separate rulings/government decisions from citizens/ONG complaints because a detailed analysis of the news shows that (at least in Argentina, and, in our data set) most regulatory decisions concerning the environment are taken ex - post citizens´ complaints. Hence, it would not be appropriate to combine news according to any of those criteria as if they were separate issues. However, we analyse positive versus negative events.

With respect to the magnitude of the impacts, much is said recently in the literature about a larger impact of environmental news on stock markets in developing countries versus studies in Canada and the United States. However, our results for Argentina do not confirm those findings. Average (and average cumulative) abnormal returns of one digit we find here are more in line with results obtained in studies related to developed countries that those of two digits found by Dasgupta, Laplante and Mamingi (2001) for four developing countries and Gupa and Goldar (2005) for India. Further study is needed to confirm the existing evidence of a large impact of environmental news in developing countries. More so, when the result (justified on a matter of volatility) happens in countries with low local government pressure and scarce environmental education, which makes the larger effect counterintuitive.

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Appendix A. More detailed review of literature

Authors (Journal, Year)	*Type of study: Database, model, window size, number and type of events, tests performed*	*Size of impact on stock return*
Muoghalu, Robinson and Glascock (*Southern Economic Journal*, 1990)	Hazardous waste mismanagement lawsuits filing and settlements announced in Wall Street Journal 120 days window 128 events divided in lawsuits and settlements and then in petro-chemical, pollution management and others Parametric tests on AAR	- 1,2 % in market value to lawsuit filing (AAR in days – 1 to 0) and no effect of settlement
Lanoie and Laplante (*Southern Economic Journal,* 1994)	Environmental news in Canada (Financial Post and Globe and Mail): 1982-1991 CAPM model 210 before/60 days 47 cases divided in 4 subsamples according to the type of event Parametric tests AAR and CAAR	- 1,1 % Canadian owned firms AAR, day announcement need investment to – 2 % day announcement of fines, no effect of incidents and lawsuit filing
Hamilton (*Journal of Environmental Economics and Management*, 1995)	First Toxic Release Inventory (1989) news in Nexis and Wall Street journal Market model 100 days before/-1 to 5 days 436 events: all, firms with media coverage, or with superfund sites Parametric AAR	- 0,3 % AAR day 0, lower days 0-5
Klassen and McLaughlin (*Management Science*, 1996)	Negative News (from 1989 to 1990) appearing in Nexis database related to US firms Market model 200 days, 10 days before/3 days 140 events CAR Parametric and Wilcoxon sign	- 1,5 % for CAAR 3 days window
Lanoie, Laplante and Roy (*Ecological Economics*, 1998)	British Columbia (Canada) list of "not complying" and "of concern" polluters for 5 announcements from 1990 to 1992 CAPM model 3 days Parametric tests AAR	No effect for AAR of 5 lists, more than once –0,1%, - 2% on day post announcement if group firms repeated in all lists
Dasgupta, Laplante and Mamingi (*Journal of Environmental Economics and Management,* 2001)	Environmental news in important newspapers Argentina, Chile, Mexico and Philippines: 1990-1994 Constant mean return model 10 days Parametric tests AR, CAR, AAR, CAAR	- 4 % / -15 %
Gupta and Goldar (*Ecological Economics*, 2005)	Announcement of "green leaf rating" f or pulp&paper, automobile and chlor firms in India: 1999, 2001 and 2002 Market model 120 trading days prior/10 days after announcement 50 firms: 17, 15 and 18 per sector Parametric tests: CAAR	Up to – 30 % CAAR within event window (10 days)
Klassen and McLaughlin (*Management Science*, 1996)	Positive news (from 1985 to1991) appearing in Nexis database related to US firms Market model 200 days, 10 days before/3 days 22 events CAR Parametric and Wilcoxon sign	+ 0,82 % for CAR 3 days window
Dasgupta, Laplante and Mamingi (*JEEM,* 2001)	Same as above	+ 20 % AR over the entire event window (10 days)

Appendix B

Table B.1. Results of regressions to estimate Expected Returns (based on 165 working days)

			Market Model			
Events	**Date**	**n**	**Est. Alpha**	**Est. Beta**	**p-value**	**Std. Dev. Resid.**
Positive						
Acindar	12/27/98	165	-0.0073	1.3182	0.0000	1.7304
	6/5/99	165	-0.1153	1.2416	0.0000	2.2108
	11/18/01	165	-0.5129	0.9872	0.0000	3.1918
Aluar	9/23/98	113	0.9965	0.8526	0.0214	9.3041
Atanor	9/16/97	139	-0.0495	0.8359	0.0000	2.3176
	12/9/98	122	-0.1099	0.9815	0.0000	2.6779
Siderar	9/6/99	141	-0.2508	1.1234	0.0000	2.7228
Siderca	10/22/99	165	0.1197	0.8495	0.0000	1.6139
Perez Companc	3/13/99	165	0.1200	1.1589	0.0000	1.5029
	5/23/00	165	0.0012	1.2200	0.0000	1.2979
Telecom	4/12/97	165	0.0271	0.8223	0.0000	1.1165
Telefónica	4/12/97	165	0.0249	0.9784	0.0000	1.1796
YPF	4/4/98	165	0.1337	0.7762	0.0000	1.3812
	6/5/99	165	0.1811	0.7219	0.0000	2.0682
	12/10/99	165	0.0917	0.4684	0.0000	1.6032
Negative						
Astra	3/25/00	165	0.1891	0.5572	0.0000	1.7702
Atanor	8/14/97	138	0.1322	0.6093	0.0000	2.5275
Celulosa	12/9/97	135	-0.1969	0.4818	0.0179	4.3338
Indupa	12/17/98	165	-0.0446	0.8439	0.0000	2.3625
	8/25/00	165	-0.1362	0.6551	0.0000	1.6093
	12/14/00	162	-0.1679	0.7595	0.0000	1.8025
Perez Companc	3/9/97	165	0.0747	0.7200	0.0000	0.8917
	6/25/98	165	-0.0659	0.9059	0.0000	1.0865
YPF	10/17/96	165	0.0235	0.7173	0.0000	0.8965
	3/9/97	165	0.0894	0.5671	0.0000	0.9757
	5/25/97	165	0.0891	0.5210	0.0000	0.9364
	12/13/97	165	0.1559	0.7007	0.0000	1.1038
	8/12/98	165	-0.0005	0.7832	0.0000	1.3538
	09/14/99	165	0.0834	0.5482	0.0000	1.7951
	12/19/00	154	-0.0529	0.1222	0.1010	1.7885
	3/5/01	146	-0.1535	0.0617	0.4199	1.6092
	6/25/01	127	-0.1055	0.0926	0.1101	1.3722

Appendix C

Table C.1. Results of AR and CAR for each positive event: Mean Model n =165*

Positive Events		Day -5	Day -4	Day -3	Day -2	Day -1	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
ACINDAR 12/27/98	AR		6.280									
	Z-stat		1.359									
	CAR		10.136	10.484								
	Z-stat		1.551	1.310								
ACINDAR 06/05/99	AR											
	Z-stat											
	CAR											
	Z-stat											
ACINDAR 11/18/01	AR											
	Z-stat											
	CAR											
	Z-stat											
ALUAR 09/23/98	AR											
	Z-stat											
	CAR											
	Z-stat											
ATANOR 09/16/97	AR											
	Z-stat											
	CAR											
	Z-stat											
ATANOR 12/9/98	AR		6.633									
	Z-stat		1.691									
	CAR											
	Z-stat											
PÉREZ C. 09/06/99	AR											
	Z-stat											
	CAR											
	Z-stat											
PÉREZ C. 10/22/99	AR											
	Z-stat											
	CAR											
	Z-stat											
SIDERAR 03/13/99	AR											
	Z-stat											
	CAR											
	Z-stat											
SIDERCA 05/23/00	AR							5.417	6.869			
	Z-stat							2.488	3.154			
	CAR											
	Z-stat											
TELECOM 04/12/97	AR							2.580				
	Z-stat							1.516				
	CAR											
	Z-stat											
TELEFÓNICA 04/12/97	AR											
	Z-stat											
	CAR											
	Z-stat											
YPF 04/04/98	AR											
	Z-stat											
	CAR											
	Z-stat											
YPF 06/05/99	AR											
	Z-stat											
	CAR											
	Z-stat											
YPF 12/10/99	AR	6.183										
	Z-stat	3.281										
	CAR	6.183										
	Z-stat	3.281										

Note: We report here abnormal (and cumulative abnormal) return, which are significant at 10% or less.

Table C.2. Results of AR and CAR for each negative event: Mean Model n =165

Negative Events		Day -5	Day -4	Day -3	Day -2	Day -1	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
ASTRA 03/25/00	AR							-3.994	-2.983			
	Z-stat							-2.033	-1.518			
	CAR		-4.333						-8.284	-10.550	-12.453	-11.104
	Z-stat		-1.560						-1.491	-1.790	-2.005	-1.704
ATANOR 08/14/97	AR					-3.769						-4.699
	Z-stat					-1.403						-1.749
	CAR									-11.067	-12.565	-17.264
	Z-stat									-1.373	-1.479	-1.938
CELULOSA 12/09/97	AR							-6.447				
	Z-stat							-1.462				
	CAR											
	Z-stat											
INDUPA 12/17/98	AR			-7.929								
	Z-stat			-2.207								
	CAR			-12.177								
	Z-stat			-1.957								
INDUPA 08/25/00	AR		-3.040									
	Z-stat		-1.509									
	CAR											
	Z-stat											
INDUPA 12/14/00	AR					-3.100						
	Z-stat					-1.336						
	CAR											
	Z-stat											
PÉREZ C. 03/09/97	AR											
	Z-stat											
	CAR											
	Z-stat											
PÉREZ C 06/25/98	AR											
	Z-stat											
	CAR											
	Z-stat											
YPF 10/17/96	AR					-2.775						
	Z-stat					-1.899						
	CAR											
	Z-stat											
YPF 03/09/97	AR											
	Z-stat											
	CAR											
	Z-stat											
YPF 05/25/97	AR									-1.832		
	Z-stat									-1.524		
	CAR											
	Z-stat											
YPF 12/13/97	AR			-5.077	-3.814					-4.382		
	Z-stat			-2.663	-2.001					-2.298		
	CAR				-7.184	-8.619				-7.545	-8.036	
	Z-stat				-1.884	-2.022				-1.319	-1.333	
YPF 08/12/98	AR									-3.267		-6.962
	Z-stat									-1.628		-3.470
	CAR											-10.978
	Z-stat											-1.650
YPF 09/14/99	AR											
	Z-stat											
	CAR											
	Z-stat											
YPF 12/19/00	AR											
	Z-stat											
	CAR											
	Z-stat											
YPF 03/05/01	AR					-2.526						
	Z-stat					-1.572						
	CAR											
	Z-stat											
YPF 06/25/01	AR				-1.648			-1.488	-1.110	-2.758	-3.262	
	Z-stat				-4.244			-3.831	-2.859	-7.102	-8.400	
	CAR				-1.170	-1.465	-1.366	-2.853	-3.963	-6.721	-9.983	-9.013
	Z-stat				-1.506	-1.688	-1.436	-2.777	-3.609	-5.770	-8.130	-6.999

Note: We report here abnormal (and cumulative abnormal) return, which are significant at 10% or less.