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► To cite this version:

Sylvain Marsat, Guillaume Pijourlet, Muhammad Ullah. Does environmental performance help firms to be more resilient against environmental controversies? International evidence. Finance Research Letters, 2021, 44, pp.102028. 10.1016/j.frl.2021.102028 . hal-03183955

HAL Id: hal-03183955

<https://hal.science/hal-03183955>

Submitted on 15 Nov 2021

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Does environmental performance help firms to be more resilient against environmental controversies? International evidence

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Post print version of

Marsat, S., G. Pijourlet, and M. Ullah. 2021. "Does environmental performance help firms to be more resilient against environmental controversies? International evidence." *Finance Research Letters*:102028 Doi: <https://doi.org/10.1016/j.frl.2021.102028>

Abstract:

This study aims at understanding the role of prior environmental performance (EP) on a firm's resilience against an environmental controversy. In line with the natural resource-based view, high EP firms should develop environmental skills and reputation that foster resilience when facing such adverse events. Using an international dataset of 233 environmental controversies over the 2010-2016 period, we find clear evidence that prior high EP significantly helps firms recover more quickly from the shock. In a context of increasing pressure on environmental issues, this result uncovers new benefits of EP for firms confronted with an environmental controversy.

Keywords: Resilience; Environmental Controversies; Environmental Performance; Survival Analysis

JEL Classification: G12, M14, O16, Q51

Declaration of interests: none

1. Introduction

Growing concerns about climate change have dramatically increased the pressure on firms to behave responsibly towards the environment (Flammer 2013). At the same time, firms are particularly under the media spotlight and grab investors' attention in the case of controversies (Aouadi & Marsat 2018). Environmental controversies (henceforth EC), i.e. negative news stories related to the environmental impact of the firm's operations, are therefore of paramount importance for companies' image and reputation. These adverse events can involve important costs since investors appear increasingly sensitive to environmental issues. EC therefore has caused substantial losses in firms' share value due to negative investor attention.

The importance of this issue for companies leads us to question whether corporate environmental policies are moderating the adverse consequences of EC. Since the seminal articles of Staw *et al.* (1981) and Meyer (1982), a large part of the managerial literature has tried to understand how organizations can respond to external threats (Linnenluecke 2017). Recently, a growing number of works have sought to understand how companies adapt their business models in a turbulent environment (Hamel & Valikangas 2003; Sutcliffe & Vogus 2003; Gittell *et al.* 2006). Hence, the concept of organizational resilience gradually emerged in the managerial literature. Organizational resilience refers to the capacity of a firm to adapt to exogenous shocks such as terrorist attacks, natural disasters, or financial crises (Ortiz-de-Mandojana & Bansal 2016; DesJardine *et al.* 2019). The resilience of an organization is defined as its ability to maintain its core functions, but also to better adapt to exogenous shocks than its competitors (Gunderson & Pritchard 2002; DesJardine *et al.* 2019). Accordingly, resilience entails two dimensions in facing an adverse event - stability and flexibility (Ortiz-de-Mandojana & Bansal 2016; DesJardine *et al.* 2019).

Previous works have underlined that a high environmental performance allows firms to improve the stability of the company by complying with the pressures and expectations of its various stakeholders with regard to environmental issues (Bansal & Clelland 2004). Eco-friendly firms benefit from a better reputation among stakeholders. They are therefore more likely to support the company in case of environmental controversies and to consider the occurrence of a negative environmental event as an anomaly rather than a usual behavior (Flammer 2013). Market reaction is thus less negative, the possible effects induced by such events (boycott, fines, etc.) being expected to be less important (Flammer 2013). Concerning the second aspect of resilience, namely flexibility, nothing is known, to our knowledge, about the way firms bounce back in the days following an EC. We are nevertheless convinced that studying more precisely firm recovery after such an event is of particular interest and may shed light on the conditions needed to better cope with adverse events (DesJardine *et al.* 2019).

A strong environmental commitment implies that policies are already in place to cope with environmental externalities. These environmental activities allows firms to develop skills that can be useful in dealing with potential future environmental controversies. For example, the use of more environmentally friendly technologies will make production processes more complex, which will help increase the skills of employees (Russo & Fouts 1997). In addition, policies aiming to prevent pollution require greater employee involvement and coordination between different departments (Russo & Fouts 1997). These policies also involve strengthening relationships with suppliers (Branco & Rodrigues 2006), which make it easier to adapt to the occurrence of unanticipated events (Ortiz-de-Mandojana & Bansal 2016). We also argue that eco-friendly policies aim to address environmental problems, which are complex and urgent in nature. Confronting a complex situation can enable firms to increase their organizational agility, i.e. "the ability to swiftly and easily change businesses and business processes beyond the normal level of flexibility to effectively manage unpredictable external and internal changes"

(Van Oosterhout *et al.* 2006). This may help firms to adapt better when they have to deal with a complex problem again (Russo & Fouts 1997; Ortiz-de-Mandojana & Bansal 2016). In addition, implementing environmental policies also enables companies to develop innovation capabilities (Russo & Fouts 1997), which enables them to better anticipate change and to better adapt to unforeseen events (Hamel & Valikangas 2003).

Meanwhile, a strong EP allows firms to build a good reputation and gain stronger support from their stakeholders. Indeed, instrumental stakeholder theory (Donaldson & Preston 1995; Jones 1995) suggests that building good stakeholder relations can give firms a competitive advantage thanks to a better reputation (Bruna & Nicolò 2020) and legitimacy (Zahller *et al.* 2015). In the case of EC, since eco-friendly firms benefit from good stakeholder relations, stakeholders are more likely to support the company (Flammer 2013), which will lead to greater resilience. These arguments, also in line with the natural resource-based view (Hart 1995; Russo & Fouts 1997; Flammer 2013), lead us to postulate that in the event of an EC, eco-friendly firms have a greater capacity to adapt quickly to the situation and to deal with it. As a result, their stock prices should take less time to recover to their pre-controversy levels. We therefore postulate that the higher a firm's EP, the lower the time to recovery after an EC.

Indeed, insofar as organizational resilience is not a directly observable variable, we draw inspiration from the previous literature by measuring the impact of our explanatory variable on resilience through another organizational outcome (Gittell *et al.* 2006; Ortiz-de-Mandojana & Bansal 2016; DesJardine *et al.* 2019). More precisely, we investigate the impact of EP on resilience after EC by measuring the time to recovery, i.e. the time required for a firm's stock price to return to the level it had prior to the EC (Ortiz-de-Mandojana & Bansal 2016; DesJardine *et al.* 2019). Based on a sample including 233 controversies over the period 2010-

2016, our survival analyses reveal that the firms with a high degree of EP are, all else being equal, significantly more resilient against the financial shock caused by EC. These results are robust to different time windows from 10 to 30 days and survival models of recovery (Weibull, Gompertz, Exponential, Probit).

In this study, we contribute to the literature by introducing, for the first time to our knowledge, the concept of resilience in analyzing the way firms deal with an EC. The way firms bounce back after an adverse event is increasingly important for organizations. Our work hence contributes to answer a central question: what are the factors that allow firms to respond to unusual and unforeseen events? Various events such as terrorist attacks (Gittell *et al.* 2006) or financial crises (Markman & Venzin 2014; DesJardine *et al.* 2019) have already been studied. Some articles have also already studied the impact of corporate social performance (Lv *et al.* 2019) or corporate social responsibility (henceforth, CSR) disclosure (Zahller *et al.* 2015) on resilience, but no previous study to our knowledge deals with the determinants of firms' resilience to EC. Meanwhile, this question is more topical than ever in a context of growing pressure on environmental issues (Flammer 2013). Our results are stimulating since they show that a high EP enables organizations to be more flexible in order to overcome these disruptive events. Overall, we reveal new benefits of the implementation of environmental policies. We thus contribute to the extensive empirical literature that has sought to address the question of financials benefits of EP by showing that these activities lead to the acquisition of specific capacities that allow firms to adapt more quickly in the event of an EC.

The remainder of the paper is organized as follows. The second section describes data and the method used. The third section is dedicated to empirical results. The last section concludes.

2. Data and methodology

Following DesJardine *et al.* (2019), we proxy resilience in its flexibility dimension as the time to recovery of the daily market price to its previous level after disclosure of EC for an observation window of 15 trading days. EC is a controversial news story disclosing the negative impact of a firm's activities on the environment. We collected data from Thomson Reuters ASSET4, a leading provider of extra-financial data. EC are corporate environmental news stories linked to firms' environmental impact of their activities on local communities or natural resources that put them under the media spotlight. For example, EC may involve events related to the impact of a firm's activities on biodiversity, or the environmental consequences of their products. Examples of environmental controversies are provided in the appendix (see Appendix). In order to identify and evaluate EC, Thomson Reuters ASSET4 analysts collect data from various media sources such as major news outlets, NGOs or trade unions (Aouadi & Marsat 2018). We extract from the Thomson Reuters ASSET4 database the exact date of each controversy in order to define starting points for measuring the time to recovery after each event.

A firm's EP is measured by the environmental dimension score from the Thomson Reuters' Asset4 ESG dataset. Based on publicly reported and objective information, ESG scores developed by ASSET4 allow a transparent and objective assessment of firms' ESG performance (Semenova & Hassel 2015). Thomson Reuters ASSET4 classifies environmental data into three categories: resource reduction, emission reduction and product innovation. Thomson Reuters ASSET4 data have been widely used in the academic literature to measure corporate social performance (Cheng *et al.* 2014; Eccles *et al.* 2014; Lys *et al.* 2015; Shaukat *et al.* 2016; Gupta 2018). More precisely, the specific validity of the environmental performance score proposed

by ASSET4 has been significantly documented since this measure converges with other existing ratings (Semenova & Hassel 2015).

As ASSET4 issues these ratings on an annual basis, prior year ratings are considered for each controversy to determine their impact on the time to recover after the controversy. It is noteworthy that every country faces pressure from local and international communities to cope with the problem of climate change. Therefore, firms may customize their environmental policies according to their country-level environmental standards. We thus include in our analysis a country's EP, proxied by the environmental performance index¹ (henceforth EPI). We also control for other variables likely to have an impact on time to recover after an EC. Therefore, we include in our models the market to book value ratio (MB), return on assets ratio (ROA), cash flows from operating activities scaled by net sales (CF), firm size (SIZE) measured by the natural log of a firm's total assets, leverage (DA) calculated by dividing the total debts of the firm by its total assets, sales growth (SG) measured by net sales divided by the previous year's net sales, research & development expenditure divided by net sales (RD), capital expenditure (CAPEX) divided by total assets, and stock price momentum (MOMENTUM). MOMENTUM represents a change in market price in the last three years before the controversy. A dummy for RD is also included, denoted by RDDUM. RDDUM is equal to 1 if firms have RD expenditure available in the database, 0 otherwise. Besides these control variables, dummies for industries and regions are also included.

Controversy data were downloaded from the ASSET4 Thomson Reuters dataset. We collected 301 EC for the period 2010-2016. Since the exact dates are not available for 37 controversies,

¹ EPI is developed by Yale University, Yale Center for Environmental Law and Policy (YCELP), and Columbia University, Center for International Earth Science Information Network (CIESIN), in collaboration with the World Economic Forum and Joint Research Centre (JRC) of the European Commission (2006).

the number of observations is reduced to 264. The sample for primary analysis is finally composed of 233 observations from 16 countries after balancing for the missing observations of control variables.

3. Results

Summary statistics are provided in Table 1. Financial data are winsorized at 1% and 99% to alleviate the impact of potential outliers. Median time to recovery is equal to 5 days. The EP of firms varies from 0.1 to 0.95 with an average and median of 0.77 and 0.87, respectively. The environmental performance of countries (EPI) in the sample varies from 0.43 to 0.89.

Table 1. Summary Statistics

	N	Mean	Median	P25	P75
Time to recovery	233	6.72	5	1	13
EP	233	0.77	0.87	0.71	0.91
EPI	233	0.7	0.68	0.68	0.73
MB	233	1.96	1.53	1.01	2.27
ROA	233	2.91	3.23	0.9	6.53
CF	233	22.38	18.63	13.06	31.04
SIZE	233	17.75	17.81	16.9	18.91
DA	233	28.65	25.87	18.33	38.48
SG	233	0.91	0.91	0.76	1
RD	233	0.46	0	0	0.35
RDDUM	233	0.47	0	0	1
CAPEX	233	8.97	8.3	5.28	11.5
MOMENTUM	233	-0.09	0.06	-0.21	0.22

Summary statistics of the sample. Resilience is the number of days of market price recovery calculated within a window of 15 trading days. EP is the environmental performance of firm from Asset4. EPI is country's overall environmental performance. MB is the market-to-book value ratio. ROA is return on assets ratio. CF represents cash flows from operation scaled by net sales. SIZE is the natural log of firms' total assets. DA represents leverage measured as total debts of firms divided by total assets. SG is the sales growth measured as total sales divided by previous year's sales. RD is the research & development expenditure divided by net sales. RDDUM represents the dummy for RD (equals to 1 if firm has RD expenditure, otherwise 0). CAPEX is the capital expenditure divided by last year's total assets. MOMENTUM is the previous three years' market price change. Financial variables are winsorized at 1% and 99 % level.

We use the Cox proportional hazard models to test whether a high EP allows firms to improve their time to recover after an EC. The Cox model predicts the impact of covariates on the probability of recovery at time t. The relationship can be expressed as:

$$h_i(t) = h_0(t) e^{(\beta'X_j)}$$

Where $h_i(t)$ represents the hazard rate of recovery for observation i^{th} . X is a set of control variables as described before. $h_0(t)$ is the baseline hazard function, which the Cox model leaves non-estimated. β are regression coefficients. A positive sign of coefficient indicates a positive link with resilience. We ran the model for a time window of 15 days. Results are provided in Table 2. Coefficients are reported rather than hazard rates as well as standard errors in parentheses for each variable for a time window of 15 days. Model 1 in the first column includes the main control variables. The coefficient of EP appears to be positive and highly significant. In Model 2, dummies for industries are included, whereas dummies for geographical regions are additionally included in Model 3. A positive sign of coefficients indicates that a higher value of that variable increases the likelihood of market price recovery from the shock of EC. Since EP has a positive and significant coefficient, we find that EP has a negative impact on time for stock market prices to recover after an EC. Exponentiation of the coefficient gives the hazard rate of $e^{1.62} = 5.05$, which means that a one-unit increase in EP enhances substantially the probability of recovery by 4.05 times.

Table 2. Recovery after an environmental controversy (Cox Proportional Hazard Regression)

VARIABLES	Model 1	Model 2	Model 3
EP	1.49*** (0.51)	1.66*** (0.56)	1.62*** (0.56)
EPI	-0.74 (1.09)	-0.76 (1.12)	0.00 (1.67)
MB	-0.18** (0.08)	-0.19** (0.09)	-0.19** (0.09)
ROA	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)
CF	0.01* (0.01)	0.01* (0.01)	0.01 (0.01)
SIZE	-0.16** (0.08)	-0.17** (0.08)	-0.18** (0.09)
DA	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
SG	-0.47 (0.50)	-0.42 (0.54)	-0.38 (0.54)
RD	-0.22 (0.16)	-0.22 (0.17)	-0.26 (0.18)
RDDUM	0.21 (0.27)	0.21 (0.28)	0.44 (0.36)
CAPEX	-0.02 (0.02)	-0.01 (0.02)	-0.01 (0.02)
MOMENTUM	0.09 (0.16)	0.06 (0.17)	0.08 (0.19)
INDUSTRY	No	Yes	Yes
REGION	No	No	Yes
Observations	233	233	233

This table presents Cox PH regression analysis for the observation window of 15 trading days. A positive coefficient indicates that an increase in the value of that variable increase resilience. EP is a firm's environmental performance proxied by environmental scores from ESG Asset4 Dataset. EPI represents the Environmental Performance Index score of the country of the firm. MB is the market-to-book value ratio. ROA is the firm's profits divided by the book value of assets as a percentage. CF represents cash flows from operation scaled by net sales. SIZE is the natural log of firms' total assets. DA represents leverage measured as total debts of firms divided by total assets. SG is the sales growth measured as total sales divided by previous year's sales as a percentage. RD is the research & development expenditure divided by net sales in percent. RDDUM represents a dummy variable for RD (equals to 1 if firm has RD expenditure, otherwise 0). CAPEX is the capital expenditures divided by last year's total assets as a percentage. MOMENTUM is the 'previous three years' market price change. INDUSTRY represents dummies for industries, REGION represents dummies for geographical regions. Financial variables are winsorized at 1% and 99 % level. Standard errors are in parentheses. * Statistical significance at the 10 % level, ** Statistical significance at the 5 % level, *** Statistical significance at the 1 % level.

As a robustness check, we tested the link through different observational windows of 5, 10, 20, 25 and 30 days. As depicted in Table 3, the results show that the relationship is significant for almost all observational windows. Secondly, we re-ran the baseline model using alternative survival models i.e. Weibull, Gompertz and Exponential. The results, as presented in Table 4, still show a consistently significant and positive relationship between EP and resilience.

Thirdly, we assess firm recovery state instead of time to recovery. Recovery state equals 1 if firm market price recovers within the observational window and zero otherwise.

Table 3. Recovery after an environmental controversy : Robustness to Different Time Windows (Cox Proportional Hazard Regression)

VARIABLES	5 days	10 days	20 days	25 days	30 days
EP	1.10 (0.71)	1.40*** (0.54)	1.06* (0.54)	1.42*** (0.53)	0.88* (0.53)
CONTROLS	Yes	Yes	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes	Yes	Yes
REGION	Yes	Yes	Yes	Yes	Yes
Observations	233	233	233	233	233

This table presents Cox PH regression analysis for different windows of observation. For the sake of brevity, we only report coefficients on EP. Our dependent variable is time to recovery of firms' market price. Control variables are the same as those used in Table 2. INDUSTRY represents dummies for industries, REGION represents dummies for geographical regions. Financial variables are winsorized at the 1% and 99 % level. Standard errors are in parentheses. * Statistical significance at the 10 % level, ** Statistical significance at the 5 % level, *** Statistical significance at the 1 % level.

Table 4. Recovery after an environmental controversy: Robustness to Different Models

VARIABLES	Weibull Time to recovery	Gompertz Time to recovery	Exponential Time to recovery	Probit Recovery (Yes/No)
EP	1.76*** (0.58)	1.71*** (0.58)	1.76*** (0.58)	1.90*** (0.60)
CONTROLS	Yes	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes	Yes
REGION	Yes	Yes	Yes	Yes
Observations	233	233	233	233

This table presents Probit and different survival models i.e. Weibull, Gompertz and Exponential analysis for a window of observation of 15 days. In the Probit model, resilience is proxied by firms' market price recovery. This equals 1 if recovered and zero otherwise. In survival models, resilience is proxied by time to recovery of firms' market price. For the sake of brevity, we only report coefficients on EP. Our dependent variable is time to recovery of firms' market price. Control variables are the same as those used in Table 2. INDUSTRY represents dummies for industries, REGION represents dummies for geographical regions. Financial variables are winsorized at 1% and 99 % level. Standard errors are in parentheses. * Statistical significance at the 10 % level ** Statistical significance at the 5 % level *** Statistical significance at the 1 % level.

These tests suggest that the choice of observational windows (except for the shorter one, i.e. 5 days window) and regression model as well as the measurement of resilience do not affect the link between EP and resilience. Overall, our results show that EP clearly enhances resilience when facing an environmental controversy, mitigating the time to recover from this adverse event. According to the natural resource-based view (Hart 1995; Russo & Fouts 1997; Hart & Dowell 2011), firms' environmental policies lead to the acquisition of specific resources and

competences that allow firms to be more skilled and to display a pro-environmental reputation, and thus to benefit from stakeholders' support. Establishing good relationships with stakeholders seems to be crucial in building organizational resilience. As stakeholder theory suggests (Donaldson & Preston 1995; Jones 1995), it seems important to take into account stakeholders' claims concerning environmental performance, in the very interests of the company when facing an environmental controversy.

4. Conclusion

Are environmentally performant firms more resilient towards EC? This study examines the unexplored question of the impact of firms' EP on their resilience by considering the time to recover after an environmental controversy. Based on an international dataset from 16 countries over the 2010-2016 period, our survival analysis shows that EP significantly increases firm resilience when confronted with a shock caused by an EC. All else being equal, we clearly find evidence that environmentally performant firms are more flexible and bounce back more quickly after an EC.

Our findings have stimulating managerial implications for corporate managers, since our article provides a better understanding of the consequences of firm environmental engagement. The development of environmental organizational skills and legitimacy are particularly helpful in the case of negative events related to environmental issues. These competences enable them to demonstrate greater agility in managing these controversies and to overcome more quickly these environmental adverse events.

Finally, this research leaves some questions unaddressed. For example, our data does not allow us to investigate whether the impact of environmental performance on resilience following EC depends on the materiality and severity of such controversies. To more precisely understand the role of stakeholder relationship in building organizational resilience, one can also wonder whether stakeholders' CSR culture and consciousness have a moderating impact on environmental performance - firms' resilience relationship². Measuring and testing these issues offers stimulating avenues for future research.

² We thank an anonymous referee for supplying this suggestion.

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Appendix. Some examples of controversies

News Story	Source
<p>1 Concerning firm: Cairn Energy</p> <p>Greenpeace target Cairn Energy in 'polar bear' protest Environmental campaigners step up pressure on energy firm over its oil spill response strategy and Arctic exploration plans Greenpeace activists dressed as polar bears occupied the Edinburgh offices of Cairn Energy on Monday as the environmental group stepped up the pressure on the company over its Arctic exploration plans. Last month the organisation's international head, Kumi Naidoo, was arrested after boarding a 52,000-tonne Cairn rig 75 miles off the west coast of Greenland. But on Monday Greenpeace switched its tactics from commando to panto in the Scottish capital as more than 60 campaigners, including dozens in polar bear suits, entered Cairn's offices near Edinburgh Castle. Greenpeace said the invasion was the latest step in a campaign to make the firm publish its oil spill strategy. Cairn announced in June that it had begun drilling two wells off Nuuk, the capital of Greenland. Both drilling operation are in water deeper than 900 metres, situated 100 miles and 185 miles from Nuuk...</p>	<p>The Guardian (July 18, 2011)</p> <p>https://www.theguardian.com/business/2011/jul/18/greenpeace-cairn-energy-polar-bear</p>
<p>2 Concerning firm: Newmont</p> <p>Foes of Newmont's \$5 billion Peru mine in standoff with police LIMA (Reuters) - Hundreds of protesters were locked in a standoff with police in northern Peru on Wednesday as they vowed to stop Newmont Mining from transferring water from a lake to a reservoir as part of its \$5 billion Conga gold project. Residents and local officials said it was the second straight day of tensions near the proposed mine that would be Peru's most expensive ever. On Tuesday, a minor clash between protesters and police marked an end to a stretch of relative calm since August, when the government of President Ollanta Humala said it would stop trying to overcome local opposition to the mine. The new round of protests came after a top official for the Conga project - Chief Executive Roque Benavides of Newmont's partner Buenaventura - told Reuters last week that water from Perol would be transferred to a new reservoir later this year...</p>	<p>Reuters (May 30, 2013)</p> <p>https://www.reuters.com/article/us-peru-mining-conga/foes-of-newmonts-5-billion-peru-mine-in-standoff-with-police-idUSBRE94S1EI20130529</p>
<p>3 Concerning firm: ANGLO AMERICAN</p> <p>Protest at Anglo's Alaskan quest Top jewellers are refusing to use gold from a proposed mine because it threatens a major fishing ground Fifty jewellers with billions of pounds in sales and stores around the world have pledged to boycott Anglo American's planned Pebble project in Alaska, saying they will not use gold from the proposed mine as it threatens Bristol Bay, the world's most important fishing ground for wild sockeye salmon. Anything from 10 million to more than 30 million sockeye – the third most abundant species of Pacific salmon – are caught each year during the span of a few weeks of intensive fishing, according to the National Oceanic Atmospheric Administration in the United States. Earthworks, a non-profit group campaigning against the Pebble mine, says that if it goes ahead, the project – a partnership between Anglo and Canada's Northern Dynasty Minerals – "would destroy salmon spawning habitat in a designated fishery reserve and jeopardise the commercial fishing industry and the livelihoods of the Alaska native communities in the region"...</p>	<p>Independent (Nov 3, 2010)</p> <p>https://www.independent.co.uk/news/business/analysis-and-features/protest-at-anglos-alaskan-quest-2123518.html?utm_source=twitterfeed&utm_med</p>