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Halkos, George and Skouloudis, Antonis

Department of Economics, University of Thessaly, Department of Environment, University of the Aegean

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# **Exploring corporate disclosure on climate change: Evidence from the Greek business sector**

**George Halkos<sup>1</sup> and Antonis Skouloudis<sup>2</sup>**

<sup>1</sup>Laboratory of Operations Research,  
Department of Economics, University of Thessaly

<sup>2</sup>Centre for Environmental Policy and Strategic Environmental Management,  
Department of Environment, University of the Aegean

## **Abstract**

An increasing number of large corporations around the world engage in accounting for and reporting on their plans and measures towards climate change, as part of their environmental responsibility agenda. Using a disclosure index, this study investigates the status of the disclosure practices of the top 100 companies operating in Greece with respect to the pivotal issue of climate change. Determinants which drive Greek companies to publicly disclose such information are examined while overlapping perspectives for the Greek case are outlined. The analysis suggests that only a small group of leading Greek companies appears to endorse a climate change discourse as an instrument of empowering stakeholders' decision-making. Most other corporations still tend to disregard disclosure practices of their actions towards this global issue.

**Keywords:** Climate change; corporate disclosure; corporate social responsibility; content analysis; Greece.

**JEL codes:** Q50; Q54; Q58; Q59; F55; L25.

## **Introduction**

Climate change poses potentially unprecedented threats to modern societies and reflects a much-debated issue as it is strongly interlinked with current lifestyles and development policies. While scientific assessments suggest that the overall impact from climate change is most likely unpredictable, they seem to denote that extreme weather conditions are to be expected among the various geographical regions in the years to come<sup>1</sup>. Moreover, such unpredictability refers to significant changes in the distribution of precipitation, affecting the intensity and frequency of draughts and floods, severe disease and pest outbreaks and well as widespread fires in forested areas.

The need for co-ordinated action to mitigate climate change impacts is an essentially complex public policy problem of modern times; a problem where meaningful actions from the business community should represent a key component in shaping effective policy responses and appropriate mitigation measures. Given the difficulties of the global community in defining concrete ways to confront climate change, the exploration of the discretionary disclosure of organizational responses to climate change makes a useful endeavour. Moreover, under the critical circumstances climate change posits, companies need to maintain the support and approval of their stakeholders by introducing or refining practices that will counteract possible legitimacy threats or risks related to climate change.

### **1. Background and conceptual underpinning**

Discretionary corporate climate change disclosure (hereafter CCD) has been identified as a valuable legitimization instrument which can mitigate conflicts with

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<sup>1</sup> For information on the dimensions of the problem of climate change and its economic effects see Halkos (2014, 2015).

stakeholders and a practice with a mediating effect in convincing societal members that the organization is fulfilling their expectations (Dowling and Pfeffer, 1975; Lindblom, 1994). The concept of legitimacy according to Dowling and Pfeffer (1975, p.122) is defined as “a condition or status which exists when an entity’s value system is congruent with the value system of the larger social system of which the entity is a part’ and add that ‘when a disparity, actual or potential, exists between the two value systems, there is a threat to the entity’s legitimacy”.

Legitimacy theory posits a systems-oriented perspective to the business-and-society relationship, where the firm influences and is influenced by the social context within it operates. It sets forth a form of a ‘social contract’ where society provides the company with a range of resources to conduct its activities along with an overarching ‘licence to operate’, in return for the provision of socially acceptable (i.e. legitimate) business conduct (Mathews, 1993; Deegan, 2002). Whenever the organization’s operation is not meeting the society’s set of norms and values then the latter can revoke its ‘licence’ and for the firm to retain its legitimacy practical demonstrations of adherence to such expectations are essential.

According to Gray et al. (1987), such disclosure practice refers to “the process of communicating the social and environmental effects of organizations (particularly companies) beyond the traditional role of providing a financial account to the owners of capital, in particular shareholders. Such an extension builds upon the assumption that companies do have wider responsibilities than simply to make money for their shareholders” (Gray et al., 1987, p. 9). In line with the multidimensionality of the corporate social responsibility (CSR) construct, CCD encompasses a diverse range of information, including vision and strategic posture to address climate change, risks and opportunities arising from climate change, investment plans to mitigate

operational impact and control emissions, quantitative information of greenhouse gas emissions, voluntary initiatives to reduce emitted greenhouse gases, etc.

A considerable number of the largest corporations around the world adds emphasis and allocates resources towards climate change mitigation plans and measures (Carbon Disclosure Project, 2013). In this respect, corporations are called upon to shape voluntary disclosure practices for such courses of action in order to address potential legitimacy deficits (Kolk, 2008). Indeed, the overlapping and multifaceted impacts of climate change are acknowledged as significant and far-reaching for business (Business Roundtable, 2007). Still, relevant corporate communication channels which incorporate such considerations leave much to be desired with Doran et al. (2009) to indicate that a mere 24% of the Standard and Poor's (S&P) 500 companies referred to climate change in their SEC filings.

CCD has received increased attention in the academic literature with a growing number of empirical studies to explore this aspect of corporate accountability. In this regard, two dominating groups of research streams are identified. A considerable number of scholars focus on trends and patterns of CCD in specific national-regional and/or industries while another group of studies attempts to shed light on determinants and predictors of CCD (e.g. Stanny and Ely, 2008; Freedman and Jaggi, 2009).

With this in mind, this study aims to contribute to the literature by shedding light on the comprehensiveness of CCD by large firms in Greece and investigate a number of determinants of such disclosures.

Next, the research questions of the study are described along with the methods employed and the sample identification. The following section presents the analysis of data and relevant findings. In the final section, implications are discussed and remarks regarding the Greek case are drawn.

## **2. Research questions**

Prior research suggests a positive relationship between corporate size and the extent to which corporations disclose information (Ahmad et al., 2003; Freedman and Jaggi, 2009; da Silva Monteiro and Aibar-Guzmán, 2009; Stanny and Ely, 2008). Larger organizations encapsulate high public visibility and significant social and environmental impacts (Watts and Zimmerman, 1986). They also have more resources to invest in CCD (Belal, 2001) and aim to present a positive image towards their stakeholders. Therefore, we hypothesize that CCD of Greek firms is dependent on organizational size.

Literature also suggests a strong industry effect on environmental and social disclosure. In particular, companies in the mining, oil and chemical sectors seem to disclose more information regarding environmental management and employees' health and safety measures (Line et al., 2002), while the financial sector, and the tertiary-service sectors in general, seem to give more emphasis to labor practices, product responsibility and broader social issues (Line et al., 2002).

In addition, corporations in sectors with high environmental sensitivity tend to disclose more information regarding their environmental performance than others (Hackston and Milne, 1996; Patten, 1991; Roberts, 1992; Ahmad et al., 2003; da Silva Monteiro and Aibar-Guzmán, 2009). Finally, business organizations with high proximity to the final consumer (i.e. companies of the banking, retailing, utilities or food and beverages sector) are expected to provide more non-financial information in general (Arulampalam and Stoneman, 1995), since promoting a positive corporate image that assures responsible conduct, increases brand loyalty and motivates consumers to buy products of the specific brand (Meijer and Schuyt, 2005). Thus, we postulate that CCD of Greek firms varies by business sector and that Greek companies pertaining to environmentally sensitive sectors will provide more CCDs.

We also postulate that Greek companies with high proximity to the final consumer will provide more CCDs.

Prior findings on the relationship between business profitability and non-financial disclosure are ambiguous (e.g. Belkaoui and Karpik, 1989; Patten, 1991; Roberts, 1992). Nevertheless, increased profitability can have a direct effect on the extent of environmental and social disclosure (Bo, 2009). Supporting arguments for this claim point out that a profitable organization is more exposed to social scrutiny (Ng and Koh, 1994), and is most likely managed by skilled and insightful executives who can potentially foresee the benefits of social responsiveness (Belkaoui and Karpik, 1989), but mostly that it has the available economic resources to engage in voluntary disclosure (Hackston and Milne, 1996; Roberts, 1992). Thus, we postulate that CCD of Greek firms is dependent on profitability.

Chapple and Moon (2005) argue that the level of internationalization of a firm can lead to increased CSR and, in our case, to increased CCD efforts. They denote that "...as businesses trade in foreign countries, they see the need to establish their reputations as good citizens in the eyes of new host populations and consequently will engage in CSR as part of this process" as well as that "...the emerging systems of world economic governance create incentives for greater CSR" (p. 419). In a similar vein, Cooke (1989) and Tang and Li (2009) stress that a firm's presence in foreign markets postulates that it is bound to disclose more comprehensive information in line with the reporting rules of the foreign business system. In addition, Robb et al. (2001) offer empirical support that international presence can be a strong determinant for non-financial disclosure. In line with these arguments, we explore the hypothesis that CCD of Greek firms depends on their level of internationalization.

Isomorphic patterns and mimetic processes as reflected in the subscription to business coalitions and self-regulatory initiatives for promoting CSR (DiMaggio and

Powell, 1983; Matten and Moon, 2008) have a mediating role in the non-financial disclosure practices of firms. In this context, the growing number of stand-alone CSR reports in Europe (KPMG, 2013) has been identified as a marking example of such processes in the homogenization of institutional environments across national boundaries (Matten and Moon, 2008: p. 412). In view of the above, we hypothesize that Members of the Hellenic CSR Network and the Greek Business Council for Sustainable Development provide more CCDs.

Secchi's (2006) evidence from Italy reveals that there is heterogeneity in the non-financial reporting practices of government-owned and privately-owned firms. In this respect, the size of the (notably larger) strongly bureaucratic, centralized public sector in Greece has aggravated calls for new public management techniques (Phillipidou et al., 2004). Yet, efforts towards the modernization of the state are admittedly slow and previous transformational processes have proved unsuccessful (Kufidou et al., 1997; Philippidou et al., 2004). Key factors for such failure include Greek state organizations' resistance to change, the myopic focus on regulations, the absence of robust strategic planning, the lack of employee motivation and stimuli to undertake initiatives in order to offer and apply new thinking in the organization (Ministry of Internal Affairs, 2000 in Phillipidou et al., 2004: p. 324).

Moreover, according to preliminary arguments and tentative findings (Tsakarestou, 2004; Hackston and Milne, 1996; Tang and Li, 2009), it is reasonable to hypothesize that subsidiaries of foreign multinationals (MNCs), which have adopted a robust CSR agenda, can act as moral agents in the country and will be more active in non-financial disclosure than those companies headquartered within the country.

Finally, companies listed on the Athens Stock Exchange (ASE) constitute 'the core' of the country's corporate sector, represent major sectors of economic activity

and form an essential driving force of the domestic economy via their linkages with other, non-listed, enterprises. These firms are not only well-known to the financial and business analysts' community, but they tend to draw more public attention and receive more extensive media coverage than unlisted firms (Branco and Rodrigues, 2006; Halkos and Sepetis, 2007). Given these, we explore that CCD of Greek firms varies by ownership identity and if Greek government-owned and government-linked corporations provide less CCDs. Similarly we investigate whether subsidiaries of foreign MNCs provide more CCDs and if companies listed on the Athens Stock Exchange provide more CCDs.

In view of the above, our study is guided by the following research questions:

- a) Is CCD a common practice among large Greek corporations? and
- b) Do organizational parameters such as those described in this section affect CCD?

### **3. Material and methods**

The sample used in this study consists of the 100 largest companies operating in Greece (based on annual revenues) according to the ICAP's annual "Greece in Figures" report. Out of the companies in question, 32% belong to the manufacturing sector, followed by firms engaged in trade/retail activities (31%), the banking-insurance sector (12%) and the utilities sector (11%). No other business sector yielded more than 10% of the sample (construction and building materials firms represent 6% while firms pertaining to other tertiary/service sectors represent 9% of the sample). Moreover, 36% of the firms are listed in the ASE, 7% are government-owned, and 29% are privately-owned while 28% are subsidiaries of foreign multinationals.

In order to explore the publicly available CCDs, a web-based search was performed during the first quarter of 2011, locating the official websites of the sample companies and all the related information (annual reports, environmental statements,

press releases, webpages, etc.) was identified. In cases of annual, stand-alone, non-financial reports (environmental, health and safety, CSR and/or sustainability), the most recent one was included in the analysis. Among the 100 corporate websites, one was under construction while three foreign subsidiaries redirected interested parties to the global website of the parent company.

CCD is assessed according to a numerical grading scheme where zero corresponds to non-disclosure and 1 stands for organizations disclosing information on internally adopted and implemented policies, plans and/or programs towards climate change mitigation. A number of independent variables are used in this empirical analysis. Specifically, *company size* is measured by the number of employees and turnover<sup>2</sup>. *Business sector* is measured by a six-scale dummy variable pertaining to the segmentation of the top Greek firms presented in the sample's description. *Profitability* is measured using return on assets (ROA), return on equity (ROE) and net profit margin<sup>3</sup>. *Internationalization* is operationalized by the percentage of sales exported to other countries as well as by the number of countries, besides Greece, where the organization operates. *Environmental sensitivity*, *consumer proximity* and *subscription to CSR initiatives* are also expressed by a binary zero/one dummy variable, where one designates a company falling in these categories and zero if it does not. *Ownership identity* is measured by a four-scale dummy variable pertaining to the segmentation of the top Greek firms presented in the sample's description.

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<sup>2</sup> Turnover is defined as the income that a company generates from its business activities.

<sup>3</sup> ROA is calculated as the ratio of the profit (loss) before tax over the average total assets in time t and t-1. It calculates the yield of total assets of a corporation providing a possible criterion for the evaluation of the management tasks achieved. ROE is calculated as the ratio of the profit (loss) before tax over the average equity in time t and t-1. It shows the profitable capability of the corporation and estimates the efficiency with which the corporation exploits its equity. Similarly As expected there was a very high correlation between ROA and ROE and thus we omitted this ratio from our analysis. Similarly the ratio of net profit margin for a corporation is usually expressed as the ratio of net profits over revenues showing what portion of each earned € by the company ends up to profits.

### 3.1 The proposed econometric model formulation

In our model formulation we treat the dependent variable climate change disclosure (CCD,  $Y_i$ ) as a dichotomous variable taking the value of 1 (organizations disclose brief or extensive coverage on specific topics) with probability  $\Theta$  and the value of 0 (non-disclosure) with probability  $1-\Theta$ .<sup>4</sup> This random variable has a discrete probability distribution:

$$\Pr(Y_i, \Theta_i) = \Theta_i^{Y_i} (1 - \Theta_i)^{1-Y_i} \quad (1)$$

With likelihood function:

$$L(Y;\beta) = \frac{\prod_{i=1}^{n1} e^{(\beta_0 + \sum_{j=1}^k X_{ij})}}{\prod_{i=1}^n \left[ 1 + e^{\left( \beta_0 + \sum_{j=1}^k \beta_j X_{ij} \right)} \right]} \quad (2)$$

Apart of the estimation of the slopes in the logistic regression model formulation we also calculate the connection between the independent variables and the dependent entailing the Odds Ratio (OR) parameters. These are identified as the ratio of the probability that CCD will occur (event E that  $Y=1$ ) divided by the probability that CCD will not occur (1- event E). That is:

$$\text{Odds}(E | X_1, X_2, \dots, X_n) = \frac{\Pr(E)}{1 - \Pr(E)} \quad (3)$$

In this way the form of the logistic model is defined as

$$\text{logit} [\Pr(Y=1)] = \log_e[\text{odds}(Y=1)] = \log_e \left[ \frac{\Pr(Y=1)}{1 - \Pr(Y=1)} \right] \quad (4)$$

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<sup>4</sup> For more details on the properties and applications of logistic regression see Halkos (2006, 2007).

## 4. Empirical results

### 4.1 Descriptive statistics

As concerns the CCD behavior on behalf of the companies operating in Greece, the descriptive analysis of our sample shows that the sizable majority of the companies (74%) take no measures at all for disclosure, with only a 26 of the organizations disclosing information. It is obvious from the above that the dialogue potential CCD encapsulates is not utilized effectively to enable and stimulate a fruitful component of corporate non-financial accountability. Quantitative information in terms of performance indicators (e.g. direct and indirect greenhouse gas emissions or CO<sub>2</sub> reductions achieved over the reporting period) is very little, mostly located in CSR reports and absent from annual reports and investor relations statements.

Table 1 presents the descriptive statistics of the variables used in our empirical analysis.

**Table 1:** Descriptive statistics of the variables under consideration

<b>Variables</b>	<b>Mean</b>	<b>Median</b>	<b>StDev</b>	<b>Minimum</b>	<b>Maximum</b>
CCD	0.2600	0.0000	0.4408	0.0000	1.0000
CSR initiatives	0.4200	0.0000	0.4960	0.0000	1.0000
Exports	0.1348	0.0200	0.2334	0.0000	0.9500
Number of countries other than Greece	1.370	0.0000	2.820	0.0000	15.000
Ownership	2.3	2	1.2268	1.0000	4.0000
Sector	2.890	3.0000	1.632	1.0000	6.000
Employees	2245	941	3577	12	24602
Turnover	885707	427554	1238434	114219	7899981
Net Profit Margin	6.90	4.20	10.46	-23.11	55.90
Return on assets	6.70	3.25	11.63	-26.38	59.07
Return on equity	25.34	11.89	48.95	-86.62	252.33
Consumer proximity	0.5100	1.0000	0.5024	0.0000	1.0000
Environmental sensitive sectors	0.3100	0.0000	0.4648	0.0000	1.0000

#### 4.2 Econometric results

For our research, the model specification is:

$$\text{logit}[\text{Pr}(Y=1)] = f(\text{size, sector, profitability, environmental sensitivity, consumer proximity, internationalization, ownership identity, subscription to CSR initiatives})$$

where  $Y$  is our dichotomous-choice dependent variable CCD with zero corresponding to non-disclosure and 1 to organizations providing disclosures on climate change mitigation. This dependent variable depends on a number of explanatory variables. Namely, number of employees, turnover, sector, return on equity, return on assets, net profit margin, internationalization, environmental sensitivity, consumer proximity, exports, subscription to CSR initiatives and ownership identity.

In Table 2, columns 2-3 refer to the full model while columns 4-5 present the final model consisting of the statistically significant variables and represented as:

$$\text{logit}[\text{Pr}(Y=1)] = \beta_0 + \beta_1 (\text{subscription to CSR initiatives}) + \beta_2 (\text{sector}) + \beta_3 (\text{turnover}) + \beta_4 (\text{return on assets}) + \beta_5 (\text{consumer proximity}) + \beta_6 (\text{environmentally sensitive sectors}) + \beta_7 (\text{number of countries other than Greece}) + \varepsilon_i$$

where  $\varepsilon_i$  is the disturbance term with the usual properties.

As shown in Table 2, the coefficients have the expected signs. All variables affect positively while sector and ROA affect negatively CCD. The magnitude of subscription to CSR initiatives, consumer proximity and environmental sensitive sectors are quite high while on the other hand the magnitude of turnover is negligible.

The constant term and the variables *subscription to CSR initiatives* and *turnover* are significant in all significance levels (0.01, 0.05 and 0.1) in both model formulations. The variables *sector* and *ROA* are significant in the statistical level of 0.1 in both model formulations. The variable *number of countries other than Greece* is statistically significant in the first model formulation and in the levels of 0.05 and 0.1 whereas the

variables *consumer proximity* and *environmentally sensitive sectors* are statistically insignificant in this model formulation. However they are both significant in the statistical level of 0.1 in the second model formulation. The variables *exports* and *ownership* were statistically insignificant in both model formulations and were omitted.

**Table 2:** Econometric results of the proposed logit model formulations

Variables	Logit models			
	Estimates	Odds Ratios	Estimates	Odds Ratios
Constant	-3.6882 [0.005]	0.02502	-3.5909 [0.004]	0.0276
Subscription to CSR initiatives	2.04485 [0.005]	7.728	2.228 [0.002]	9.2815
Sector	-0.511 [0.073]	0.5999	-0.5086 [0.056]	0.6013
Turnover	0.0000014 [0.009]	1.000	0.0000015 [0.004]	1.000
Return on Assets	-0.0687 [0.078]	0.9336	-0.0674 [0.068]	0.9349
Consumer Proximity	1.7258 [0.133]	5.6168	1.9014 [0.077]	6.6951
Environmentally sensitive sectors	1.6523 [0.133]	5.2190	1.7565 [0.091]	5.7918
Number of countries other than Greece	0.2484 [0.019]	1.2820		
Pseudo R <sup>2</sup>	0.48		0.44	
LR $\chi^2(7)$	55.25 [0.000]		49.74 [0.000]	
$\chi^2(6)$				
Log Likelihood	-29.682		-32.434	
Hosmer Lemeshow	3.89 [0.867]		2.60 [0.957]	

The estimated adjusted odds ratio for the variables *subscription to CSR initiatives*, *consumer proximity* and *environmentally sensitive sectors* are 9.28, 6.695 and 5.792 respectively. This implies that the odds are about 9.3, 6.7 and 5.8 times higher for a corporation which provides disclosures on climate change mitigation.

The percentage change in the odds  $\pi = \frac{\Pr(Y = 1)}{\Pr(Y = 0)}$  for every 1 unit in  $X_i$  holding

all other  $X$ 's fixed can be also computed. For instance, in relation to sector the odds of CCD decrease by about 40% ceteris paribus. Similarly, the percentage change in

the odds from a unit change in ROA is negligible (0.7%) while there is no change in the case of organizational size expressed by turnover.

The overall significance of the models is given by  $X^2$  values equal to 55.25 and 49.74 with significance levels of  $P=0.000$  in both cases and 7 and 6 degrees of freedom for the first and second model formulation respectively. Based on this value we can reject  $H_0$  (where  $H_0: \beta_1 = \beta_2 = \dots = \beta_7 = 0$  and  $H_0: \beta_1 = \beta_2 = \dots = \beta_6 = 0$ ) and conclude that at least one of the  $\beta$  coefficients is different from zero ( $X^2_{0.05,7}=14.067$  and  $X^2_{0.05,9}=12.592$ ). The Hosmer and Lemeshow values equal to 3.89 and 2.60 (with significance equal to 0.867 and 0.957) for the first and second model respectively. The non-significant  $X^2$  value indicates a good model fit in the correspondence of the actual and predicted values of the dependent variable.

## **5. Concluding remarks and policy implications**

In our research effort we have tried to relate CCD with a number of explanatory factors like size, sector, profitability, environmental sensitivity, consumer proximity, internationalization, ownership identity and subscription to CSR initiatives. Presenting them in order of their magnitudes, we found that subscription to CSR initiatives, consumer proximity as well as environmentally sensitive sectors, are significant variables affecting positively CCD. In contrast, sector and profitability (expressed by return on assets) have a significant negative effect on CCD while size (expressed by turnover) has a positive yet negligible effect. Internationalization, expressed by the number of countries other than Greece that the company operates, and exports along with ownership identity seem to have no significant influence.

Deegan *et al.* (2002) assert that “where there is limited concern, there will be limited disclosures” (p.335). In this respect, our findings suggest that Greek companies are most likely overlooking or disregarding CCD. Apart from a very small

sub-group of Greek firms actively engaged in the endorsement of CCD practices, most other assessed corporations tend to treat such accountability perspectives superficially and in a ‘window-dressing’ manner, offering primarily self-laudatory information. Given that gathering and sharing climate change information can be conceived as a reflection of a firm’s related performance as well as a useful ‘proxy’ to assess it (Snider et al., 2003), most assessed firms appear to undertake inadequate actions towards the identification of their exposure to climate change risks and implicit opportunities.

Such information deficit fails to inform stakeholders’ decision-making and adds very little to environmental policy and planning. Yet, domestic market forces (suppliers, customers, investors, creditors, etc.) and bottom-up pressures (from civil society actors and the wider public) in challenging the environmental accountability of business have so far been weak and sporadic in Greece. Awareness, interest and knowledge in environmental management are low (Kassolis, 2007) while ‘domestic mobilization’ (Börzel, 2003) has generally been slack. Stakeholders’ demands and expectations have so far proved to be moderate in stimulating the Greek business community towards consistent environmental reporting and meaningful environmental management.

Future research should investigate CCD in other national contexts using more detailed content analysis approaches. Moreover, longitudinal analysis of CCD could contribute in examining whether and how the recent economic downturn affected the climate change discourse of corporations. Finally, action research and qualitative evidence could shed light on where climate change stands among the various corporate reporting aspects and, ultimately, provide additional insights into factors that determine accountability responses towards this global concern.

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