SUSTAINABLE BUSINESS PRACTICES AND CORPORATE PERFORMANCE: EVIDENCE FROM OIL AND GAS INDUSTRY

VATAVU Sorana
Postdoctoral researcher, Finance Department, Faculty of Economics and Business Administration, West University of Timisoara, Timisoara, Romania
sorana.vatavu@e-uvt.ro

Abstract: *Recently more companies focus on developing and implementing socially responsible strategies and policies to reduce the negative impacts on society, economy, and environment. The oil and gas industry is one of the most harmful industry on the environment. Therefore, we decided to study some of the companies operating in this industry in the United Kingdom, where the extraction of petroleum and natural gas is significant for the economy. Lately, more of these companies try to promote their activities as sustainable and as environmentally friendly as possible. Oil and gas companies started to report annually their sustainability performance and their actions in managing climate, environmental, and social impacts as well as the opportunities for undertaking sustainable actions. Moreover, they seem to pay more attention to human resource policies, promoting an inclusive culture, with no differences in gender, ethnicity, or disabilities. Nowadays, based on gender quotas within board members, the corporate performance faced some downturns, as companies seem to appoint the wrong board members to conform to the countries regulations or recommendations: increase the number of women in the board for quota-setting for women in leadership roles. Our analysis is focused on financial data (ROA, profit margin, taxes paid) as well as on information available in the annual reports and sustainability reports (Greenhouse Gas Emissions - CO2 Equivalent, number of male and female board members) of six companies. The database overviews the period 2006-2014. The descriptive analysis highlights a decreased trend of corporate performance along with the compositions of the board in oil and gas companies operating in the UK and a reduced level of gas emissions. Based on the regression models employed we underlined the importance that variables related to sustainable practices have on profitability. According to the main results, in terms of governance, oil and gas companies register higher performance when their boards have fewer members. In terms of gas emissions, lower levels would increase performance, although in our case the companies still impact the environment with high levels of GHC emissions. Finally, in terms of taxation, these companies have the potential to develop a country, as these taxes can cover important public expenditures.*

Keywords: *performance; gas emissions; sustainability; UK; oil and gas industry.*

JEL Classification: *Q5; L25.*

1. Introduction

The global oil and gas industry association for advancing environmental and social performance (IPIECA) with the American Petroleum Institute (API) and the International Association of Oil and Gas Producers (IOGP) introduced in 2005 "The Guidance" to help companies from oil and gas industry, to report on sustainability performance, referring to the economic, social, and environmental challenges (ESG). Over time, more oil and gas companies started to publish their sustainability reports to evidence the sustainability aspects addressed by their activities. Based on The Guidance (IPIECA, 2020), there are six topics developed to achieve sustainability: (1) Reporting Process, (2) Governance and Business Ethics, (3) Climate Change and Energy, (4) Environment, (5) Safety, Health and Security, and (6) Social. By 2020, four editions of the "Sustainability reporting guidance for the oil and gas industry" (or The Guidance report) were realised by IPIECA, in partnership with API and IOGP, and they are focused on helping companies to report sustainability performance and their actions in managing climate, environmental and social impacts as well as the opportunities for undertaking sustainable actions.
According to the information available on the IPIECA website, the key benefits for sustainability reporting are related to increasing the environmental and social performance of operations by enhancing for companies which activities can be improved and those that are successful, increasing the stakeholders' confidence in business performance, and adding business value by managing potential risks and taking advantage of business opportunities. Overall, the main scope of the Guidance is to encourage oil and gas companies to declare their solutions on reducing carbon emissions and protect the environment as an example of good practices.
The relationship between sustainability and performance has been frequently studied over the last decade. Therefore, sustainability reporting carries an increasing significance in this context, with relevance for the economic, societal, and political point of view. This paper aims to investigate how important sustainability policies and sustainability reporting are and the extent to which they impact the performance of the oil and gas companies. The paper also tries to demonstrate whether or not sustainability should be viewed as a compulsory criterion for oil and gas companies, turning sustainability reporting into a mandatory aspect in all countries.

2. Sustainability challenges in oil and gas industry

According to British Petroleum (2019) the energy demand will increase by 30% by 2040, and the need for oil and gas will continue its increase over the next decade. Even though the focus is currently on green energy and renewables, oil and gas will still count for half of the market in 2040. Therefore, regardless of global warming and environmental problems, the oil and gas industry is far from its downturn. The current situation and previous periods with low oil prices bring a major pressure on

oil and gas companies which have to minimise their costs mainly by reducing production and their human resource. For countries with a developed oil and gas industry, a decrease in oil price affects the economy due to increased unemployment, a limit in supplying access to energy, and a deficit in public revenues as long as the substantial taxes paid by the companies are affected by low profits.
Nowadays, the debate over climate change is one of the main problems in society. Being under government pressure or under the pressure of international laws and regulations, oil and gas companies face a series of challenges in their activities due to environmental concerns and crises. As a consequence, the companies in the oil and gas industry now focus on reducing the costs of production of hydrocarbon resources, complying with environmental laws and social responsibilities. In the process of implementing sustainable policies, companies must change the conventional ways of extraction. Normally, the production of crude oil, refining, and transportation is associated with high temperatures from the resources reservoirs, production of hydrocarbon, and pollution (Mojarad et al., 2018). Significant gas emissions are due to flaring, venting and drills management activities realised by the oil and gas companies, but these companies also produce a large waste of water and sometimes cause spills that immediately endanger the environment.

3. Data and methodology

To test the impact of sustainable practices on corporate performance, we approach the three factors of sustainability, i.e. environmental, economic, and social. We will further discuss the importance of each one and present the data collected to capture these three factors in terms of oil and gas companies.
The environmental aspect of sustainability regards the fact that companies and citizens should be more aware of the consumption of natural resources, considering the material scarcity, and the damage produced by the extraction of these materials. Production activities in the oil and gas industry produce a large volume of greenhouse gas emissions. These may be evaluated through CO_2 equivalent and methane emissions. In our analysis we employ the Total Greenhouse Gas (GHG) Emissions - CO2 Equivalent (noted “GasEmiss”) declared by oil and gas companies in their Sustainability reports.
The economic concept of sustainability refers to countries and businesses and how responsibly they operate and how sustainable their profits or development are. In terms of business, our analysis is focused on the profits oil and gas companies register and also on how effective their operational activities are, employing return on assets (ROA) and profit margin (PrMg) as response variables. The analysis also contains taxes paid by the oil and gas companies (Tax), illustrating on one side the profits registered through the income tax paid, while for the countries in which businesses operate, it reflects public revenues which should be spent on economic development.
For the third factor, the social aspect of sustainability, we consider the number of male and female members in the board of directors (noted “NoMaleBoD” and “NoFemaleBoD”). As the social concept of sustainability observes the ability to

obtain good social wellbeing which can be maintained over the long term, we refer in our analysis to the corporate governance policy which promotes gender equality for board diversity.

Our database is consisting of six companies operating in the oil and gas industry in the United Kingdom, namely: Royal Dutch Shell, Conocophillips, Esso Exploration and Production, Suncor Energy, and Premier Oil. The period analysed is 2006-2014, and the indicators were collected from the Amadeus database and the Sustainability reports published by the companies on their websites.

The analysis will start with a description of the evolution of the variables considered, observing their trends over the 2006-2014 period. Then, several regression models will be exploited to observe whether or not there is a statistically significant impact from the sustainability factors (GHC emissions, taxes, male board members, and female board members) towards the performance of the companies (ROA, profit margin).

We start our regression analysis by observing the sustainability impact on performance indicators. Sustainability will be considered from the three aspects, environmental, economic, and social, and then the models will be changed to observe whether or not the influences or their statistical significance change. Depending on the dependent variable observed (ROA or profit margin), the basic regression models considered are the following:

$$ROA_{it} / PrMg_{it} = \alpha_i + \beta_1 GasEmiss_{it} + \beta_2 Tax_{it} + \beta_3 NoMaleBoD_{it} + \varepsilon_{it}, \quad (1)$$

$$ROA_{it} / PrMg_{it} = \alpha_i + \beta_1 GasEmiss_{it} + \beta_2 Tax_{it} + \beta_3 NoFemaleBoD_{it} + \varepsilon_{it}, \quad (2)$$

where α_i represents the unknown intercept of every company (i is one of the six companies operating in the extraction of petroleum and natural gas industry, i=1..6), t (t=2006..2014) is the year analysed, the βs are the coefficients for every independent variable, and ε_{it} is the error term.

Based on the trends observed between the dependent and independent variables, we will also employ non-linear regression models, mainly quadratic regressions where we consider the squared values of the independent variables in order to evidence the statistical significance of the non-linear relationship with the performance indicators. More specifically, the new models will have the following form:

$$ROA_{it} / PrMg_{it} = \alpha_i + \beta_1 GasEmiss_{it} + \beta_2 GasEmiss_{it}^2 + \beta_3 Tax_{it} + \beta_4 Tax_{it}^2 + + \beta_5 NoMaleBoD_{it} + \varepsilon_{it}, \quad (3)$$

$$ROA_{it} / PrMg_{it} = \alpha_i + \beta_1 GasEmiss_{it} + \beta_2 GasEmiss_{it}^2 + \beta_3 Tax_{it} + \beta_4 Tax_{it}^2 + + \beta_5 NoFemaleBoD_{it} + \varepsilon_{it}, \quad (4)$$

Ultimately, we apply two non-linear regression models considering only the level of gas emissions (with the simple and squared variables) and the taxes paid (with the simple and squared variables) as independent variables in order to check the results robustness:

$$ROA_{it} / PrMg_{it} = \alpha_i + \beta_1 GasEmiss_{it} + \beta_2 GasEmiss_{it}^2 + \varepsilon_{it}, \quad (5)$$

$$ROA_{it} / PrMg_{it} = \alpha_i + \beta_1 Tax_{it} + \beta_2 Tax_{it}^2 + \varepsilon_{it}, \quad (6)$$

We mention that the models consider either the number of male board members or the number of female board members because these two are complementary and therefore the variables NoMaleBoD and NoFemaleBoD are strongly correlated.

4. Results

This section will start by describing the evolution of the analysed variables by observing their trend over the nine years. Then, a correlation matrix between each pair of variables will be presented followed by the regression results exemplified in a comparison between the linear and non-linear models applied.

4.1. Descriptive analysis

From the first figure, we can observe that over the period analysed, the economic performance of the oil and gas companies was quite volatile. Besides, overall, it decreased for all the companies except for Suncor Energy.

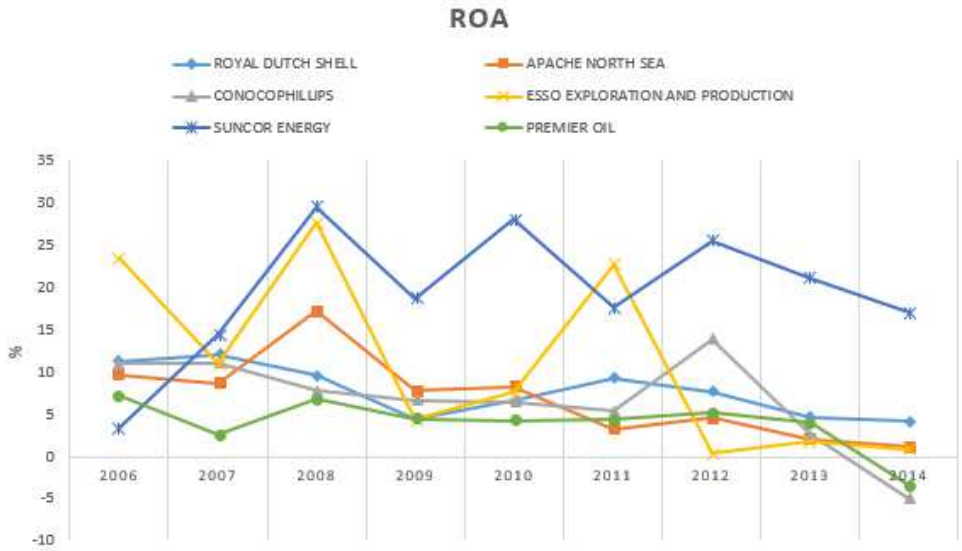

Figure 1: The evolution of ROA registered by oil and gas companies in 2006-2014

In terms of the profit margin presented in figure 2, which presents a similar trend to ROA, Suncor Energy is once again the only company with an increase in the profitability indicator from 2006 until 2014. From the companies analysed, Conocophillips, Premier Oil, and Esso Exploration and Production faced a loss over the last year analysed; from these companies, Esso Exploration and Production registered a profit from operational activities, with a positive return on assets.

The trend of the taxes paid is presented in the third figure, based on the variable calculated as the natural logarithm of the amount of taxes in euro. We chose to illustrate them like this to reduce the differences in their levels: some companies (e.g. Royal Dutch Shell) pay millions of euros as tax, while others pay several dozen thousand of euros (e.g. Premier Oil). Overall, we observe again a decrease in the

taxes paid by the oil and gas companies, which may also be reflected by the decrease in profits.

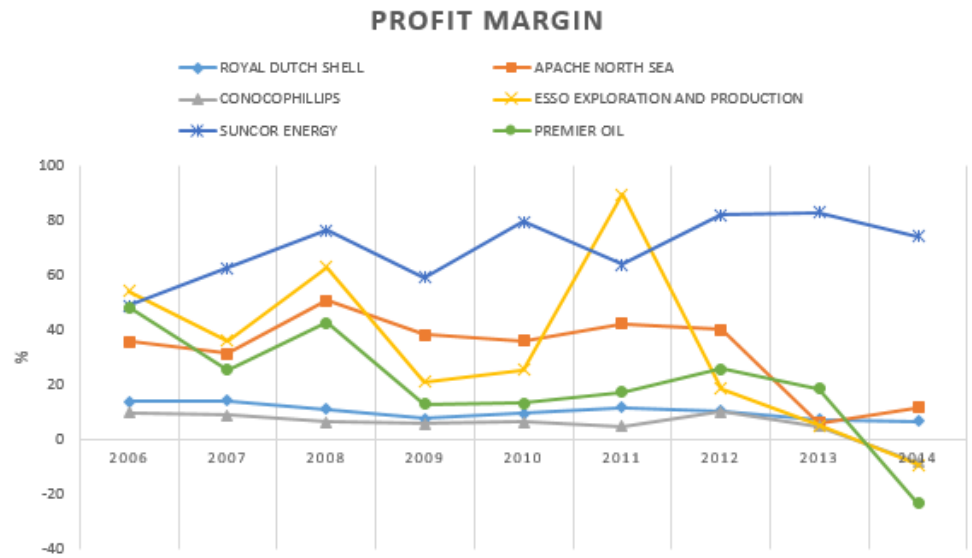

Figure 2: The evolution of Profit margin registered by oil and gas companies in 2006-2014

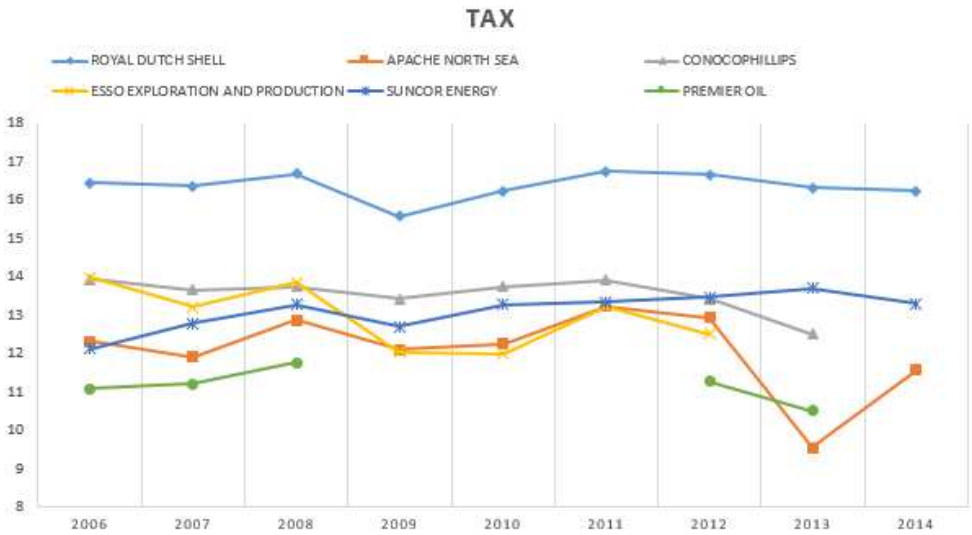

Figure 3: The evolution of taxes paid by oil and gas companies in 2006-2014

From the graph illustrating taxes we observe that some of the trend lines are interrupted. This is the case for companies that registered negative taxes and

therefore we could not obtain a natural logarithm for these values. Considering that oil and gas companies are usually group companies, they can register positive income at the end of a fiscal year, but at the same time zero tax or tax refunds, by taking advantage of tax breaks in the tax system of the country where the mother company is established.

In figure 4 we observe the least volatile variable from this analysis.

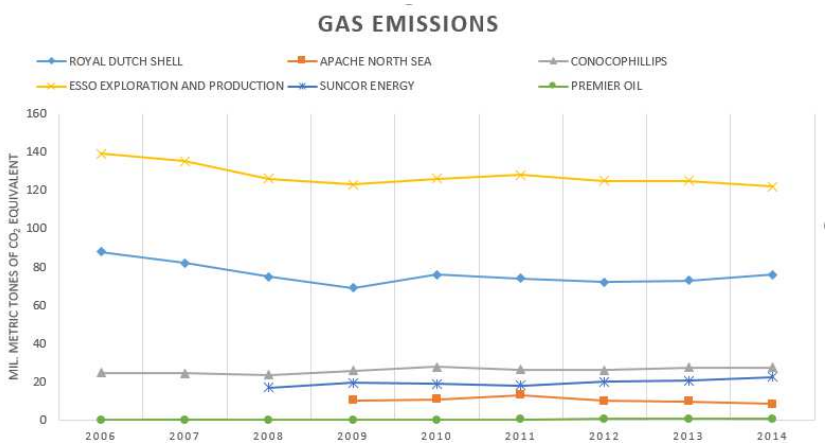

Figure 4: The evolution of GHG Emissions - CO2 equivalent produced by oil and gas companies in 2006-2014

The highest level of gas emissions is realised by Esso Exploration and Production (an average of 127 million metric tons of CO_2) and Royal Dutch Shell (an average of 76 million metric tons of CO_2), while the lowest level of gas emissions was achieved by Premier Oil, which is the smallest companies from all these six (with less than 1000 employees, compared to 94000 or 75000 employees in Royal Dutch Shell and Esso Exploration and Production respectively). All these numbers underline that the level of gas emissions for Esso Exploration and Production is a lot higher than that from Royal Dutch Shell, although its human resource employed is a lot lower.

4.2. Regression analysis

We expect linear and non-linear relationships as we realised plots between the independent variables and performance indicators (ROA and PrMg) evidencing the parabolas through the quadratic best fit line option in Stata. In figure 5 we observe the non-linear relationship between ROA (left side of the figure) and profit margin (right side of the figure) and gas emissions and taxes. The statistical significance of these relationships will be tested through regression analysis.

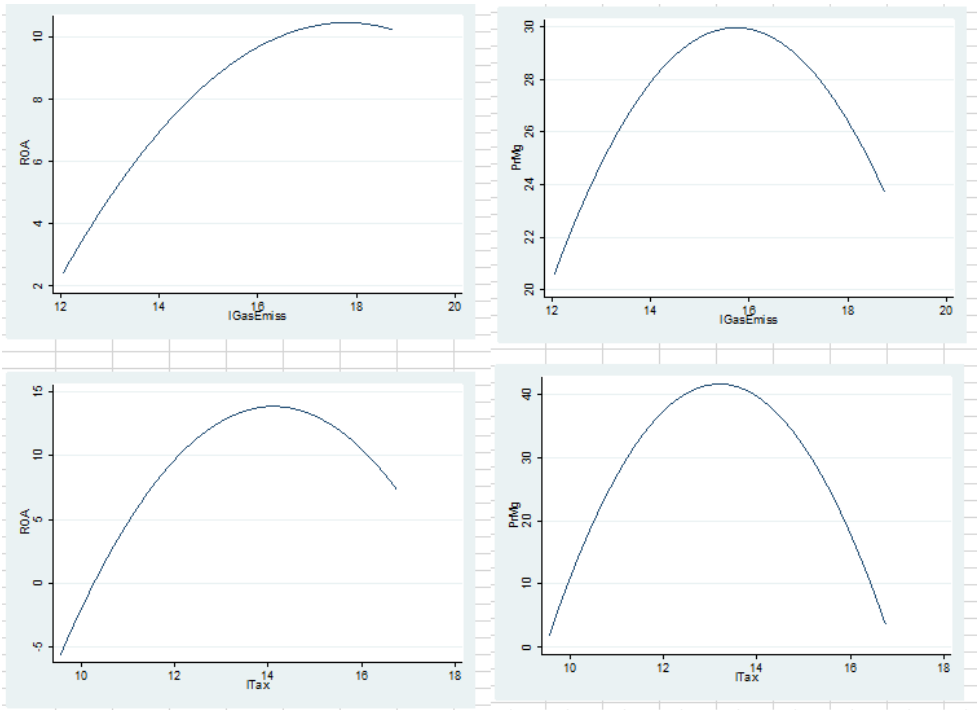

Figure 5: Expected relationships between the dependent variables and gas emissions and taxes

Results from the regression models observing the variance of return on assets are included in the first table. All these models evidence a negative influence from the number of board members, but the number of women seems to influence ROA to a greater extent, as the regression coefficient is higher than the coefficient associated with men in boards. All regression coefficients for the number of men and women board members are statistically significant.

The level of gas emissions has an indirect impact on economic performance but a low statistical significance. The non-linear regressions (models 3-6) also evidence a negative effect on ROA and a positive one from the squared variable of gas emissions. Based on the statistics in our database, three companies (Royal Dutch Shell, Conocophillips, Esso Exploration and Production) which are part of the Supermajors or Big Oil companies, produce gas emissions with values higher than 17. According to the non-linear graph, the economic performance of these big companies is affected by the large values of CO2 emissions. However, for smaller oil and gas companies, with lower levels of gas emissions, the asset performance might not be affected. However, the relevance of the fifth model considering only the variables GasEmiss and GasEmmiss^2 for explaining ROA was not confirmed as the F-test was not statistically significant and the R-squared is below 1%.

In terms of statistical significance, taxes have more influence on ROA. They have a positive impact on ROA up to value 14 (which is approximately 1.2 million euros). From the companies observed, only Royal Dutch Shell paid annual taxes higher than this over the period 2006-2014 (an average annual tax of 13 million euros). Therefore, for most companies observed, taxes have a direct relationship with economic performance.

Table 1: Results of regression models with ROA as dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
lGasEmiss	-2.239**	-0.915	-6.202	-9.274	-8.707	
	(0.940)	(0.961)	(8.621)	(9.403)	(9.995)	
lGasEmiss^2			0.130	0.256	0.245	
			(0.272)	(0.296)	(0.320)	
lTax	4.554***	2.183**	11.802	21.651***		26.430***
	(1.102)	(0.978)	(8.025)	(7.851)		(7.543)
lTax^2			-0.275	-0.705**		-0.936***
			(0.302)	(0.283)		(0.273)
MaleBofD	-0.542***		-0.495***			
	(0.103)		(0.122)			
FemaleBofD		-0.885***		-0.809***		
		(0.242)		(0.243)		
Constant	-3.014	2.494	-21.240	-62.705	-66.997	-172.65***
	(9.490)	(11.043)	(81.054)	(82.959)	(76.817)	(51.546)
F test	10.61***	5.48***	6.38***	4.97***	1.98	6.47***
R-squared	0.456	0.302	0.47	0.408	0.079	0.227

*** p<0.01, ** p<0.05, * p<0.1; standard errors in parentheses
Source: author's calculations in Stata

The second table includes the results from the regression models observing the variance of profit margin. Linear models indicate that gas emissions have a negative influence on profit margin. Results from the non-linear regressions (models 3-6) also evidence the negative influence on ROA and a positive one from the squared variable of gas emissions. Compared to the analysis of ROA, in the models explaining the variance in profit margin, all GasEmiss coefficients are statistically significant, except for those from the model considering only two explanatory variables: GasEmiss and GasEmmiss^2. In this case, the F-test is not statistically significant and the R-squared is lower than 1%.
Taxes have more influence on profit margin than on ROA, as regression coefficients are higher. Taxes also have a direct impact on the profit margin for companies that pay up to 1 million euros as annual taxes.
The models explaining the variance in profit margin also indicate a statistically significant negative impact from the number of board members. Once again, coefficients are higher for women in boards (double compared to the coefficients for

the men in boards), indicating a higher influence on profit margin than on ROA, as their values are higher than in the previous models explaining ROA.

Table 2: Results of regression models with Profit margin as dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
lGasEmiss	-13.30***	-8.76***	-50.12**	-70.71***	-21.76	
	(2.19)	(2.44)	(19.39)	(21.24)	(34.41)	
lGasEmiss^2			1.17*	1.93***	0.69	
			(0.61)	(0.67)	(1.10)	
lTax	16.02***	7.06***	21.60	67.61***		79.45***
	(2.57)	(2.48)	(18.05)	(17.74)		(24.89)
lTax^2			-0.20	-2.18***		-3.01***
			(0.68)	(0.64)		(0.90)
MaleBofD	-2.35***		-2.40***			
	(0.24)		(0.27)			
FemaleBofD		-4.36***		-4.40***		
		(0.61)		(0.55)		
Constant	83.15***	112.92***	330.23*	189.41	-141.28	-482.44***
	(22.11)	(28.02)	(182.27)	(187.40)	(264.44)	(170.09)
F test	34.74***	18.48***	22.49***	19.16***	1.98	6.47***
R-squared	0.73	0.59	0.76	0.73	0.079	0.227

*** p<0.01, ** p<0.05, * p<0.1; standard errors in parentheses
Source: author's calculations in Stata

5. Conclusions

Our analysis evidences a few ideas for increasing corporate performance based on the environmental, economic and social aspects of sustainability. First of all, gas emissions should be reduced worldwide, especially by big oil and gas companies. Considering that in 2016 the petroleum and natural gas industry was responsible for approximately 56% of the CO_2 emissions worldwide (U.S. Energy Information Administration in Lu et al., 2019), GHG reduction measures became a target for all the companies operating in this industry and extremely important in terms of corporate sustainability. For example, the Royal Dutch Shell, which from the six companies analysed has extremely high levels of gas emissions, is currently targeting a 2%-3% drop in GHG emissions per year to achieve a reduction of 20% by 2035 (Bloomberg, 2020).
Our results emphasise that the level of taxes paid by oil and gas companies is directly linked to both the financial and economic performance of the companies. Besides, some companies, such as Conocophillips (2020), are lobbying for a carbon pricing mechanism implemented by the governments which gradually increases carbon fees. This way, GHG emissions would form the basis of taxation, constraining companies to reduce their emissions. Overall, taxes paid by oil and gas

companies increase the public revenues of a country sustaining its economic development, which strengthens the idea that taxation of profits but also taxes related to environmental protection can bring sustainable economic development in countries with a developed oil industry.
Finally, related to the social aspect of sustainability, more countries tend to adopt gender quotas in corporate governance by promoting women as board members. However, for the companies analysed, all results indicate that boards should be kept at minimum members and more women in board tend to decrease even more the performance of oil and gas companies.
Future research should extend the database and consider several countries, analysing the sustainability policies implemented by companies in different industries, and their operational activities according to national regulations.

6. Acknowledgements

This work was cofinanced from the European Social Fund through Operational Programme Human Capital 2014-2020, project number POCU/380/6/13/125015 "Development of entrepreneurial skills for doctoral students and postdoctoral researchers in the field of economic sciences".

References

1. British Petroleum - BP (2019) "BP energy outlook 2019 edition", [online], Available: https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2019.pdf, [24 Mar 2001].
2. Bloomberg (2020) "Shell's 2019 Greenhouse Gas Emissions Fell Due to Asset Sales", [online], Available: https://www.bloomberg.com/news/articles/2020-04-07/shell-s-2019-greenhouse-gas-emissions-fell-due-to-asset-sales, [14 Apr 2020].
3. Conocophillips (2020) "Public Policy Engagement", [online], Available: http://www.conocophillips.com/sustainability/managing-climate-related-risks/public-policy/, [14 Apr 2020].
4. IPIECA (2020) "Sustainability reporting guidance for the oil and gas industry – 4th edition", [online], Available: https://www.ipieca.org/media/5115/ipieca_sustainability-guide-2020.pdf, [2 Apr 2020].
5. Lu, H., Guo, L. and Zhang, Y. (2019) "Oil and gas companies' low-carbon emission transition to integrated energy companies", *Science of the Total Environment*, Vol. 686, pp 1202-1209.
6. Mojarad, A.A., Atashbari, V. and Tantau, A. (2018) "Challenges for sustainable development strategies in oil and gas industries", *Proceedings of the International Conference on Business Excellence*, Vol. 12, pp 626-638.