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Performance analysis of Euro-zone energy companies

Abstract: This investigation is focused in answering if the location and sector of activity of energy companies located in the Euro-zone impact the performance of these companies. A database of eighteen largest energy companies in the Euro-zone between 2005 and 2009 was constructed. The method of linear regressions with panel data was applied. Results get posible to infer that oil and gas sector have the highest returns and the location does not impact the economic and financial performance of energy companies.

Keywords: Energy companies; performance, location, sector of energy activity; Euro-zone.

1. INTRODUCTION

Regarding the cost of capital and country risk components, Harvey (2004) concluded that for emerging countries is possible to associate the country risk measures to future equity returns. The implication is that country risk can impact the cost of equity and consequently the cost of capital of firms. This can impact the financial results of the firms.

Koedijk, Kool, Van Dijk and Schotman (2001) have found differences in cost of capital of the firms when using local and international asset pricing models, and attribute these findings to strong country factors in individual stock returns with impacts in financial returns.

Fratianni (2007) disclosures that differences in credit risk were an important explanation of differences in long-term interest rates across countries since 16th and 17th century in Europe. Higher long-term interest rates imply an increase in the cost of capital of firms in the countries with worse credit risk measures.

The literature mentioned before allow to infer that companies that are located in different countries have different cost of capital and this can decrease the profitability of firms in countries with worse credit risk measures.

Regarding the relationship between oil prices and performance of oil and gas firms, Ramos and Veiga (2011) analyzed a sample of 34 countries and found evidence that oil price is a globally priced factor for the oil industry and that the oil and gas sector in developed

countries responds more strongly to oil price changes than in emerging markets.

Also about the relationship between oil crude prices and performance of oil and gas companies, Dayanandan and Donker (2011), using accounting measures of performance, found that crude oil prices positively and significantly impact the performance of oil and gas firms in North America.

By the other hand, Mohanty, Nandha and Bota (2010) analyzed the relation between oil prices and the stock returns of oil and gas firms in Central and Eastern European (CEE) countries. The overall results indicated no significant association between oil prices and the stock returns over 1998–2010 period.

Related to the literature about oil prices and oil and gas companies returns it is possible to infer that oil price can be more profitable energy sector and one reason is that the crude oil price is established by an international market with less regulation by the countries.

By the other hand, Gerlagh and Mathys (2011) showed that countries with more energy available attract a greater number of companies, especially those that have products where energy is an important factor of production.

As this paper focuses the attention on the EU market, it is very important to know the energy strategy of the EU, because the policy can strongly affect the market by providing economic incentives for one or more sectors or maximum thresholds for other ones. In fact, the green paper of the Commission of the European Communities (2006) reports that half of the EU's gas consumption went from only three countries (Russia, Norway, Algeria). Moreover the oil and gas prices had nearly doubled in the EU over the past two years, with electricity prices following. For these reasons the green paper identifies six key areas where action is necessary to address the challenges we face:

1. Competitiveness and the internal energy market
2. Diversification of the energy mix
3. Solidarity
4. Sustainable development
5. Innovation and technology
6. External policy

Specifically, the second key area is considered strategic in the global market, because of

the unpredictable social and political situations in several Mediterranean countries. For this reason green paper wants to promote an international agreement on energy efficiency and a renewable energy road map in order to reduce the dependency from other countries, beside of the solidarity (task number 3) between the countries of EU in order to help each other when natural disasters happen.

Nevertheless the EU tasks have to meet the national decisions, but it not always happens. For example, Italian government had planned that 25% of energy would be produced by nuclear facilities, but recently a referendum has nullified this decision; then a new strategy have to be planned by the Italian government. Moreover, Germany had planned to extend the life-cycle of its nuclear facilities for other 20 years before the Fukushima disaster, but Germany has decided to anticipate the decommissioning after the disaster.

This overview of the literature allows to understand that two energy issues are nowadays opened in the Euro-zone. This paper tries to answer to the following two questions:

1. the oil and gas sector is more profitable than other energy sectors in EU?

2. companies operating in central countries of EU are more profitable than companies operating in peripheral countries of EU?

To investigate the mentioned relationships a panel data has been constructed to run linear regressions. The investigated period is from 2005 to 2009. Results confirm that the oil and gas sector is more profitable than the others – holdings and electricity sectors – and rejects the possibility that it is better to be a company of energy in rich and politically strong countries of Euro-zone. The paper is organized as follows: Section 2 introduces the methodology and the mathematical model, Section 3 presents the results, while conclusions are reported in Section 4.

2. METHODOLOGY

2.1. ASPECTS OF THE RESEARCH

This research has an exploratory nature. The aim is the investigation of the relationships between the energy sector and the national market where the company operates with the respect to financial returns (performance). It seeks to probe the relationships between the energy sector and performance, and try to find some evidences between the market where the company

operate and their performance. The concepts, the variables and the indicators used in this research are listed in Table 1.

Table 1:Concepts, variables and indicators used in this research

CONCEPT (ATTRIBUTE)	VARIABLES	INDICACTORS OF VARIABLE
Profitability of the energy companies	Financial performance of the energy companies	Return on Assets – ROA (%); Return on Equity – ROE (%); Return on Capital Employee – RCE (%); Profit Margin – PM (%).
Size of the energy companies	Relative financial indicator of the size of companies assets	Assets per employee – APE - in Thousand of North American dollars.
Energy sector where the company develops its activities	Energy sector	The dummies: SECEL with the value 0 if company not operates in Electricity sector, and 1 if it operates; SECH with the value 0 if company not operates as a Holding, and 1 if it operates; SECOG with the value 0 if company not operates in Oil and Gas sector, and 1 if it operates.
The level of participation in economic and financial Euro-zone decisions	Classification in central or peripheral country	The dummy COUNTRY that includes the value 0 if the country is peripheral, and 1 if the country is central.

Secondary data have been obtained from the Amadeus Database for the period of 2005 to 2009. The database for this study is composed of the greater 34 energy companies in Europe. The focal sample includes a set of 18 companies of 7 countries. These 18 companies are in included in the 30 greatest companies in Europe. To construct this sample, all data available at the Amadeus Database related to the companies in the period investigate have been included.

Table 2 shows the countries and the number of companies that make up the sample, while Table 3 contains companies and related countries included in this investigation.

Table 2 - Countries and the number of companies of the sample

Countries in alphabetical order	Number of companies
Czech Republic	1
Finland	4
France	3
Germany	6
Italy	4

Netherlands	1
Norway	2
Portugal	1
Russia	3
Spain	2
Sweden	1
United Kingdom	5
Total	34

2.2. HYPOTHESIS

The hypotheses to be tested in this research are as follows:

H1: The relationship between oil and gas sector, as classified by the dummy SECOG, and the performance, as measured by ROA, ROE, RCE and PM, will be positive. One possible explanation is that this sector is historically more profitable than the others, with lower regulation and an open global market to establish the prices.

H2: The relationship between the level of political influence in Euro-zone of the country of the company, classified by the dummy COUNTRY, and the performance measured by ROA, ROE, RCE and PM should be positive for central countries. The explanation may be that the risk of the core countries of the Euro-zone is lower than the risk of peripheral countries. Therefore, the cost of debt capital decreases, and this aspect should positively impact the company's financial results.

Table 3: Companies and countries of the sample investigated

Order number	Companies in alphabetical order	Countries
1	Abengoa	Spain
2	Aceas S.P.A.	Italy
3	Alstom	France
4	B.H.P. Billinton	United Kingdom
5	Bilfinger Berger A.G.	Germany
6	Centrica	United Kingdom
7	Cez A.S.	Czech Republic
8	DCC Public Limited Company	Ireland
9	Edison S.P.A.	Italy
10	EDP S.A.	Portugal
11	Elf Equitaine	France
12	Enbw Energy	Germany
13	Energetiki i Elektrifikatsi Mosenergo	Russia
14	Eni S.P:A.	Italy
15	E.On Energie A.G.	Germany
16	E.On Ruhrgas A.G.	Germany
17	Eurasian Natural Resources Corporation P.L.C.	United Kingdom
18	Fortum Oyj	Finland
19	Iberdrola Renovables	Spain
20	Invensys P.L.C.	United Kingdom

21	Iride S.P:A.	Italy
22	Kholding Mrsk	Russia
23	M Real Oyj	Finland
24	MosenergosbyГ	Russia
25	MVV Energie A.G.	Germany
26	Norske Skogindustrier A.S.A.	Norway
27	Norsk Hydro Asa	Norway
28	Royal Dutch Shell P.L.C.	Netherlands
29	Rwe Aktiengesellschaft	Germany
30	Shell Trading International Limited	United Kingdom
31	Skanska A.B.	Sweden
32	Total S.A.	France
33	Upm Kymmene Oyj	Finland
34	Wârtsilâ Oyj Abp	Finland

2.3. MATHEMATICAL MODELS USED IN THIS RESEARCH

To determine if there are relationships between the energy sectors, the country and the performance, the method of linear regressions with panel data was employed as shown below:

$$PERFORMANCE = \beta_0 + \beta_1 * ENERGY\ SECTOR + \beta_2 * COUNTRY + \beta_3 * SIZE + \varepsilon$$

where:

$PERFORMANCE$ = Performance of energy companies measured by Return on Assets – ROA(%), Return on Equity – ROE(%), Return of Capital Employee RCE – (%), Profit Margin – PM(%).

β_0 = linear coeficient of the linear regression.

β_i = coefficients of the variables, where $3 \leq i \leq 1$.

$ENERGY SECTOR$ = SECEL if company is from Eletricity sector, SECH if company is a holding and SECOG if company is from Oil and Gas sector.

$COUNTRY$ = Dummy with zero if the company is at a peripheral country and 1 if the company operates in a central country.

$SIZE$ = Size of the energy companies measured by Assets per employee in Thousand of North American dollars. Used as a control variable

ε = error term of the linear regression

In order to use the linear regressions with panel data it is necessary to verify two assumptions: a) the normality of the dependent variables, and b) the multicollinearity of the

independent variables. First the Jarque-Bera (J-B) test has been applied to identify if the dependent variables have normal distribution, and after the Variance Inflation Factor (VIF) test has been used to observe if the independent variables have problems of multicollinearity. The size of the companies has been used to control the results of the test.

The limitations of the linear regression method include: a) the distribution of the independent variables can be not-gaussian. Regarding this point the J-B test has been done and a transformation to logarithm function has been made to solve the problem; b) the intentional omission of other relevant variables that impacts the performance beyond size and energy sector; c) there may be difficulties in identifying a time trend, but panel data covering a period of five consecutive years should nullify this effect; d) there may be problems regarding the selection of the sample, because of the limitation of the data.

3. RESULTS

To utilize the linear regression using Ordinary Least Squares (OLS) it is necessary to have normally distributed dependent variables. Jarque-Bera test has been used to check the normality of the variables. A logarithmic transformation has been used in ROA, ROE, RCE and PM. Multicolinearity among the variables of the sample has been tested, through the VIF test. The results of all variables, in all models, have been less than 2.0, indicating the absence of multicollinearity for the data investigated. Therefore, after performing all the aforementioned tests, the method of linear regression has been applied and the results obtained are presented in Table 4.

The relationships carried out with OLS on the panel data allow to link better financial returns, measured by ROA, ROE and RCE to companies of the oil and gas sector. The results are aligned with the hypothesis H1. The differences between the level of significance for the coefficients of SECOG are not a relevant aspect regards the methodology. The possible reasons for observing these differences are: a) this variable is a dummy variable, b) the dependent variables are different, and c) the greater or lesser relationship between the dependent variables with the control variable – APE.

The results regarding the possible relationship between the type of the country and the returns of the companies reject the hypothesis H2.

Thus, it is possible to confirm that oil and gas sector is more profitable than the others. Also, the results without statistical significance allows to reject that companies that operate in central countries of Euro-zone have higher returns than other companies of the same energy sector that operate in peripheral countries.

Table 4: Results of linear regressions with panel data with their respective p-values. The symbols *, **, ***, **** indicate, respectively, values statistical significant at 15%, 10%, 5%, 1% and 0.1%.

Dependent Variable:	**Log ROA(%)**	**Log ROE(%)**	**Log RCE(%)**	**Log PM(%)**
APE	**0,0009*** (0,0098)**	**0,0018** (0,0859)**	**0,0009** (0,0889)**	**0,0010* (0,1124)**
SECEL	-1,5558 (0,6196)	-2,2774 (0,8084)	-1,9659 (0,7231)	2,6554 (0,6588)
SECH	-1,3208 (0,6116)	0,1361 (0,9861)	0,5123 (0,9098)	-4,9881 (0,3191)
SECOG	**5,7805*** (0,0409)**	**13,4688* (0,1102)**	**12,2089*** (0,0136)**	4,4662 (0,4048)
COUNTRY	0,4335 (0,7728)	-3,6404 (0,4200)	2,3785 (0,3644)	1,7733 (0,5389)
C	**4,9914*** (0,0402)**	**19,3728**** (0,0085)**	**8,1606** (0,0522)**	**8,7866** (0,0593)**
Numbers of observations	4163	4163	4163	4163
R^2	0,2477	0,1498	0,2292	0,1556
R^2 adjusted	0,1947	0,0899	0,1733	0,0962
DW	2,5944	2,0474	2,4900	2,5966
Log Likelihood	-238,8534	-323,4390	-274,0629	-289,0689

4. CONCLUSION

Results obtained by applying the method of linear regression with panel data in the period between 2005 and 2009 have allowed to infer that the oil and gas sector has the highest profitability among energy companies located in Euro-zone. This result is in line with Ramos and Veiga (2011).

On the other hand, the results have not shown that the location in central or peripheral countries can affect the performance of energy companies in Euro-zone.

Thus, in the long-term, supply and demand for energy would be adjusted so that it is not reasonable to expect differences in the returns from energy companies located in different countries.

Also, energy prices of a country cannot be kept lagged from market reality, because the adjustments can produce serious impacts in the development of this country.

Thus, it is believed that the long-term energy prices reflect economic conditions of each country. So, it is not reasonble to expect significant differences in performance of energy companies due to its location, what was confirmed by the results of this research.

Future research may increase the period investigated and may also insert other variables that may promote differences in the performance of energy companies. Issues such as regulation and performance of the regulator and features of the energetic matrix of each country can be tested as instrumental variables in order to expand the scope of the research.

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