This is the accepted manuscript of the article:
Nicolau, J. L. (2005). Valuing the business environment on a daily basis. *European Journal of Operational Research*, *164*(1), 217-224.
https://doi.org/10.1016/j.ejor.2003.12.009

VALUING THE BUSINESS ENVIRONMENT ON A DAILY BASIS

Juan Luis Nicolau

Dpt. of Economía Financiera, Contabilidad y Marketing
Faculty of Economics
University of Alicante
Carretera de San Vicente, s/n
03690 San Vicente del Raspeig (Alicante)
SPAIN

Telf.- +34 965903621
Fax.- +34 965903621
e-mail: JL.Nicolau@ua.es

VALUING THE BUSINESS ENVIRONMENT ON A DAILY BASIS

Abstract

The analysis of the environment is an outstanding topic, due mainly to the fact that the definition of any kind of strategy to be implemented has to be guided by an accurate assessment of the relevant factors that may, in a way, condition the decision-making. With this said, the chief purpose of this paper is to formalise and apply a model that allow us to analyse the business environment on a daily basis, whose main advantage is its ability to directly measure the effects of environmental factors on firm performance; the main novelty is the way the projections are measured: they are not just mere *perceptions* but *money reactions* based on expectations. An empirical application is carried out to illustrate its use, the results arrived at being outstanding since the model seems to catch quite well some of the different happenings detected, what implicates that this tool can notably aid in scanning-related activities.

Keywords: Business Environment, Market Value, Decision Making, Analysis of the Environment.

1. INTRODUCTION

Today's companies have to survive in a Darwinian marketplace where the natural selection plays a fundamental role. For this reason, the analysis of the business environment is a critical element in the decision-making process, as success will come only if firms are able to match the threats and opportunities in the environment with appropriate strategies. Thus, constant scanning of the environment through surveillance of all the relevant events is crucial to compete in an efficient way in this dynamic environment.

In a formal way, we can define the environment as all elements that exist outside the boundary of the organisation and have the potential to affect all or part of it (Daft, 1989). Given that all of these factors and actors can influence the future of the company, top managers must envision their effects, to take advantage of opportunities and defend from threats, and to measure their impact on performance. In fact, Choo (1998) indicates that, to the extent that a firm's ability to adapt to its outside environment depends on knowing and interpreting the external changes that are taking place, environmental scanning constitutes a primary mode of organisational learning. On this account, environmental scanning is defined as the systematic methods used by a company to monitor and forecast those forces that are external to and not under the direct control of the organisation [1] (Byars, 1987).

However, in spite of its importance and the diversity of the existing tools, Olsen et al. (1994) point out that, in general, many decision-makers still choose not to devote much energy to the scanning of their business environment because they are uncertain about the cause and effect relationships which exist between environmental events and firm performance. This is the core issue on which this paper is based. Hereby we attempt to formalise the market model to analyse the business environment, in such a way that allows us to find a direct link between these two items: environmental factors and their effects on firm performance [2]. This is, in a way, both a quantitative and qualitative approach, since is based on statistical techniques to get objective measures and, at the same time, on investors' perceptions and the subsequent "money" reactions.

Thus, in the next section a conceptualisation of the analysis of the business environment is laid out, to subsequently, in section 3, present and develop the approach proposed. Section 4 is devoted to the empirical application, where the data used are described, the model is made operational, to end up showing the results. Finally, in Section 5, the conclusions and managerial implications that can be drawn are highlighted.

2. ASSESSING THE BUSINESS ENVIRONMENT

Companies need a planning model that allows them to anticipate the future and to use this anticipation in conjunction with an analysis of the firm's strengths and weaknesses to define strategic issues, to chart their direction by developing strategic vision and plans, and to define how they will implement and evaluate these plans. Therefore, the assessment of the environment is a critical element in decision-making, given that its valuation will strongly conditioned the market activities chosen as well as the way they will be implemented.

At the outset, the environment was regarded as a single entity, but later on it was broken down into different realms (Daft et al., 1988). Basically, it has been split up into two groups: one being comprised of those factors most closely related to the company itself, usually called micro-environment or task environment; and another one which contains the elements affecting all the firms as a whole, also known as macro-environment or general environment. The ease with which one analyses them is contingent upon the given industry and specific situation. As a matter of fact, the necessity of scanning the environment is not of the same degree in all kind of industries. Indeed, the effort devoted to analyse the environment is conditioned by the concept of "strategic uncertainty" (Choo, 1998). The strategic uncertainty is the need for decision-makers to scan events in selected environments. It depends directly on the importance that specific factors hold and on the perceived environmental uncertainty (Daft et al., 1989), which, in turn, is relying on both, complexity or heterogeneity of external events that are relevant to the firm, and the rate of change or perceived dynamism which explains how rapid changes occur in the organisation's environment (Child, 1972).

The concept of uncertainty becomes specially relevant when it is expressed as the degree of variability in any performance measure such as cash flow per share of stock (Olsen et al., 1998). In fact, these authors suggest that managers should identify the forces that cause variability in the firm's cash flow, and concentrate on monitoring them and determining their impact on this performance measure. With this respect, we propose an approach which explicitly takes these considerations into account. It is attempted to model the impact that different kinds of elements within the environment have on the present value of future cash flows per share.

Traditionally, the techniques used to forecast the influence of given environmental changes on the firm's performance, fall into two categories (Aaker et al., 1998): on one side, *qualitative* methods, which includes techniques such as a jury of executive opinion, sales force estimates or the well-known Delphi approach. All of them are flexible and can integrate large quantities of information, but suffer from the biases, uncertainties and inconsistencies inherent in the subjective judgements used. On the other, *quantitative* methods, within which the projection of historical data through time-series analysis and causal models stands out; although they work adequately in the short-term, they are not capable of properly depicting turning points where the environment changes.

In the face of this amalgam, the approach proposed here takes advantage of both quantitative and qualitative methods. First, it is operationalised by means of the ground statistical properties provided by portfolio theory; and second, which in turn turns out to be a superiority of this approach, it is based on reactions rather than mere perceptions or intuitions; in other words, contrary to other techniques in which respondents may or may not be implicated in the firm [3], the analysis of investor's reactions implies observing how they have *put in movement* their own money, so, *a priori* there should be a higher degree of implication when making decisions about buying or selling shares. In sum, we are focusing on "real decisions" rather than "opinions".

3. THE MODEL

The relation between share prices and future cash flows, materialised in dividends, is well established in the literature (Bromiley and Marcus, 1989; Chaney et al., 1991). With this respect, Horsky and Swyngedouw (1987) literally point out that the price of a security is the discounted value of future cash flows that are expected to accrue to the asset. So, under the efficient markets/rational expectations hypothesis, it comes to imply that the asset's price reflects all the relevant information available and that there is no opportunity of making profits by buying (selling) assets whose prices are too low (high).

Thus, we start by specifying the share price-dividends relationship

$$P_t = \sum_{s=1}^{n} d_s (1+i)^{-s} + P_{t+n}(1+i)^{-(t+n)}$$

where P_t is the price of the asset on day t, i is the interest rate, d_s is the dividend being paid in period s, and P_{t+n} is the quantity the investor receives when selling the share in period n. However, the latter component can be easily discarded when $n \to \infty$ as $\lim_{n\to\infty} P_{t+n}(1+i)^{-(t+n)} = 0$. So, the share price is expressed exclusively by the present value of future cash flows (Schwert, 1981):

$$P_t = \sum_{s=1}^{\infty} d_s (1+i)^{-s}$$

Dividends that shareholders expect to get in each period are clearly contingent upon the different circumstances or events affecting the firm. Therefore, we can incorporate into the previous equality the information Ω_s referred to period s, which might well influence the decision as to dividends:

$$P_t = \sum_{s=1}^{\infty} d_s(\Omega_s)(1+i)^{-s}$$

Considering that $\Omega_s = \{h_{s1}, h_{s2}, ..., h_{sk}\}$ where h_{sk} is the amount of information on specific news k on which future cash flows are relying, their impact can be measured as

$$\frac{\partial P_t}{\prod_{s=1}^{\infty} \partial h_{sk,\forall k \in K_s}} = \sum_{s=1}^{\infty} \frac{\partial d_s(h_{s1}, h_{s2}, ..., h_{sK})}{\partial h_{sk,\forall k \in K_s}} (1+i)^{-s}$$

Furthermore, in the same period of time, even within the same day, different kinds of news may be released, so we take the simultaneity of their effects into account

$$\frac{\partial P_t}{\prod_{s=1}^{\infty} \prod_{k=1}^{K_s} \partial h_{sk,\forall k \in K_s}} = \sum_{s=1}^{\infty} \frac{\partial d_s(h_{s1}, h_{s2}, ..., h_{sK})}{\prod_{k=1}^{K_s} \partial h_{sk,\forall k \in K_s}} (1+i)^{-s}$$

where K_s is the number of different news released in a specific period s.

Nevertheless, an individual is able to be aware of the information available up to the present day, say day t; so, we add this restriction to the model in such a way that the impact θ_{K_t} of a given group K_t of news items is expressed as

$$\theta_{K_t} = \frac{\partial P_t}{\prod_{k=1}^{K_t} \partial h_{tk,\forall k \in K_t}} = \sum_{s=1}^{\infty} \frac{\partial d_s(h_{s1}, h_{s2}, ..., h_{sK})}{\prod_{k=1}^{K_t} \partial h_{tk,\forall k \in K_t}} (1+i)^{-s}$$

Considering that returns are defined as $R_t = \frac{P_t - P_{t-1}}{P_{t-1}}$, it can be equalled to the previous expression if it were expressed in relative terms. To do this, we just have to take the prices in logarithms in such a way that the price variation β_{K_t} is arrived at by the expression

$$\beta_{K_t} = \frac{\theta_{K_t}}{P_{t-1}} = \frac{\partial \ln P_t}{\prod_{k=1}^{K_t} \partial h_{tk,\forall k \in K_t}}$$

So, given that $\prod_{k=1}^{K_t} \partial h_{tk,\forall k \in K_t}$ can equal, without loss of generality, the unity, we obtain that $R_t = \beta_{K_t}$.

Notwithstanding, we are interested in determining the specific impacts of each and every one of the environmental episodes rather than the joint impact. Thus, assuming separability of effects we can break the parameter β_{K_t} down into several sub-parameters, representing each of them those specific events:

$$\beta_{K_t} = \beta_{t1} + \beta_{t2} + ... + \beta_{tK} + \xi_{K_t}$$

where ξ_{K_t} is the error term that accounts for the deviation derived from such a breaking.

Having demonstrated before that $R_t = \beta_{t1} + \beta_{t2} + ... + \beta_{tK} + \xi_{K_t}$, in order to represent the time in which the information is being released a dummy variable is included, in such a way that $R_t = \beta_{t1} + \beta_{t2} x_{t2} + ... + \beta_{tK} x_{tK} + \xi_{K_t}$ where x_{tk} takes the value 1 if the *k*-typed news item is occurring on day *t*, and 0 otherwise.

Finally, re-arranging the effects it is possible to distinguish a number of *J*-1 events belonging to the macro-environment, and *K-J* micro-environment-related news,

$$R_t = \beta_{t1} + \sum_{j=2}^{J} \beta_{tj} x_{tj} + \sum_{k=J+1}^{K} \beta_{tk} x_{tk} + \xi_{K_t}$$

where $\xi_{K_t} \sim N(0, \sigma_{\xi})$

4. ILLUSTRATIVE APPLICATION

For illustrative purposes, we select a Spanish firm to apply the model. In order to assure a number of news, we choose one of the most news-generating companies publicly trading in the Spanish Stock Exchange, which is Repsol. Next, the data used are laid out, to subsequently display the operationalisation of the model and the results obtained.

4.1 Data

A series of data is gathered from this firm in the period comprised from 2nd January 1991 to 29th December 2000. These data are of two types: on the one hand, the daily returns the asset is reaching during this period are collected, which are adjusted by dividends, capital increases and splits. On the other hand, we look at newspapers to find news related to the firm [4]. This search was done by scanning each of the 2,508 days of the period of study, in order to find out events concerning the organisation. Evidently, it implies that the final results of this application will show an average impact of all the news regarding a specific kind of environmental event. However, if this method were to be applied from a given date on, say today, it would permit the recognition of the punctual effect (and not just on average terms) [5], as will be commented later.

To be precise, the news releases found are: announcements of discovering oil wells (DOW, 9); releases on new gas fields (GF, 4); collaboration agreements concluded (CA, 14); signing of contracts regarding oil installations (COI, 11); openings of new oil plants (ONP, 5); closing plants (CP, 4); announcements of general investments (AGI, 20); investments in environmentally-friendly activities (EFA, 7); new petrol stations (PS, 4); reports on the position stood at by the company in specific firm rankings (R,7); announcements of privatizations (AP, 6); acquisition of oil assets (AOA, 4); the firm starts trading in foreign stock markets (FSM, 2); announcements of workers' strikes (WS, 2); denounces of unfair competition due to changes in petrol prices (UC, 9); sponsorship activities (SA, 4); issues of bonds (IB, 2); decreases in petrol prices (DPP, 14); alignments of competitors' prices (ACP, 5); increases in oil prices (IPP, 7); appointments of new managers (ANM, 3); acquisition of oil companies (AOC, 4); and a tender offer (TO) over the Argentinian oil company YPF, which created much of hype due to the level of investment required and the magnitude that it would confer to the firm itself.

4.2 Operationalising the Model

In an attempt to directly model the aforementioned micro-environmental events we can operate as follows. By calling $\beta_{t1} = \alpha$ the specific risk, we can represent the global macro-environment effect by means of the influence on the return R_t of a market portfolio's return R_{Mt}, which captures the impact of the general environment events on the economy. So, according to this, it is possible to set

$$\beta_{t1} + \sum_{j=2}^{J} \beta_{tj} x_{tj} = \alpha + \beta_M \cdot R_{Mt}$$

where β_M is the parameter that shows the market effect (For the market portfolio the Spanish index IBEX-35 is used).

Additionally, so as to stabilise the model we incorporate the possibility of structural changes, allowing the market parameter and the constant to vary along time. So, the final expression which operationalise the model is

$$R_t = \sum_{g=1}^{G} \alpha_g D_g + \sum_{g=1}^{G} \beta_{Mg} R_{Mt} D_g + \sum_{k=J+1}^{K} \beta_{tk} x_{tk} + \varepsilon_t$$

where the variable D_g takes the value 1 if day t belongs to the year $g \in G = \{1,...,10\}$. In this last specification $\varepsilon_t = \xi_{K_t} + \eta_t \sim N(0, \sigma_\varepsilon)$, where η_t accounts for the facts that are not observable by the analyst [6] [7].

4.3 Results

By applying the Chow test to the global regression and the individual parameters we find out that the one presenting structural change is that referred to the market. To be precise, we get an F equal to 8.44 for the global parameters, and 0.83, 16.5 respectively, for the specific risk and the market parameter. This is done in order to make the model more flexible; in fact, these structural changes are sometimes inherent to the stock return series (Cho and Taylor, 1987; Gultekin and Gultekin, 1983; Rozeff and Kinney, 1976).

[Insert Table I about here]

Table I depicts the parameter estimates. The estimation has been done by means of OLS, and the significance of the parameters has been obtained by calculating the variance and covariance matrix of Newey-West. From a general perspective, the model seems to catch some of the kinks appearing in the series, which in turn are due to the facts expressly considered. Specifically, and apart from the whole significance of the global conditions represented by the market structural parameters, those events with relevant impact on returns are the opening of new oil plants, the acquisition of oil assets, the decreases in oil prices, the alignments of competitors concerning these variations in prices, and the tender offer. From a management standpoint, these results permit the assessment of a decision made in a given situation; that is, the value the investors assign to expected consequences derived from such decisions.

An aspect that deserves special attention is the economic value of these events which appear to significantly explain the returns of the firm. On this account, the increase in the market value *MV* derived exclusively from an event, can be measured as

$$\frac{\partial R_t}{\partial x_{tk}} MV_{t-1} = \left\{ \frac{\partial \alpha}{\partial x_{tk}} + \frac{\partial \left[\sum_{g=1}^{G} \beta_{Mg} R_{Mt} D_g \right]}{\partial x_{tk}} + \frac{\partial \left[\sum_{k=J+1}^{K} \beta_k x_{tk} \right]}{\partial x_{tk}} + \frac{\partial \varepsilon_t}{\partial x_{tk}} \right\} MV_{t-1} = \beta_k MV_{t-1}$$

where MV_{t-1} is the number of shares on day t-1 multiplied by the closing price on that day. In order to illustrate the impact of the significant events, we take the average market value estimated from the study period as the benchmark magnitude, which is 11,977 million €. So the profits obtained from opening new oil plants stand at 35 million €, those derived from acquiring oil assets and the decrease in prices are worth 47 million €. The alignment of competitors is valued in 83 million €, and finally, the tender offer appears to be the *star event* in this period, reaching a change in the market value of 994.1 million €: this is the present value assigned to this merger.

As indicated before, except for the latter event, all these parameters represent the average impact of the specific news item analysed. It is obvious that a much more atomised appraisal would allow the analyst to uncover particular reactions within these aggregated figures. Bearing this caveat in mind, this is quite an easy-to-handle task for managers in the sense that, being fully aware of all decisions made and events potentially affecting the company, it is possible to measure them at the end of each day, just looking at the stock reactions.

Also, with respect to this issue, we check the robustness of the results obtained from this application. Along these lines, we built two dummy variables representing those kinks too high or too low appeared in the residual plot outside a 1% threshold on days where *unknown* information was released [8]. Equation 2 presents this estimation, showing basically the same results as Equation 1.

The model accounts for a high percentage of the variance of the dependent variable, which stands at 42.0% by looking at the *R*-squared and 41.3% at the Adjusted *R*-squared for the Equation 1. These measures rise in Equation 2, 80.1% and 79.9% respectively, indicating some hints about the possibility of representing in an accurate way a number of happenings related to the firm if one were fully aware of them. Both estimates are globally significant at 1% by the *F*-statistic.

5. CONCLUSIONS

The need for managers to know the factors influencing the future wealth and stability of their firms has aroused the interest for valuing business environment; today, this is a tricky task considering the complex business environment that decision-makers have to face.

The market model has been formalised to permit the estimation of given events in cash-flow value terms. It can be regarded as both, objective, in the sense that is based on measures which come from the market itself, and subjective, because they are based on investors' expectations. An important issue arises on this point, which is the way the investors are providing these perceptions: contrary to other techniques, in this method they are not just *giving their opinion*, they *are acting* according to their perceptions; and, what is more, in this case, *acting* involves determining how they are investing their own money, which leads to a high degree of implication when making their decisions. This should lead to a rather reliable measurement.

For illustrative purposes, an empirical application has been carried out in a Spanish oil company. The analysis allows us to observe that some environmental events are recognised quite well. A limitation of this procedure is that the analyst might not be able to know all the information that has been released, so one has to take care of assuring, as far as possible, not to neglect relevant data.

To operate this process on a daily basis the following steps are proposed: 1) Estimate the market model for N days previous to day t (today); 2) create a dummy variable which takes on value 1 if on day t an event has occurred, and re-estimate the market model including the closing share price of day t; and 3) observe the significance of the parameter associated with the dummy variable, and if so it is, interpret its sign.

At any rate, the information obtained from this type of assessment can be used by managers not only to see how investors are regarding the direction of the environmental cause-effect relationship but also to quantify its impact. This might help to determine the aspects that are more relevant, and which of them deserve higher attention, both to defend from and to take advantage of. What is more, considering that the analysis of the business environment can be implemented on a daily basis by updating the data series at the end of the day, managers can appraise how worth investors are valuing their management actions and how important they regard specific events. Finally, taking into account that more than a news item can be released on a day, it would be interesting to analyse the market model through intra-day data.

6. REFERENCES

Aaker, D.A., Kumar, V. and Day, G. S. (1998), Marketing Research, John Wiley & Sons, New York.

Bromiley, P. and Marcus, A. (1989) "The Deterrent to Dubious Corporate Behaviour: Profitability, Probability and Safety Recalls", Strategic Management Journal, vol 10, pp. 33-50.

Byars, L.L. (1987), Strategic Management: Planning and Implementation; Concepts and Cases, Harper & Row, New York.

Chaney, P.K., Devinney, T.M. and Winer, R.S. (1991), "The Impact of New Product Introductions on the Market Value of Firms", Journal of Business, vol 64, No 4, pp. 573-610.

Child, J. (1972) "Organizational Structure, Environment and Performance -the Role of Strategic Choice", Sociology, vol 6, pp. 1-22.

Cho, D.Ch. and Taylor, W.M. (1987) "The Seasonal Stability of the Factor Structure of Stock Returns", Journal of Finance, vol 42, No 5, pp. 1195-1211.

Choo, Ch. W. (1998) "The Art of Scanning the Environment", Bulleting of the American Society for Information Science (ASIS), Vol 25, No 3, pp. 13-19.

Daft, R. (1989), Organizational Theory and Design, West Publishing Co, St. Paul, Minn.

Daft, R., Sormunen, J. and Parks, D. (1988) "Chief Executive Scanning, Environmental Characteristics, and Company Performance: An Empirical Study", Strategic Management Journal, Vol 9, pp. 123-139.

Gultekin, M.N. and Gultekin, N.B. (1983) "Stock Market Seasonality: International Evidence", Journal of Financial Economics, Vol 12, pp. 469-481.

Horsky, D. and Swyngedouw, P. (1987) "Does It Pay to Change Your Company's Name? A Stock Market Perspective", Marketing Science, Vol 6, No 4, pp. 320-335.

Karafiath, I. (1988) Using Dummy Variables in the Event Methodology, The Financial Review, 23(3), 351-357

Morrison, J.L. and Wilson, I. (1996) The Strategic Management Response to the Challenge of Global Change, in Didsbury, H. (ed.) *Future Vision, Ideas, Insights and Strategies*. Bethesda, MD: The World Future Society..

Olsen, M.D., Murthy, B. and Teare, R. (1994) "CEO Perspectives on Scanning the Global Hotel Business Environment", International Journal of Contemporary Hospitality Management, Vol 6, No 4, pp. 3-9.

Olsen, M.D., Tse, E. C-Y and West, J.J. (1998) Strategic Management in the Hospitality Industry, New York: John Wiley & Sons.

Roll, R. And Ross, S. (1984) "The Arbitrage Pricing Theory Approach to Strategic Portfolio Planning", Financial Analysis Journal, May-June, pp. 14-26.

Rozeff, M.S. and Kinney, W.R. (1976) "Capital Market Seasonality: The Case of Stock Returns", Journal of Financial Economics, Vol 3, pp. 379-402.

Schwert, G.W. (1981) "Using Financial Data to Measure Effects of Regulation", Journal of Law and Economics, 24, pp. 121-158.

Endnotes

[1]Albeit the terms scanning and monitoring are often used interchangeably, some authors make a distinction between them, considering that monitoring follows scanning (Morrison and Wilson, 1996): While scanning enables a firm to identify critical trends and potential events, monitoring uses descriptors or indicators of these trends and events as kew elements in a systematic search to obtain information about them; so, the goal of monitoring is to assemble sufficient data to enable the firm to estimate the strength of indicators of events, such as their effect of firm performance.
[2] Under Morrison and Wilson's (1996) distinction, this model would be used in the monitoring stage in order to ascertain the impact of given environmental events, in such a way that it would provide the analyst with an indicator of the effect of an event on firm performance.
[3] For example, in a Delphi experiment the experts give their opinions but they do not necessarily belong to the firm's staff; or even being members of the firm as the case of the sales force, their estimation might well be biased, underestimate to be precise, due to the fact that their commission thresholds are calculated by means of the level of sales expected for the future.
[4] This task has been done by means of the *Baratz* database, which provides information published in 28 different newspapers of national or regional coverage, as well as those of general and/or specialised content. This database allows us to obtain all the relevant information published on a specific firm on a day-to-day basis (also it permits the detection of all the news items related to a particular topic) by introducing a key word (say, name of the firm, brand, topic, etc.). Although shareholders tend to look at the newspapers in order to make decisions, it is important to bear in mind that other sources of information can be used today (e.g. the Internet), what would lead practitioners to consider them all as well.
[5] Of course, we could have applied the model this way, but the number of parameter to be estimated would have been 159, with the subsequent estimation problems that it would involve.
[6] This expression can be seen as a one-factor model where the disturbance u_t is equal to $\sum_{k=J+1}^{K}\beta_{tk}x_{tk}+\varepsilon_t$.
Asset's returns on a specific day are arrived at by anticipated and non-anticipated events. The former are incorporated into investor's expectations through systematic factors affecting the economy; the latter, however, are the ones which ultimately form the returns. Contrary to the systematic factors, these are called idiosyncratic elements as they have an effect on a given firm in particular and not on the global economy. Evidently, these non-anticipated events are not known *a priori*, but it is possible to appraise the security's sensitivity to such news (Roll and Ross, 1984). In this sense, the composite element $\sum_{k=J+1}^{K}\beta_{tk}x_{tk}$ represents an attempt to model non-anticipated micro-environmental events impacting on the firm's performance. In order to get a parsimonious model, from now on it is assumed that $\beta_{tk}=\beta_{t+L,k}\ \forall L\in Z$.
[7] This formalisation can be regarded as an extension of the alternative method for event studies proposed by Karafiath (1988) as it permits the analysis of multiple events simultaneously.
[8] As seen before, the error term includes the error η_t derived from news not observed by the analyst (e.g. news not published in the newspapers revised, or news released in other information sources).

Table I. Parameter Estimates of Environmental Events

Variables	Equation 1		Equation 2	
	Parameter	SD	Parameter	SD
Constant	0.000	0.000	-0.000	0.000
Market 91	1.046***	0.041	1.070***	0.032
Market 92	0.997***	0.065	1.036***	0.022
Market 93	0.940***	0.101	0.943***	0.035
Market 94	0.984***	0.074	1.005***	0.024
Market 95	0.746***	0.080	0.713***	0.038
Market 96	0.833***	0.075	0.824***	0.056
Market 97	0.729***	0.052	0.710***	0.027
Market 98	0.567***	0.033	0.567***	0.029
Market 99	0.587***	0.088	0.553***	0.035
Market 00	0.371***	0.074	0.383***	0.039
DOW	0.001	0.002	0.001	0.002
GF	-0.002	0.003	-0.002	0.003
CA	-0.000	0.002	-0.000	0.002
COI	-0.003	0.003	-0.003	0.003
ONP	0.003*	0.001	0.003**	0.001
CP	-0.001	0.002	-0.001	0.002
AGI	-0.003	0.002	-0.003	0.002
EFA	0.001	0.005	0.001	0.005
PS	0.003	0.004	0.003	0.004
R	-0.004	0.003	-0.004	0.002
AP	-0.000	0.004	0.000	0.004
AOA	0.004***	0.001	0.004***	0.001
FSM	0.003	0.007	0.003	0.007
WS	0.002	0.003	0.002	0.003
UC	-0.004	0.006	-0.004	0.006
SA	0.000	0.001	0.000	0.001
IB	0.004	0.003	0.004	0.003
DPP	0.004*	0.002	0.005*	0.002
ACP	0.007**	0.003	0.007**	0.003
IPP	-0.004	0.005	-0.004	0.005
ANM	0.000	0.005	0.000	0.005
AOC	0.003	0.004	0.004	0.004
TO	0.083***	0.001	0.084***	0.000
High			0.018***	0.000
Low			-0.016***	0.000
R-squared	0.420		0.801	
Adjusted R-squared	0.413		0.799	
F-statistic	54.49		285.7	
Prob(F-statistic)	0.000		0.000	

*=p<0.1; **p<0.05; ***=p<0.01.