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Capital Market Responses to Environmental Performance in Developing Countries

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Capital markets do respond to information about a firm's environmental performance and if properly informed, may provide appropriate financial and reputational incentives for pollution control. Perhaps more resources should be used for disseminating firm-specific information about environmental performance to allow all stakeholders to make informed decisions.

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Summary findings

Firms in developing countries are often said to have no incentives to invest in pollution control because they typically face weak monitoring and enforcement of environmental regulations. But the inability of formal institutions to control pollution through fines and penalties may not be as serious an impediment to pollution control as is generally argued, contend Dasgupta, Laplante, and Mamingi.

Capital markets may react negatively to news of adverse environmental incidents (such as spills or violations of permits) as well as positively to the announcement that a firm is using cleaner technologies.

The authors assess whether capital markets in Argentina, Chile, Mexico, and the Philippines react to the announcement of firm-specific environmental news. They show that:

• Capital markets react positively (the firms' market value increases) to the announcement of rewards and explicit recognition of superior environmental performance.

• They react negatively (the firms' value decreases) to citizens' complaints.

Environmental regulators in developing countries could (1) harness market forces by introducing structured programs to release firm-specific information about environmental performance, and (2) empower communities and stakeholders through environmental education programs.

CAPITAL MARKET RESPONSES
TO ENVIRONMENTAL PERFORMANCE
IN DEVELOPING COUNTRIES

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Acknowledgments

Executive summary

It is generally said that firms in developing countries do not have incentives to invest in pollution control effort because of the weak monitoring and enforcement of the environmental regulations. This argument assumes that the environmental regulator is the only agent that can penalize the firm for a lack of pollution control effort, or reward the firm for good environmental performance or innovation in environmental technologies. It ignores that capital markets may react *negatively* to the announcement of adverse environmental incidents involving specific firms (such as violation of permits, spills, etc.) or *positively* to the announcement of greater pollution control effort such as the adoption of cleaner technologies. Hence, the inability of formal institutions in developing countries to provide incentives for pollution control effort (via the traditional channel of fines and penalties) may not be as serious an impediment to pollution control as is generally argued. Capital markets, if properly informed, may provide the appropriate financial and reputational incentives.

In this paper, we assess whether or not capital markets in Argentina, Chile, Mexico, and the Philippines react to the announcement of firm-specific environmental news. We show that capital markets react positively (increase in firms' market value) to the announcement of rewards and explicit recognition of superior environmental performance; we also show that capital markets react negatively (decrease in firms' value) to citizens' complaints. An immediate policy implication from the current analysis is that environmental regulators in developing countries may explicitly harness those market forces by introducing structured programs of information release on firms' environmental performance, and empower communities and stakeholders through environmental education programs. At the margin, less resources should be devoted to the enforcement of regulations and more to the dissemination of information which allows all stakeholders to make informed decisions.

These results may also shed some new light on the pollution haven hypothesis. A large number of studies have examined the potential impact of environmental regulations on international competitiveness. Many of these have concluded that pollution intensive firms have *not* invested or relocated in developing countries to benefit from lower environmental standards and/or poor enforcement of environmental regulations. Hettige et al. (1992) observes that "one possibility is that the expected profitability of investment in pollution-intensive sectors has also been affected by growing concern over legal liability or reputational damage" (p. 480). To the extent that capital markets may reward firms with good environmental performance and penalize firms with poor environmental performance, the potential reaction of capital markets may explain that the pollution haven hypothesis has so far not found empirical support.

1. Introduction

Though environmental regulations have now been in use for more than 20 years, it is increasingly recognised that their efficacy in controlling pollution emissions has been dampened by a lack of appropriate monitoring and enforcement. Resources devoted by various regulatory agencies to the monitoring of emission standards have typically been characterized as insufficient.[1] Moreover, when compliance with the standards is found to be lacking, it is generally acknowledged that fines and penalties are too low (compared to pollution abatement costs) to act as effective deterrents. In a recent study of environmental regulations in East Asian countries, O'Connor (1994) writes:

> In several of the countries studied here,[2] the monitoring problem is compounded by weak enforcement. In short, when violators of standards are detected, if penalised at all they often face only weak sanctions. (...) polluters are exempted from fines either on grounds of financial hardship or because the violators wield undue political influence. Perhaps the most pervasive problem is that, even when fines are levied, they are frequently so low in real terms that they have little if any deterrent value. In virtually all the countries studied, there remains considerable room for improvement on the enforcement front. (p. 94)

It is indeed generally said that firms in developing countries do not have incentives to invest in pollution control effort because of weak monitoring and enforcement of the environmental regulations. This argument however assumes that the environmental regulator is the only agent that can penalise the firm lacking pollution control effort, or reward the firm for good environmental performance or innovation in

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[1] See Russell (1990).
[2] Those being Japan, Korea, Taiwan, Thailand, and Indonesia.

environmental technologies. It ignores that capital markets may react *negatively* to the announcement of adverse environmental incidents (such as violation of permits, spills, court actions, complaints, etc.) or *positively* to the announcement of greater pollution control effort such as the adoption of cleaner technologies.

The impact of firm-specific environmental news on market value may work its way through various channels: a high level of pollution intensity may signal to investors the inefficiency of the firm's production process; it may invite stricter scrutiny by environmental groups and/or facility neighbours; it may result in the loss of reputation, goodwill, etc. On the other hand, the announcement of a good environmental performance or of the investment in cleaner technologies may have the opposite effect: lesser scrutiny by regulators and communities (including the financial community), greater access to international markets, etc.[3]

Hence, the inability of institutions in developing countries to provide incentives for pollution control effort via the traditional channel of fines and penalties may not be as serious an impediment to pollution control as is generally argued. Capital markets, if properly informed, may provide the appropriate reputational and financial incentives.

A limited number of papers have analyzed the reaction of capital markets to environmental news in Canada and the United States. These studies have generally shown

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[3]   See Porter and Van Linde (1995) and Klassen and McLaughlin (1996) for more details.

that firms suffer from a decline in market values upon announcement of adverse environmental news.[4] In this paper, we assess whether or not capital markets in Mexico, Chile, Argentina, and the Philippines react to the announcement of firm-specific environmental news. To our knowledge, the current analysis is the first of this nature performed in developing countries. Even in those countries where it is generally argued that the environmental regulations suffer from poor implementation, we show that capital markets react negatively (decrease in firms' value) to citizens' complaints targeted at specific firms. We also show that markets react positively (increase in firms' market value) to the announcement of rewards and explicit recognition of superior environmental performance. An immediate policy implication from the current analysis is that environmental regulators in developing countries may explicitly harness those market forces by introducing structured programs of information release on firms' environmental peformance, and empower communities and stakeholders through environmental education programs.[5]

These results may also shed some new light on the pollution haven hypothesis. A large number of studies have examined the potential impact of environmental regulations on international competitiveness.[6] Many of these have concluded that pollution intensive

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[4]   In the United States, these studies include, among others, analysis of the reaction of markets to releases of the *Toxics Release Inventory* (Hamilton (1995) and Konar and Cohen (1997)). Lanoie and Laplante (1994) analyze the reaction of capital markets to environmental news in Canada. For a survey of these studies, see Lanoie, Laplante and Roy (1997).

[5]   We know of at least two such programs currently in place in developing countries: in Indonesia (PROPER Prokasih) and the Philippines (Ecowatch). Similar programs are currently being developed in Mexico and Colombia. For further details. see Afsah et al. (1996).

[6]   See for example, Jaffe et al. (1995), Kolstad and Xing (1994), Levinson (1992), Low and Yeats (1992), Stewart (1993), Tobey (1990), Walter (1992), and Wheeler and Moddy (1992).

firms have *not* invested or relocated in developing countries to benefit from lower environmental standards and/or poor enforcement of environmental regulations. Hettige et al. (1992) observes that "one possibility is that the expected profitability of investment in pollution-intensive sectors has also been affected by growing concern over legal liability or reputational damage" (p. 480). Where traditional tools and actions may have been unable to create incentives for pollution control, our results give some support to this point of view to the extent that capital markets may reward firms with good environmental performance and penalize firms with poor environmental performance.

In the next section, we describe our dataset. In Section 3, we briefly describe the event-study methodology used in this analysis to measure the reaction of capital markets to environmental news (both positive and negative news). Results are presented in Section 4. We briefly conclude in Section 5.

2.   Dataset

The countries retained in this study - Argentina, Chile, Mexico, and the Philippines - are countries where stock markets are believed to work reasonably well, where market capitalization is relatively high and increasing over time (Table 1), and where market concentration is not an impediment to conducting event-study analyses (Table 2).[7]

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[7]   Alhough market concentration may appear to be high, note that the IFC General Indexes represent only a fraction of total market capitalization. Actual market concentration is lower than suggested in Table 2.

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TABLE 1
Capitalization of the stock market of Argentina, Chile, Mexico, and the Philippines, 1990-1994
(in million of U.S. dollars)

Market	1990	1991	1992	1993	1994
Argentina	3 268	18 509	18 633	43 967	36 864
Chile	13 645	27 984	29 644	44 622	68 195
Mexico	32 725	98 178	139 061	200 671	130 246
Philippines	5 927	10 197	13 794	40 327	55 519

Source: International Finance Corporation, *Emerging stock markets factbook,* 1995.

TABLE 2
Market Concentration in the IFC General Indexes, End - 1994

Market	IFCG Index share of total market capitalization	10 largest stocks' share of total market capitalization
Argentina	50.9	41.7
Chile	66.1	46.4
Mexico	63.9	33.8
Philippines	54.4	44.3

Source: International Finance Corporation, *Emerging stock markets factbook,* 1995.

For each country, we selected a newspaper which has a large circulation and is of particular interest to the business community.[8] Environmental news were collected in each of the countries over the period 1990-94 inclusively. Once these news were

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[8]   In the United States, the Wall Street Journal is generally the preferred source of information for conducting event-study analyses. In Argentina, environmental news were collected from the newspaper *La Nacion* (daily circulation of approximately 250 000; ranks 3rd in Buenos Aires); in Chile, we used *El Mercurio* (daily circulation of approximately 200 000; ranks 3rd in Santiago); in Mexico City, we used *Excelsior* (daily circulation of 200 000; ranks 7th in Mexico City); finally, in the Philippines, news were collected from the *Manila Bulletin* (daily circulation of 300 000; ranks 3rd in Manila). All newspapers were available from the Library of Congress for most of the period 1990-94. Information from missing issues was obtained directly from the publishers of the papers in the respective countries.

collected, we identified those articles involving firms traded in local capital markets. As shown in Table 3, the number of environmental news (i.e. newsclips) collected in each country is relatively large (a total of 7 354 environmental news were collected over the period 1990-94), with Mexico alone representing 47.5% of the total number of news. The number of environmental news is also relatively constant over the period of analysis. Approximately 20% of the news involve specific firms, traded and non-traded. As expected, the number of news involving publicly traded companies is relatively small in all countries. However, publicly traded companies represent a much larger share of the number of companies cited in environmental news than their relative numbers in the economy. This may be explained by their generally larger size, thus being of greater scrutiny.

TABLE 3
Number of news (1990-1994)

	1990	1991	1992	1993	1994
Argentina					
Total number of environmental news	201	189	168	198	170
With name of non-traded companies	28	32	48	33	27
With name of publicly traded companies	0	0	2	13	15
Chile					
Total number of environmental news	309	285	293	282	272
With name of non-traded companies	29	48	43	22	32
With name of publicly traded companies	4	25	34	36	16
Mexico					
Total number of environmental news	625	707	759	613	618
With name of non-traded companies	161	143	118	73	88
With name of publicly traded companies	14	25	7	10	8
Philippines					
Total number of environmental news	317	309	334	265	266
With name of non-traded companies	54	47	44	47	55
With name of publicly traded companies	8	8	4	9	12

Environmental news were divided into two groups: positive (e.g. rewards, investment in pollution control, etc.), and negative (e.g. spills, complaints, warnings, etc.). The sample set is described in Table 4. As can be observed, Chile registered 53 events (environmental news) involving 17 publicly traded firms over the period 1990-94; 20 of those events were positive while 33 were negative. Argentina registered 20 events (5 positive and 15 negative) involving 11 firms. The Manila Bulletin reported 18 events (10 positive and 8 negative) with 10 firms. Finally, the Mexican sample consists of 35 events (of which only 4 were positive) involving 10 publicly-traded firms firms. Observe that the number of events in Table 4 is smaller than the number of news (with name of publicly traded companies) in Table 3. This is the case since a significant number of newsclips is simply a repetition or follow-up on an initial event and does not provide any additional information to what is already known. In most cases, we have included in our dataset only the announcement of the initial event.

Table 4
Description of data set

Country	Name of firm[1]	Sector of activity	Nature and Number of Events	
			Positive	Negative
Argentina	Astra	Oil	1	1
	Ipako	Oil	1	2
	Perez	Oil	0	2
	YPF	Oil	1	4
	Celulosa	Pulp and paper	1	0
	Telefonica	Telephone	0	1
	Colorin	Chemical	0	2
	Indupa	Chemical	1	0
	Molinos Rio	Food	0	1
	Sevel	Metal	0	1
	Siderca	Metal	0	1
Total	**11 firms**	**6 sectors**	**5**	**15**

Table 4 (continued)

Country	Name of firm	Sector of activity	Nature and Number of Events	
			Positive	Negative
Chile	Endesa	Electric	3	4
	Chilgener	Electric	4	4
	CMPC	Pulp and paper	2	1
	CAP	Metal	3	4
	Volcan	Building material	0	1
	Minera	Investment	0	1
	Vapores	Transportation	0	1
	Emos	Water	3	1
	Puerto	Water	0	1
	Victoria	Fabric	0	1
	Iansa	Food	1	1
	Molymet	Metal	1	1
	Coloso	Fishery	0	5
	Iquique	Fishery	1	5
	Lirquien	Building material	0	1
	Chilectra	Electric	1	1
	Eperva	Fishery	1	0
Total	**17 firms**	**10 sectors**	**20**	**33**
Mexico	Cydsasa	Pulp and paper, oil	1	3
	Grupo Maya (A)	Cement	0	6
	Grupo Maya (B)	Cement	0	4
	Tolteca (Tolmex)	Cement	0	2
	Met-Mex Penoles (A)	Mining	1	6
	Met-Mex Penoles (B)	Mining	0	3
	Femsa	Food	1	0
	Grupo Vitro	Manufacture	1	0
	GC3	Cement	0	1
	Kimberly y Clark	Pulp and paper	0	2
	Grupo Bimbo	Food	0	2
	Telefonos de Mexico	Communication	0	2
Total	**10 firms**	**8 sectors**	**4**	**31**
Philippines	Apex Mining	Mining	0	1
	Atlas C. Mining	Mining	1	0
	Ayala Land, Inc.	Property	0	1
	Benguet	Mining	3	2
	Jolibee	Food	1	0
	Lepanto	Mining	0	1
	Manila Mining	Mining	1	0
	Mondragon	Trading	0	1
	San Miguel	Food	4	1
	Robinson Land	Property	1	0
Total	**10 firms**	**5 sectors**	**10**	**8**

Complete names of firms appear in Appendix 1.

III. Event-study methodology

The event-study methodology is used in this study to examine the reaction of investors to positive and negative news (also called events).[9] The methodology is based on the assumption that capital markets are sufficiently efficient to evaluate the impact of new information (events) on expected future profits of the firms. It involves the following steps: (1) identification of the events of interest and definition of the event window[10]; (2) selection of the sample set of firms to include in the analysis;[11] (3) prediction of a "normal" return during the event window in the absence of the event; (4) estimation of the abnormal return within the event window, where the abnormal return is defined as the difference between the actual and predicted returns; and (5) testing whether the abnormal return is statistically different from zero. Several methods may be used to obtain to estimate abnormal returns: the single-index model (constant mean return model), the market model and the capital asset price model (CAPM) are the most widely used.

The market model assumes a linear relationship between the return of any security to the return of the market portfolio:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it}$$

(1) $\qquad$ *with* $E(e_{it}) = 0$ $\qquad$ *and* $\qquad Var(e_{it}) = \sigma^2_{e_i}$

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[9] $\quad$ For more details, see MacKinlay (1997).

[10] $\quad$ The event window consists of the day where the event occured (day 0) and some days before and after the event.

[11] $\quad$ Firms may be excluded if simultaneous events are occuring within the event window.

where t is the time index, $i = 1,2,\ldots,N$ stands for security, R_{it} and R_{mt} are the returns on security i and the market portfolio respectively during period t, and e_{it} is the error term for security i.

Equation (1) is generally estimated over a period which runs between 120 and 210 days prior to the event up to 10 days prior to the event. The event window is defined as the period from 10 days prior to the event to 10 days after the event. With the estimates of α_i and β_i from equation (1), one can predict a "normal" return during the days covered by the event window. The prediction error (the difference between the actual return and the predicted normal return), commonly referred to as the abnormal return (AR), is then calculated as:

$$(2) \qquad AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

Under the null hypothesis, the abnormal returns will be jointly normally determined with a zero conditional mean and conditional variance $\sigma^2(AR_{it})$:

$$(3) \qquad \sigma^2(AR_{it}) = \sigma_{e_i}^2 + \frac{1}{L}\left[1 + \frac{(R_{mt} - \overline{R}_m)^2}{\sigma_m^2} \right]$$

where L is the estimation period length (i.e. number of days used for estimation) and $\overline{R}_m$ is the mean of the market portfolio. With L large, $\sigma^2(AR_{it}) \rightarrow \sigma_{e_i}^2$.

For each individual event, one can estimate the abnormal return and relevant test statistics at each instant in time within the event window. However, in order to draw overall inference on the abnormal return observations for the event(s) of interest, one can also aggregate the abnormal returns. For any given subset of N events (or securities), the sampled aggregated abnormal returns (AAR_t) at each instant t within the event window is computed as

$$(4) \qquad AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it}$$

For large L, the variance is

$$(5) \qquad VAR(AAR_t) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{e_t}^2$$

To test for the significance of AAR_t a Z (or t) test can be derived.

In order to test for the persistence of the impact of the event during a period $(T_2 - T_1)$, the abnormal return can be added to obtain the cumulated abnormal returns $(CAR_i(T_1, T_2))$ for security i over the period $(T_2 - T_1)$:

$$(6) \qquad CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{it}$$

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where $T_a \le T_1 < t < T_2 \le T_b \in$ event window, and T_a and T_b are the lower and upper limits of the event window, respectively. Asymptotically (as L increases) the variance of the cumulative abnormal return for security i is

(7) $$\sigma_i^2(T_1, T_2) = (T_2 - T_1 + 1)\,\sigma_{\varepsilon_i}^2.$$

To test the null hypothesis of zero cumulative abnormal return, one can formulate a Z test as $CAR_i(T_1, T_2) \sim N(0, \sigma_i^2(T_1, T_2))$:

(8) $$Z = \frac{CAR}{(\sigma_i^2(T_1, T_2))^{1/2}} \sim N(0,1)$$

An aggregation of interest can also be performed across both time and events. In that scenario, the average cumulative abnormal return is defined as:

(9) $$CAAR(T_1, T_2) = \frac{1}{N}\sum_{i=1}^{N} CAR_i(T_1, T_2)$$

where N is the number of events. The variance of $CAAR$ is

(10) $$\mathrm{var}(CAAR(T_1, T_2)) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_i^2(T_1, T_2)$$

Under the null hypotheses that the abnormal returns are zero,

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$$(11) \qquad Z = \frac{CAAR(T_1, T_2)}{(\text{var}(CAAR(T_1, T_2)))^{1/2}} \sim N(0,1)$$

As pointed by MacKinlay (1997, pp. 24), this distributional result is asymptotic with respect to the number of securities N and the length of estimation window L.

In the next section, we present results obtained from using the single-index model (constant mean return model).[12]

IV.   Empirical Results

We apply the event-study methodology to the environmental events collected in each of the country over the period 1990-94. While various subsets of firms can be presented (e.g. by countries, by industrial sectors, etc.), each of those subsets contains a relatively small number of firms, and results in each subset are typically driven by changes in the market values of a limited number of firms. Hence, for the purpose of the analysis, we first present the results obtained at the most disaggregated level, i.e. the firm level. This is more likely to indicate the nature of the events to which capital markets

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[12]   The single-index model is a particular case of the market model described above. Where market returns were available, we also obtained results using the market model. Results were similar to those presented here. In fact, Henderson (1990) points out that the three estimating methodologies yield results of similar nature.

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appear to be more sensitive. In Table 5 and 7. we indicate the nature of events for which statistically significant increases or reductions in market values are observed.[13]

With respect to positive news. it is of extreme interest to note in Table 5 (and Appendix 2) that out of the 13 events for which statistically significant increases in market values are obtained, 8 of them involve the report of an agreement with the regulator or the explicit recognition by the regulator of a superior environmental performance. That a firm reports an investment in pollution control (or compliance with standards) does not appear to impact capital markets. Markets appear to react to the recognition of such investment or performance by the authorities. For those events, market values increase by more than 20% over the entire event window.

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[13] Complete statistical results are presented in Appendix 2 and 3. Where the length of estimation period is too short, we combine days prior to the event window with post event period starting 30 days after the event window.

Table 5
Positive events
(* indicates a statistically significant increase in market value)

ARGENTINA		
Name of Company	**Date**	**Nature of Event**
Astra	3/15/94	Investment in environmental protection.
Ipako	2/7/93	Investment in environmental protection.
YPF	12/24/94	Investment to save birds.
Celulosa	8/3/92	Investment in manufacturing recyclable papers.
Indupa	2/7/93	Company action : agreement with government for environmental performance improvement.
CHILE		
Endesa	1/31/92 9/6/93 8/8/94	Investment in pollution abatement. Court verdict: positive for the company. Investment in environmental protection.
Chilgener	1/9/90 * 8/5/90 11/9/93 * 6/23/94	Pollution abatement: agreement between company and government. Pollution abatement announcement. Government action: agreement approved by the President of Chile. Company action: declaration of technical aspects of the agreement.
CMPC	2/26/92 1/7/94 *	Investment in water pollution abatement. Investment realization: recycling plant to be inaugurated by the president of Chile.
CAP	8/15/92* 10/2/92 11/8/92 *	Court verdict: investment in pollution abatement. Investment action: use of equipment for pollution control. Government action: recognition of the company's investment in pollution control equipment.
Emos	4/16/92 2/24/93 8/11/93	Investment in construction of a waste water treatment plant. The treatment plant will start working from March 15. President of Chile will officially inaugurate the plant.
Iansa	9/26/93 *	Investment in water pollution abatement.
Molymet	10/11/93	Pollution treatment plant inaugurated by the President of Chile.
Iquique	8/11/92	Investment in pollution abatement.
Chilectra	5/29/93	Company reward for environmental performance.
Eperva	7/1/94	Self impact assessment of environment.

Table 5 (continued)

MEXICO		
Cydsasa	5/11/92	Investment in improvement of environment.
Apenol	7/10/93 *	Announcement: existence of pollution control equipment.
Femsa	9/14/91	Agreement with government on pollution abatement.
Vitro	4/18/91*	Investment in environmental projects.
PHILIPPINES		
Atlas	10/20/90	The company has a representation project since 1970.
Benguet	12/28/92	Government action: mandatory environmental guarantee fund for the company.
	7/19/93 *	Government action: Reward (trophy) for reforestation program.
	2/6/94	Investment in environmental protection.
Jolibee	6/28/94*	Investment in recyclable paper.
Manila Mining	4/17/92 *	Compliance certified by the Environmental Regulatory authority of Philippines.
San Miguel	11/5/90 *	Investment in waste water treatment plant.
	2/10/91 *	Government action: praise company for having environmental concern.
	9/14/91	Company action: implementation of reforestation project.
	6/8/93	Announcement: new waste water treatment plant.

As indicated in Section 3, it is possible to pool together events and test for the statistical significance of the average abnormal return for the events thus pooled. Given the nature of the results on individual stock markets, it is of interest to test if government actions (e.g. agreements and awards) as a whole are statistically significant. In Table 6, we have grouped together these government actions and treated them as a single set of events. As can be observed, government actions as a whole are mildly statistically significant on day +1. However, the difference between government actions and other

positive events fail to be statistically significant. This may be explained by noting in

Table 5 that 3 individual government actions failed to be statistically significant.[14]

Table 6
Government actions vs Other positive events[15]

Day -1		Day 0		Day +1		Window
Government actions						
AAR	CAAR	AAR	CAAR	AAR	CAAR	CAAR
5.080	23.805	-10.627	13.177	14.420•	27.615	9.574
(0.650)	(0.904)	(-1.360)	(0.509)	(1.846)	(1.020)	(0.267)
All other positive events						
-2.156	-10.583	-0.846	-11.457	-1.625	-15.488	17.245
(0.176)	(-0.247)	(-0.069)	(-0.255)	(-0.133)	(-0.330)	(0.308)
Government actions Vs All other positive events						
7.236	34.387	-9.781	24.634	16.045	43.103	-7.670
(0.499)	(0.696)	(-0.674)	(0.475)	(1.106)	(0.796)	(-0.115)

These results give some support to public information programs whereby the

regulator rates and releases not only bad environmental performance but also superior

performance. The results indicate that such recognition does not solely limit itself to an

increase in reputation but also has a positive financial impact on the firm (through an

expected increase in demand brought about by the enhanced reputation, or reduction in

expected costs, e.g. lesser scrutiny by environmental groups, communities, and

regulators).

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[14] In Argentina: Indupa (2/7/93). In Chile: Emos (8/11/93) and Molymet (10/11/93). In these last two events, it was announced that the President of Chile would inaugurate a plant (as opposed to approving an investment or agreement).

[15] For Government actions and All other positive events, the sampled aggregate abnormal return (AAR) is computed for day -1, 0, and +1. The average cumulative abnormal return (CAAR) is computed for day -10 up to the day. For the event window, the average cumulative abnormal return is calculated over the period -10 to +10. Within brackets is the value of the Z statistics. For Government actions Vs All other positive events, the AAR is here defined as the difference between the AAR for Government actions and the AAR for All other positive events. The Z statistics is defined accordingly. "•", "*", and "**" means significant at the 10%, 5% and 1% level respectively (one tailed-test).

With respect to negative events (Table 7), we obtain statistically significant

decreases in market values especially when it is reported that governments or citizens

have complained about the pollution record of the firm, and not when court actions or

fines are reported.

Table 7
Negative events
(* indicates a statistically significant reduction in market value)

Name of Company	Date	Nature of Event
ARGENTINA		
Ipako	10/16/92* 9/9/93	Government action: warning about pollution problem. Accident.
Perez	5/2/93 12/12/94	Government action: warning for oil spill. Accidental oil spill.
YPF	11/7/93* 11/30/93 * 1/24/94 8/10/94	Environmental problem (birds killed). Citizens complaint. Government action: warning. Oil spill to river.
Colorin	8/2/93 11/2/94 *	Suspicious transfer of solid waste. Government deadline to company.
Molinos	9/30/93	Government action: fine.
Sevel	8/2/93	Government Court action against co.
Siderca	11/2/94	Government action: warning.
CHILE		
Endesa	1/19/92 * 9/29/92 * 2/7/93 4/21/93 *	Government complaint. Warning from environment ministry. President's advice on pollution improvement. Citizens protests against company.
Chilgener	7/13/90 1/19/92 4/8/92 * 4/16/92	Government complaint. Government complains on bad environmental performance of the company. Environmental accident. Court action by citizens.
CMPC	9/30/92 *	Citizens complain about solid waste pollution.
CAPC	4/2/91 6/27/92 8/8/92 8/12/92	Air polluter. Court action by citizens. Grace period granted to curb water pollution. Government supports court action.
Volcan	12/2/93	Government black list of polluters.

Table 7 (continued)

Minera	9/2/91	Court action.
Vapores	6/6/92	Company is fined by government.
Emos	10/17/93	Accident: drinking water contamination.
Puerto	7/23/92 *	Government complains about health hazard in the vicinity of the company.
Victoria	12/2/93	Government black list of air polluter.
Iansa	5/29/93	One of the plants ordered to shutdown.
Coloso	4/1/92	Government action: fine.
	12/2/93	Government action: company shutdown for few hours.
	2/5/94	Court action:fine.
	3/11/94	Government action: company shutdown.
	3/18/94	Citizens complaint: accident.
Iquique	4/1/92 *	Government action: fine.
	12/21/93	Government action: fine.
	2/5/94	Court action: fine.
	3/10/94	Government action (Company closed for 72 hours).
	3/11/94	Court action for bad smell problem.
Lirquien	7/15/92	Government black list of air polluter.
Chilectra	7/11/92	Citizens complain against company expansion.
Molymet	1/19/92	Government complaint: company major air polluter.
PHILIPPINES		
Apex	4/24/91 *	Government action.
Ayala	12/8/94 *	Government warning.
Benguet	3/21/90	Government action: penalty.
	3/23/90	Workers dismissals.
Lepanto	10/22/90	Pollution problem resulting in death and illness.
Mondragon	10/11/94	Complaint by citizens about tree cutting.
Robinson Land	6/15/94	Government action: company shutdown.
San Miguel	10/7/94	Oil spill.
MEXICO		
Cydsasa	2/16/90	Spill causing death and injury.
	3/19/92	Black list of air polluter for company's subsidiary.
	10/9/92	Government action: environmental audit.
Grupo Maya (A)	10/4/90	NGO's black list of air polluter.
	3/12/91	Company relocation requested by Citizens.
	3/15/91	Government action: warning.
	9/20/91 *	Citizens complaint.
	11/27/91*	(11/25/94): Citizens and ecologists complaint.
	7/29/92 *	Citizens complaints.

Table 7 (continued)

Grupo Maya (B)	3/12/91	Company relocation requested by Citizens.
	3/15/91	Government action: warning.
	9/20/91 *	Citizens complaint.
	11/27/91*	(11/25/94): Citizens and ecologists complaint.
Tolteca	10/14/90	NGO's black list of air polluter.
	2/13/92	Temporary and partial shutdown.
Met-Mex Penoles (A)	3/22/91	Citizens complaints.
	6/4/91	Company pollution bad record pointed by a Senator.
	8/9/91 *	Government action: company temporarily shutdown.
	3/2/94	Accident: citizens complaint.
	3/4/94	Pollution control equipment investigation.
	8/27/94	Relocation of 300 families living in the vicinity of the co.
Met-Mex Penoles (B)	3/22/91	Citizens complaints.
	6/4/91 *	Company pollution bad record pointed by a Senator.
	3/4/94	Pollution control equipment investigation.
Cementos de Chiguagua (GC3)	5/25/92	Government action: warning about environmental performance.
Kimberly Clark	5/21/92 *	Government action: fine for water pollution.
Grupo Bimbo	3/19/92 *	Black list of air polluter.
	2/14/93	Government action: initiate court action.
Telefonos de Mexico	5/21/93	Government action: warning about tree cutting.
	6/9/94	Government action: fine.

Given the nature of these results, we have pooled together government and citizens' complaints and tested whether or not they had a statistically significant differential impact on market values when compared to all other negative events. Results in Table 8 indicate that they strongly do.

Table 8
Complaints Vs All other negative events[16]

Day -1		Day 0		Day +1		Window
Complaints (Government and Citizens)						
AAR	CAAR	AAR	CAAR	AAR	CAAR	CAAR
-1.405	-30.209*	3.137	-27.331*	-1.244	-24.473•	-36.014•
(-0.343)	(-2.335)	(0.767)	(-2.014)	(-0.304)	(-1.727)	(-1.921)
All other negative events						
-2.751	-1.274	0.524	-1.489	2.889	2.680	1.1687
(-0.988)	(-0.146)	(0.190)	(-0.162)	(1.047)	(0.280)	(0.092)
Complaints Vs All other negative events						
1.347	-28.934•	2.613	-25.842•	-4.133	-27.152•	-37.182•
(0.273)	(-1.853)	(0.530)	(-1.578)	(-0.838)	(-1.587)	(-1.643)

We may interpret this result by noting that the filing of a complaint can provide *unanticipated* news to markets leading them to expect further actions, yet unknown, to be undertaken. Reductions in market values range on average from 4% to 15%. These losses are much greater in magnitude than any losses observed in previous studies conducted in developed countries.[17]

V.   Conclusion

In this paper, we have shown that despite a generally acknowledged poor enforcement of environmental regulations, capital markets in Argentina, Chile, Mexico and the Philippines appear to react to the announcement of environmental events involving publicly traded companies. While fines and penalties used by the environmental agencies of these countries may have fallen short of creating incentives for pollution control, capital markets have penalised firms suffering from adverse environmental events, and rewarded firms with positive environmental news. While we

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[16]   See Footnote 15 for details of computation.
[17]   See Lanoie et al. (1997) for more details.

are certainly not arguing that strong enforcement of regulations should be abandoned and that markets (firms, consumers, communities) be left to themselves to negotiate and induce pollution abatement from polluters (not all firms may be responsive to public release of their environmental performance), these results suggest that in numerous circumstances market forces (even in developing countries) have not remained idle upon receiving signals of the environmental performance of firms. These results indicate that at the margin, environmental regulators should devote less resources to the enforcement of regulations, and more to the collection, analysis, and dissemination of appropriate, reliable, and timely information. Further research in this area will indicate whether or not our findings can be generalised, as well as providing a greater understanding of the mechanisms which underpin the reaction of capital markets.

Moreover, whether or not firms have "voluntarily" undertaken pollution abatement activities seeking the obtention of the reward, and whether or not adverse market reaction has lead firms to subsequently invest in pollution control is a further issue of investigation.[18] It is indeed currently beyond the realm of our possibilities to comprehensively address this issue as it requires a vast amount of firm-level data that is not currently available for the countries studied here. From an anecdotal point of view however, it is interesting to note, among others, that after Chilgener (Chile) had released a cloud of toxic air pollution over Santiago and suffered a loss of 5% of its market value

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[18]   Konar and Cohen (1997) have shown that firms that have suffered the largest reduction in market value following the release of the TRI in 1989 have subsequently invested most in pollution abatement.

in April 1992, it announced on September 25 1992, an investment of 115 million dollars to control air pollution.

ARGENTINA

Astra:	Astra Compania Argentina de Petroleo
Ipako:	Ipako Industria Petroquimica
Perez:	Perez Compane
YPF:	Yacimientos Petroliferos Fiscales
Celulosa:	Empresa Celulosa Argentina
Telefonica:	Empresa Telefonica de Argentina
Colorin:	Colorin Industrial de Material Sintetico
Indupa:	Indupa
Molinos Rio:	Molinos Rio de la Plata
Sevel:	Sevel Argentina
Siderca:	Siderca

CHILE

Endesa:	Empresa Nacional de Electricidad
Chilgener:	Chilgener
CMPC:	Compania Manufacturera de Papetes y Cartones
CAP:	Compania de Acero del Pacifico
Volcan:	Compania Industrial el Volcan
Minera:	Compania Minera Tamaya
Vapores:	Compania Sud Americana de Vapores
Emos:	Empresa Metropolitana de Obras Sanitarias
Puerto:	Empresa Portuaria Puchoco
Victoria:	Fabrica Victoria de Puente Alto
Iansa:	Industria Azucarara Nacional
Molymet:	Molibdenos y Metales
Coloso:	Empresa Pesquera Coloso
Iquique:	Pesquera Iquique
Lirquien:	Vidrios y Planos Lirquien
Chilectra:	Chilectra
Eperva:	Empresa Pesquera Eperva

MEXICO

Cydsasa:	Celulosa y Derivados
Grupo Maya:	Grupo Empresarial Maya
Tolteca (Tolmex):	Cementos Tolteca
Met-Mex Penoles:	Empresa Metalurgica Met-Mex Penoles
Femsa:	Fomento Economico Mexicano
Vitro:	Grupo Vitro
GC3:	Cementos de Chiguagua
Kimberly Clark:	Kimberly y Clark de Mexico
Bimbo:	Grupo Bimbo
Telmex:	Telefonos de Mexico

PHILIPPINES

Apex Mining:	Apex Mining Company
Atlas C. Mining:	Atlas Consolidated Mining & Development Corporation
Ayala Land:	Ayala Land
Benguet:	Benguet Corporation
Jolibee:	Jolibee Corporation
Lepanto:	Lepanto Consolidated Mining Company
Manila Mining:	Manila Mining
Mondragon:	Mondragon International Philippines
San Miguel:	San Miguel Corporation
Robinson Land:	Robinson Land Corporation

Appendix 2
Reaction of Market to Positive News[1]

ARGENTINA								
		day -1		day 0		day + 1		Event window
Astra	3/15/94	2.651 (1.017)	2.705 (0.328)	-0.476 (-0.183)	2.229 (0.258)	-1.355 (-0.520)	0.874 (0.097)	-7.626 (-0.639)
Ipako	2/7/93	-4.107 (-0.534)	2.266 (0.093)	-2.819 (-0.366)	-0.553 (-0.054)	-0.825 (-0.107)	-1.378 (-0.052)	19.965 (0.566)
YPF	12/24/94	-4.573 (-0.169)	-4.714 (-0.123)	-2.279 (-0.084)	-6.933 (-0.149)	-0.346 (-0.013)	-7.339 (-0.136)	-7.695 (-0.127)
Celulosa	8/3/92	-2.462 (-0.425)	-10.117 (-0.546)	0.696 (0.119)	-9.421 (-0.485)	0.696 (0.119)	-8.725 (-0.430)	-9.984 (-0.372)
Indupa	2/7/93	-1.106 (-0.157)	11.735 (0.528)	-5.145 (-0.732)	6.589 (0.283)	0.855 (0.122)	7.444 (0.306)	18.187 (0.565)

CHILE								
Firms	Date	AR	CAR	AR	CAR	AR	CAR	CAR
Endesa	1/31/92	0.873 (0.327)	2.428 (0.288)	1.029 (0.386)	3.457 (0.391)	-0.861 (-0.323)	2.596 (0.281)	8.568 (0.700)
	9/6/93	-0.426 (-0.318)	-0.367 (-0.087)	-0.031 (-0.023)	-0.397 (-0.090)	-0.096 (-0.072)	-0.493 (-0.106)	0.530 (0.086)
	8/8/94	-0.019 (-0.015)	0.839 (0.213)	-0.486 (-0.391)	0.353 (0.085)	-1.497 (-1.203)	-1.145 (-0.265)	-2.388 (-0.419)
Chilgener	1/9/90	0.347 (0.146)	6.899 (0.917)	0.596 (0.251)	7.495 (0.950)	1.588 (0.668)	9.083 (1.102)	21.290* (1.953)
	8/5/90	-3.626 (-1.350)	-12.180 (-1.434)	-4.386 (-1.633)	-16.566 (-1.860)	-2.500 (-0.931)	-19.066 (-2.049)	-21.697 (-1.863)
	11/9/93	2.746 * (1.780)	7.624• (1.563)	0.943 (0.611)	8.567* (1.674)	0.250 (0.162)	8.817* (1.650)	25.443** (3.599)
	6/23/94	-1.510 (-0.654)	-8.549 (-0.943)	-1.711 (-0.746)	-9.843 (-1.124)	-1.343 (-0.586)	-8.753 (-1.245)	-23.820 (-2.267)
CMPC	2/26/92	1.401 (0.699)	3.346 (0.505)	2.560 (1.222)	5.906 (0.850)	-0.604 (-0.288)	5.302 (0.731)	0.755 (0.144)
	1/7/94	-2.523 (-2.188)	4.475 (1.227)	1.957* (1.697)	6.431* (1.681)	2.980** (2.584)	9.412** (2.356)	25.915** (4.903)
CAP	8/15/92	-3.077 (-1.387)	-5.639 (-0.803)	3.597• (1.621)	-2.042 (-0.277)	0.260 (0.117)	-1.783 (-0.232)	0.094 (0.009)
	10/2/92	0.448 (0.261)	(-2.033) (-0.375)	1.430 (0.833)	-0.603 (-0.106)	-0.745 (-0.433)	-1.344 (-0.277)	0.808 (0.103)
	11/8/92	-0.105 (-0.095)	2.095 (0.420)	1.544 (0.979)	3.640 (0.730)	2.850* (1.807)	6.489• (1.301)	21.613** (2.991)

[1] The cumulative abnormal return for day -1, 0 and +1 is computed for day -10 up to the specified day. For the event window, the cumulative abnormal return is calculated over the period -10 to +10. Within brackets is the value of the Z statistics. "•", "*", and "**" means significant at the 10%, 5% and 1% level respectively (one tailed-test).

Appendix 2 (continued)

Name	Date							
Emos	4/16/92	-9.544 (-1.797)	-13.429 (-0.799)	-0.453 (-0.085)	-13.884 (-0.788)	-2.58 (-1.215)	-27.684 (-1.137)	-27.684 (-1.137)
	2/24/93	1.131 (0.257)	-1.194 (-0.086)	-0.385 (-0.087)	-1.578 (-0.108)	-1.137 (-0.258)	-2.175 (-0.178)	-12.693 (-0.629)
	8/11/93	-0.024 (-0.006)	-0.169 (-0.012)	-0.024 (-0.06)	-0.193 (-0.015)	-0.024 (-0.006)	-0.217 (-0.227)	0.919 (0.051)
Iansa	9/26/93	-0.727 (-0.345)	9.881• (1.483)	-1.626 (-0.772)	8.255 (1.182)	0.170 (0.081)	8.425 (1.155)	21.265** (2.203)
Molymet	10/11/93	-5.500 (-0.704)	-15.168 (-0.614)	-1.409 (-0.180)	-16.577 (-0.634)	-1.409 (-0.180)	-17.986 (-0.664)	-35.849 (-1.000)
Iquique	8/11/92	-5.947 (-1.293)	-4.452 (-0.306)	-0.437 (-0.095)	-4.889 (-0.320)	-4.603 (-1.001)	-9.492 (-0.596)	-13.421 (-0.638)
Chilectra	5/29/93	-1.026 (-0.500)	4.499 (0.533)	-1.039 (-0.506)	3.460 (0.387)	-0.822 (-0.401)	2.368 (0.371)	8.440 (0.897)
Eperva	7/1/94	-2.284 (-0.491)	3.093 (0.210)	-4.802 (-1.031)	-1.709 (-0.111)	-7.642 (-1.642)	-9.352 (-0.580)	11.877 (0.557)
MEXICO								
Cydsasa	5/11/92	-0.361 (-0.129)	-10.654 (-1.363)	-0.3975 (-0.052)	-10.783 (-1.299)	-1.729 (-0.052)	-10.912 (-1.259)	-12.558 (-1.109)
Apenol	7/10/93	1.603 (0.806)	0.927 (0.147)	9.979** (5.018)	10.905* (1.653)	-1.997 (-1.004)	8.909• (1.293)	11.397 (1.241)
Femsa	9/14/91	-0.872 (-0.247)	-3.102 (-0.278)	-2.967 (-0.840)	-6.068 (-0.518)	1.254 (0.355)	-4.814 (-0.393)	-13.125 (-0.817)
Vitro	4/18/91	4.863** (2.533)	11.703* (1.943)	-4.213 (-2.212)	7.490 (1.186)	-1.922 (-1.046)	5.498 (0.833)	-8.386 (-0.936)
PHILIPPINES								
Atlas	10/20/90	0.142 (0.045)	0.419 (0.042)	-1.078 (-0.342)	-0.658 (-0.063)	0.142 (0.045)	-0.517 (-0.047)	-10.746 (-0.945)
Benguet	12/28/92	-0.071 (0.015)	0.049 (0.003)	-8.404 (-1.773)	-8.356 (-0.531)	-0.071 (-0.015)	-8.426 (-0.513)	-16.287 (-0.750)
	7/19/93	-0.111 (-0.020)	7.769 (0.441)	-0.111 (-0.020)	7.657 (0.415)	7.581• (1.303)	15.238 (0.790)	42.271* (1.656)
	2/6/94	-0.107 (-0.019)	-3.926 (-0.224)	-0.107 (-0.019)	-4.033 (-0.219)	-0.107 (-0.019)	-4.141 (-0.216)	-9.660 (-0.389)
Jolibee	6/28/94	0.032 (0.010)	-9.049 (-0.910)	0.032 (0.010)	-9.017 (-0.868)	4.032• (1.282)	-4.985 (-0.458)	-14.616 (-1.014)
Manila Mining	4/17/92	29.086** (5.211)	20.201 (1.145)	-8.606 (-1.542)	11.595 (0.526)	40.753** (7.302)	52.347** (2.708)	107.786** (4.214)
San Miguel	11/5/90	1.843 (0.696)	18.210* (2.199)	0.353 (0.135)	18.563** (2.138)	-1.097 (-0.419)	17.466* (1.926)	20.663* (1.722)
	2/10/91	3.688 (1.244)	33.578** (3.582)	4.651* (1.571)	38.234** (3.889)	-2.738 (-0.924)	35.496** (3.457)	48.323** (3.557)
	9/4/91	-0.342 (-0.120)	-7.808 (-0.867)	-0.342 (-0.120)	-8.150 (-0.862)	-1.268 (-0.445)	-9.418 (-0.954)	-12.389 (-0.949)
	6/8/93	-4.008 (-0.059)	-43.761 (-0.204)	-5.875 (-0.087)	-49.636 (-0.211)	-5.262 (-0.078)	-54.894 (-0.234)	-97.839 (-0.315)

Reaction of Market to Negative News[1]

Firms	Date	day -1		day 0		day +1		Event window
		AR	*CAR*	*AR*	*CAR*	*AR*	*CAR*	*CAR*
ARGENTINA								
Astra	9/10/93	-1.057	8.415	-1.969	6.447	-0.864	5.583	4.333
		(-0.385)	(0.743)	(-0.717)	(0.708)	(-0.315)	(0.587)	(0.344)
Ipako	10/16/92	-21.038**	-20.897	0.664	-20.143	28.381	8.238	50.549
		(-3.902)	(-0.967)	(0.098)	(-0.893)	(4.171)	(0.350)	(1.621)
	9/9/93	3.037	-13.871	-0.167	-14.038	0.180	-13.858	-20.347
		(0.646)	(-0.889)	(-0.035)	(-0.944)	(0.038)	(-0.850)	(-0.944)
Perez	5/2/93	-1.706	1.876	-0.003	1.873	2.491	4.364	18.290
		(-0.374)	(0.130)	(-0.001)	(0.124)	(0.547)	(0.277)	(0.876)
	12/12/94	-0.053	0.255	1.439	1.694	0.580	2.274	-14.778
		(-0.021)	(0.031)	(0.556)	(0.197)	(0.224)	(0.254)	(-1.245)
YPF	11/7/93	1.057	-10.942*	2.224	-8.718 •	1.978	-6.740	-8.499
		(0.600)	(-1.963)	(1.262)	(-1.491)	(1.122)	(-1.104)	(-1.052)
	11/30/93	-0.306	-10.723*	1.519	-9.204•	-1.102	-10.305*	-14.820*
		(-0.171)	(-1.890)	(0.847)	(-1.547)	(-0.614)	(-1.658)	(-1.803)
	1/24/94	-1.631	-0.973	-0.710	-1.683	1.564	-0.119	7.406
		(-0.964)	(-0.182)	(-0.420)	(-0.300)	(0.924)	(-0.020)	(0.955)
	8/10/94	-0.052	-0.522	-0.250	-0.773	-0.647	-1.420	-1.477
		(-0.028)	(-0.090)	(-0.136)	(-0.300)	(-0.352)	(-0.223)	(-0.175)
	5/15/94	2.692	7.326	2.924	10.250	5.306	15.556	15.461
		(0.948)	(0.816)	(1.030)	(1.089)	(1.343)	(1.582)	(1.189)
Color	8/2/93	-5.761	5.786	0.211	5.977	0.211	6.208	15.708
		(-0.744)	(0.240)	(0.028)	(0.237)	(0.028)	(0.235)	(0.450)
	11/2/94	-0.261	-16.840	-3.039	-19.880•	-0.261	-20.141	-37.418*
		(-0.056)	(-1.146)	(-0.654)	(-1.290)	(-0.056)	(-1.251)	(-1.757)
Molymos	9/30/93	2.852	7.673	6.798	14.471	-2.159	12.311	34.425
		(0.926)	(0.788)	(2.208)	(1.417)	(-0.701)	(1.154)	(2.440)
Sevel	8/2/93	-3.061	-6.476	-1.092	-7.568	-0.061	-7.628	-5.440
		(-1.107)	(-0.741)	(-0.395)	(-0.825)	(-0.022)	(-0.796)	(-0.429)
Siderca	11/2/94	2.997	-5.423	1.236	-4.186	-0.167	-4.353	-5.854
		(1.394)	(-0.790)	(0.575)	(-0.587)	(-0.078)	(-0.585)	(-0.594)
CHILE								
Endesa	1/19/92	-2.112	-13.831*	-2.326	-16.157*	-2.362	-18.519*	-9.370
		(-0.794)	(-1.920)	(-0.870)	(1.831)	(-0.888)	(-2.009)	(-0.768)
	9/29/92	-4.603**	-12.720	1.0401	-11.680	-2.356•	-14.035	-4.419
		(-2.612)	(-0.793)	(0.590)	(-0.756)	(-1.337)	(-0.724)	(-0.547)
	2/7/93	-1.139	2.971	-0.817	2.154	-0.315	1.893	5.112
		(-0.698)	(0.575)	(-0.500)	(0.398)	(-0.193)	(0.325)	(0.683)
	4/21/93	1.505	-1.635	1.837	0.201	-2.000•	-1.799	-12.281**
		(0.980)	(-0.337)	(1.196)	(0.040)	(-1.302)	(-0.338)	(-1.745)

[1] The cumulative abnormal return for day -1, 0 and +1 is computed for day -10 up to the specified day. For the event window, the cumulative abnormal return is calculated over the period -10 to +10. Within brackets is the value of the Z statistics. "•", "*", and "**" means significant at the 10%, 5% and 1% level respectively (one tailed-test).

Chilgener	7/13/90	1.305	-1.052	0.294	- 0.759	4.524	3.765	1.667					
		(0.479)	(-0.122)	(0.108)	(-0.084)	(1.663)	(0.399)	(0.134)					
	1/19/92	-1.556	-9.914	-0.306	-10.220	-0.306	-10.525	-7.082					
		(-0.507)	(-1.022)	(-0.100)	(-1.004)	(-0.100)	(-0.990)	(-0.504)					
	4/8/92	-8.325**	-7.054	5.689	-1.365	-5.316*	-6.681	-6.534					
		(-2.841)	(-0.761)	(1.941)	(-0.140)	(-1.814)	(-0.658)	(-0.487)					
	4/16/92	1.285	-12.290•	2.612	-10.308	0.712	-9.595	12.009					
		(0.432)	(-1.373)	(0.878)	(-1.045)	(0.239)	(-0.931)	(-0.881)					
CMPC	9/30/92	-0.041	-9.023*	-2.891*	-11.921*	0.018	-11.903*	-1.349					
		(-0.026)	(-1.805)	(-1.833)	(-2.274)	(0.012)	(-2.174)	(-0.186)					
CAPC	4/2/91	4.021	5.704	-1.145	4.559	-2.165	2.394	-7.426					
		(1.682)	(0.754)	(-0.479)	(0.575)	(-0.906)	(0.289)	(-0.678)					
	6/27/92	0.025	-0.668	0.025	-0.644	1.087	0.444	-1.021					
		(0.009)	(-0.074)	(0.009)	(-0.068)	(0.378)	(0.045)	(-0.078)					
	8/8/92	0.472	1.946	-0.384	1.562	-0.925	0.637	2.716					
		(0.209)	(0.272)	(-0.170)	(0.258)	(-0.408)	(0.081)	(0.262)					
	8/12/92	-0.944	-0.284	-1.825	-2.109	-0.201	-2.310	2.973					
		(-0.419)	(-0.040)	(-0.810)	(-0.282)	(-0.089)	(-0.296)	(0.288)					
Volcan	12/2/93	-2.862	-28.589	2.138	-26.451	1.900	-24.551	-33.202					
		(-0.357)	(-1.128)	(0.267)	(-0.995)	(0.237)	(-0.884)	(-0.904)					
Minera	9/2/91	-0.477	-2.374	-0.477	-2.850	-0.477	-3.327	-3.942					
		(-0.171)	(-0.270)	(-0.171)	(-0.309)	(-0.171)	(-0.345)	(-0.309)					
Vapores	6/6/92	-1.498	-3.135	0.926	-2.209	0.911	-1.298	0.807					
		(-0.593)	(-0.393)	(0.367)	(-0.115)	(0.361)	(-0.148)	(0.070)					
Emos	10/17/93	-0.148	-1.471	-0.148	-1.619	-0.148	-1.767	-5.799					
		(-0.038)	(-0.119)	(-0.038)	(-0.125)	(0.038)	(-0.131)	(-0.324)					
Puerto	7/23/92	-0.374	-5.464•	-2.160	-7.624•	-0.738	-8.362	-16.892*					
		(-0.208)	(-1.473)	(-1.203)	(-1.343)	(-0.411)	(-0.963)	(-2.054)					
Victoria	12/2/93	-9.895	-42.389	-13.272	-55.661	-10.848	-66.508	-86.081					
		(-0.502)	(-0.680)	(-0.673)	(-0.851)	(-0.550)	(-0.974)	(-0.953)					
Iansa	5/29/93	0.500	0.015	0.498	0.513	0.042	0.555	3.279					
		(0.242)	(0.002)	(0.241)	(0.081)	(0.020)	(0.072)	(0.346)					
Coloso	4/1/92	6.961	35.171	-2.988	35.174	-0085	32.089	32.052					
		(2.165)	(3.459)	(-0.932)	(3.017)	(-0.026)	(2.881)	(2.243)					
	12/2/93	0.256	16.630	4.359	20.989	0.256	21.245	44.995					
		(0.087)	(1.777)	(1.472)	(2.138)	(0.087)	(2.072)	(3.317)					
	2/5/94	0.086	-3.492	-4.460•	-7.952	-4.914•	-12.628	-15.746					
		(0.028)	(-0.357)	(-1.440)	(-0.774)	(-1.510)	(-1.177)	(-1.109)					
	3/11/94	-4.860•	1.273	0.140	1.413	0.140	1.533	-12.670					
		(-1.545)	(0.128)	(0.045)	(0.135)	(0.045)	(0.143)	(-0.879)					
	3/18/94	0.139	0.741	0.139	0.880	-3.808	-2.928	-13.210					
		(0.044)	(0.074)	(0.044)	(0.084)	(-1.211)	(-0.269)	(-0.916)					

Iquique	4/1/92	-0.032 (-0.07)	13.750 (0.955)	21.632 (4.753)	35.382 (2.344)	-17.838** (-3.919)	17.543 (1.113)	19.676 (0.943)
	12/21/93	3.895 (0.779)	15.384 (0.996)	0.124 (0.025)	15.507 (0.957)	11.151 (2.283)	26.659 (0.916)	35.137 (1.569)
	2/5/94	0.086 (0.028)	25.987 (1.666)	-0.017 (-0.003)	25.971 (1.587)	-0.017 (-0.003)	25.954 (1.519)	16.726 (0.740)
	3/10/94	-0.032 (-0.006)	18.820 (1.177)	-0.094 (-0.019)	18.725 (1.123)	-0.032 (-0.006)	18.694 (1.073)	52.526 (2.279)
	3/11/94	-0.147 (-0.029)	7.126 (0.443)	-0.085 (-0.017)	7.042 (0.417)	-3.209 (-0.631)	3.832 (0.217)	40.314 (1.729)
Lirquien	7/15/92	-2.509 (-0.121)	-23.458 (-0.358)	27.491 (1.325)	4.033 (0.059)	0.600 (0.029)	4.633 (0.064)	6.302 (0.066)
Chilectra	7/11/92	-0.207 (-0.132)	-7.201• (-1.391)	1.065 (0.651)	-6.136 (-1.130)	1.133 (0.693)	-5.003 (-0.882)	-1.204 (-0.160)
Molymet	1/19/92	-3.140 (-0.378)	-40.617• (-1.545)	-9.390 (-1.130)	-50.007* (-1.814)	-4.029 (-0.485)	-54.036* (-1.877)	-111.943** (-2.939)
MEXICO								
Cydsasa	2/6/90	-1.661 (-0.733)	4.582 (0.605)	0.254 (0.112)	4.448 (0.610)	-0.134 (-0.059)	3.928 (0.567)	-1.842 (-0.178)
	3/19/92	1.591 (0.676)	3.058 (0.411)	1.565 (0.665)	4.623 (0.392)	1.146 (0.487)	5.768 (0.707)	6.671 (0.618)
	10/9/92	0.104 (0.040)	11.788 (1.414)	0.104 (0.040)	11.892 (1.394)	-0.396 (-0.154)	11.146 (1.290)	13.082 (1.110)
Grupo Maya (A)	10/4/90	-0.176 (-0.045)	6.264 (0.505)	-0.176 (-0.045)	6.088 (0.468)	-0.176 (-0.045)	5.912 (0.435)	7.347 (0.409)
	3/12/91	-0.209 (-0.053)	3.875 (0.308)	1.220 (0.307)	5.095 (0.387)	0.073 (0.018)	5.168 (0.376)	29.874 (1.641)
	3/15/91	1.222 (0.308)	5.624 (0.448)	0.075 (0.019)	5.699 (0.432)	-0.207 (-0.052)	5.492 (0.399)	30.213 (1.660)
	9/20/91	-1.269 (-0.675)	-11.604* (-1.953)	-1.269 (-0.675)	-12.873* (-2.066)	-1.269 (-0.675)	-14.141* (-2.173)	-24.845** (-2.885)
	11/27/91	-1.041 (-0.566)	-14.545** (-2.500)	-1.041 (-0.566)	-15.586** (-2.554)	-0.295 (-0.160)	-15.881** (-2.492)	-27.475** (-3.259)
	7/29/92	-1.170 (-0.297)	-26.986* (-2.069)	-1.171 (-0.297)	-28.409* (-2.063)	-1.423 (-0.361)	-31.854 * (-2.079)	-52.891** (-2.926)
Grupo Maya (B)	3/12/91	2.737 (0.954)	14.242 (1.569)	1.268 (0.442)	15.511 (1.630)	-0.121 (-0.042)	15.390 (1.548)	59.367 (4.514)
	3/15/91	1.257 (0.438)	13.579 (1.480)	-0.132 (-0.046)	13.448 (1.412)	-0.132 (-0.046)	13.316 (1.338)	63.416 (4.818)
	9/20/91	-1.386 (-0.525)	-12.392• (-1.484)	-1.748 (-0.662)	-14.140• (-1.615)	0.069 (0.026)	-14.410• (-1.539)	-30.332** (-2.507)
	11/27/91	-2.688 (-1.075)	-16.099* (-1.835)	-1.591 (-0.636)	-16.193* (-1.942)	-0.094 (-0.038)	-16.632* (-1.870)	-29.371** (-2.564)
Tolmex	10/14/90	4.594 (1.658)	6.162 (0.703)	9.798 (3.536)	15.961 (1.737)	0.417 (0.151)	16.378 (1.706)	30.047 (2.366)

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MetMEx (A)	3/22/91	4.142 (1.992)	20.674 (2.789)	0.119 (0.057)	20.793 (3.104)	-0.710 (-0.341)	20.084 (3.143)	37.335 (3.917)
	6/4/91	-0.008 (-0.004)	23.669 (3.370)	-0.521 (-0.240)	23.149 (3.213)	10.044 (4.623)	33.193 (4.411)	29.115 (2.925)
	8/9/91	-9.677** (-4.237)	-3.142 (-0.445)	-5.239** (-2.343)	-8.388 (-1.131)	-0.088 (-0.039)	-8.476 (-1.094)	-15.193• (-1.482)
	3/2/94	-0.765 (-0.105)	1.088 (0.047)	-0.113 (-0.016)	0.975 (0.040)	0.107 (0.015)	1.081 (0.043)	0.812 (0.024)
	3/4/94	-0.134 (-0.018)	0.882 (0.038)	0.086 (0.012)	0.968 (0.040)	-0.795 (-0.110)	0.173 (0.007)	0.599 (0.018)
	8/27/94	0.141 (0.020)	6.067 (0.268)	-0.923 (-0.129)	5.144 (0.217)	-0.289 (-0.040)	4.854 (0.196)	7.850 (0.239)
MetMEx (B)	3/22/91	-2.662 (-0.284)	-8.572 (-0.289)	3.480 (0.371)	-5.092 (-0.164)	9.577 (1.022)	4.485 (0.138)	-16.531 (-0.385)
	6/4/91	-8.985 (-0.936)	-28.811 (-0.949)	-13.064• (-1.361)	-41.875• (-1.316)	-0.161 (-0.017)	-42.036 (-1.264)	-43.385 (-0.986)
	3/4/94	-0.187 (-0.021)	18.743 (0.655)	0.279 (0.031)	18.556 (0.618)	0.046 (0.005)	18.835 (0.601)	25.107 (0.605)
GCG	5/25/92	-3.168 (-0.937)	-12.765 (-1.193)	9.937 (2.938)	-2.828 (-0.252)	-1.820 (-0.538)	-4.648 (-0.397)	-8.458 (-0.546)
Kimber	5/21/92	0.560 (0.308)	-6.951 (-1.210)	-0.565 (-0.311)	-7.516 (-1.217)	-0.192 (-0.106)	-7.708 (-1.225)	-55.103** (-6.618)
Bimbo	3/19/92	1.630 (0.942)	-8.763 • (-1.603)	1.972 (1.140)	-6.792 (-1.184)	-0.301 (-0.174)	-7.092 (-1.184)	-22.521** (-2.842)
	2/14/93	-0.655 (-0.761)	4.452 (0.141)	0.861 (0.086)	5.313 (0.160)	-4.139 (-0.414)	1.174 (0.034)	-89.247* (-1.950)
Telmex	5/21/93	-0.761 (-0.455)	-1.361 (-0.257)	-0.436 (-0.261)	-1.797 (-0.324)	0.883 (0.527)	-0.915 (-0.158)	-10.272• (-1.339)
	6/9/94	-0.953 (-0.508)	-3.065 (-0.340)	1.044 (0.556)	-2.021 (-0.324)	-1.148 (-0.611)	-3.169 (-0.487)	-9.840• (-1.453)
PHILIPPINES								
Apex	4/24/91	0.263 (0.035)	-9.810 (-0.408)	-14.023* (-1.844)	-23.832 (-0.935)	0.263 (0.035)	-23.564 (-0.895)	-40.704 (-1.168)
Ayala	12/8/94	0.024 (0.008)	1.752 (0.187)	-4.201* (-1.415)	-2.449 (-0.249)	4.436 (1.494)	1.986 (0.193)	9.238 (0.679)
Benguet	3/21/90	-2.217 (-0.451)	1.752 (0.113)	-2.275 (-0.463)	-0.524 (-0.032)	2.664 (0.542)	2.140 (0.126)	3.615 (0.161)
	3/23/90	2.634 (0.538)	-1.119 (-0.072)	0.134 (0.027)	1.515 (0.102)	0.134 (0.024)	1.649 (0.105)	2.990 (0.133)
Lepanto	10/22/90	3.388 (1.412)	-3.298 (-0.435)	3.273 (1.364)	-0.025 (-0.003)	6.391 (2.664)	6.366 (0.766)	5.917 (0.538)
Mondrag on	10/11/94	-0.284 (-0.087)	-5.824 (-0.564)	2.841 (0.870)	-2.983 (-0.275)	-0.284 (-0.087)	-3.268 (-0.289)	3.057 (0.204)
San Miguel	10/7/94	0.342 (0.129)	3.589 (0.427)	0.342 (0.129)	3.931 (0.446)	0.342 (0.129)	4.273 (0.461)	-4.810 (-0.395)
Robinson Land	6/15/94	-1.389 (-0.373)	-2.605 (-0.221)	1.127 (0.303)	-1.417 (-0.120)	-0.139 (-0.037)	-1.617 (-0.125)	-5.332 (-0.397)

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