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Firm performance and diversification in the energy sector

Wim Westerman
Faculty of Economics and Business, University of Groningen, Groningen, The Netherlands
Adri De Ridder
Faculty of Social Sciences, Uppsala University, Visby, Sweden, and
Marijn Achtereekte
Faculty of Economics and Business, University of Groningen, Groningen, The Netherlands

Received 29 November 2019
Revised 9 April 2020
Accepted 3 May 2020

Abstract

Purpose – The study aims to fill a gap in the literature on the economic impact of industrial and international diversification on firm performance in the energy sector. Li *et al.* (2016) investigate firms listed in China, and this study analyzes firms listed in (Western) Europe.

Design/methodology/approach – A sample of 129 energy firms is extracted from Datastream and covers the period from January 2009 to December 2015. Univariate and multivariate regression analyses are used to determine a plausible relation of diversification on corporate performance. Also, the difference between renewable energy firms and conventional energy firms is explored.

Findings – A univariate analysis using both return on assets and *Tobin's Q* as a variable shows that renewable energy firms have a higher profitability than conventional energy firms. However, a multivariate analysis does not confirm this result. The authors also document a negative relation between diversification strategies and firm performance.

Research limitations/implications – The study uses main industry codes. Yet, one might make a distinction between renewable energy and conventional energy amounts with corporations. Also, the authors cover financial crisis years. Researchers might take into account more recent years.

Practical implications – The findings of the study highlight the importance of short-term and long-term considerations for practitioners related to demand, the energy mix, oil prices and firm strategies.

Originality/value – The authors contribute to the debate and the literature when identifying similarities and differences between conventional energy firms and renewable energy firms in their application of diversification strategies and their (relation to) firm performance.

Keywords Firm performance, Diversification, Energy sector, Europe

Paper type Research paper

1. Introduction

The energy industry is facing a rapidly changing environment. Conventional energy companies need to modify their business strategies and be prepared to new market conditions. Also, more firms enter into renewable energy markets. The Paris Agreement of October 2016 is a premonition that governments, and therefore also indirectly firms, will have to introduce new measures to achieve the climate requirements (United Nations, 2015). Various strategies have to be used by firms to offset negative effects of new rules and regulations. Moreover, firms generally apply an array of different strategies to strengthen their market position and increase their performance, with the literature being inconclusive on which parameters do have a positive impact on it.

Managerial Finance
Vol. 46 No. 11, 2020
pp. 1373-1390
Emerald Publishing Limited
0307-4358
DOI 10.1108/MF-11-2019-0589

Previous research in the international business literature on diversification strategies is voluminous and has examined firm operations across business lines (industrial diversification) as well as across countries and regions (international diversification). Much of the literature is of a general nature. Moreover, the literature is inconclusive with respect to the impacts of these strategies as a result of different definitions, industries, countries and time periods examined. A gap in the literature is, however, the economic impact of diversification on firm performance in the energy sector. Li *et al.* (2016) investigate this relation on firms listed in China and report that industrial diversification has a negative relation with firm performance and that international diversification is accompanied with a positive change in performance of renewable energy firms but negatively to conventional energy firms. To the best of our knowledge, no prior studies have examined the topic for other countries, and our ambition in this study is to fill in this gap.

We contribute to the debate on firm performance in the energy industry by examining the impact of diversification on firms in the energy sector in Western Europe (henceforth, just denoted as Europe). This region is one of the pioneers in the global energy industry, aiming to reduce its dependency on imports and to meet the targets in the battle against global warming. We also contribute to the literature by attempting to identify differences between conventional energy firms and renewable energy firms in their application of diversification strategies and their relation to firm performance.

Differences between countries, viewed from a corporate governance perspective, do also exist in Europe. For instance, the United Kingdom differs from other countries as it uses a common law legal system, while many other European countries have a civil law system. Next to that, it has a timely and conservative shareholder corporate governance model, while the other European countries use a stakeholder corporate governance model that is less timely and less conservative (Doupnik and Perera, 2011). The United Kingdom holds, in general terms, a very liberal attitude, focused on deregulation, which is beneficial for the competition in the sector. A result of this liberal approach is that the consumer prices related to energy in the United Kingdom are lower compared to other European countries.

The size of renewable energy in a country's energy mix has increased through more pressures from public authorities. The renewable energy sector captivated serious investments through different forms of financial packages including long-term feed-in tariffs (guaranteeing a fixed income) and green certificates. Germany supports its renewable energy industry with substantial subsidies, and other countries such as France have followed. These investments in the renewable energy sector imply increased consumer prices. The transition to more renewable sources of energy therefore requires acceptance by citizens, and for that reason consumer prices for electricity need to be fair (International Energy Agency, 2013).

Each member country in the European Union (EU) has a goal for 2020 regarding the total share of renewable energy in its gross final energy consumption (see Figure A1 in the appendix). As of 2015, the United Kingdom is lagging behind the schedule and target for reaching its 2020 goal. France and The Netherlands also need to invest to successfully reach their target of renewable energy. This implies that authorities and firms in those countries will have to focus more on renewable energy sectors, which can lead to new regulations and further subsidies. Norway, Finland, Sweden and Austria are forerunners, already having a higher (30%) fraction of renewable energy in their total energy mix.

We show with a univariate analysis, using a sample of 52 conventional and 77 renewable energy firms in Europe between 2009 and 2015, that renewable energy firms have a higher profitability in terms of return on assets *(ROA)* compared to conventional energy firms, but also lower market valuations *(Tobin's Q)*. However, a multivariate analysis does not confirm this result. Examining the relation between diversification strategies and firm performance in conventional and renewable energy firms, we observe no strong association. Our findings highlight the importance of short-term and long-term considerations related to demand, the energy mix, oil prices and firm strategies.

The paper proceeds as follows. We provide a brief literature review and specify our main hypotheses in Section 2. Section 3 describes our data and models. Section 4 presents the empirical results. We discuss the results in Section 5, and Section 6 concludes our study.

2. Literature and hypotheses

Previous literature contemplates extensively on diversification and firm performance, and several terms are used to describe international diversification such as multinationality and international diversity. For simplicity reasons, we will refer to international diversification most of the time. In this section, different business strategies will be described based on prior literature. We begin with a general description of the energy market in Europe and focus on two specific business strategies that involve diversification as well as their relation to firm performance: (1) international diversification and (2) industrial diversification.

2.1 The energy market

The energy market is a complex market, but it is also attractive from several viewpoints. This is the case not only for firms competing in this industry but also for governments, looking at the large employment possibilities and the size of capital linked to the industry. Also, it has an important function in the role of supporting other industries successfully. The substantial value within the industry makes it difficult for governments to act, for example, on whether they want to intervene or simply set boundaries. Moreover, since the early 2000s, firms and governments not only deal with common economic interests, but they also have to address the environmental and security issues.

Van den Heuvel *et al.* (2010) conclude that because energy companies have to deal with a dynamic and uncertain environment, they continuously need to work on and improve their strategies for growth. It can be argued that the European market has matured since growth rates have started to fall. Two business strategies for firms in the energy industry can be pursued: (1) transition from being a domestic firm to becoming an international firm, and (2) industrial diversification, to grow as a company by adding new products to its portfolio. For instance, between 2000 and 2007, several large energy companies in Europe became active in both the gas and power businesses.

Research on sustainable development and the value creation with energy firms shows that firms that are more focused on sustainability have better control over their costs and also tend to report higher *ROA* than conventional-driven energy firms (Pätäri *et al.*, 2012). Renewable energy firms have also outperformed conventional energy firms between the years 2000 and 2009. This leads to the following hypothesis with respect to firm performance:

H1. Firms that have their main operations in the renewable energy sector have higher profitability than firms do in the conventional energy sector.

2.2 International diversification

The internationalization and continuous expansion of multinational corporations (MNCs) has changed the scene of the global economy (Helpman, 1984). Firms have to look broader than just their home market when they want to stay competitive with their rivals (Porter, 1986). The literature provides different definitions of an MNC. Kogut and Zander (1993) specify MNCs as economic organizations that expand from their domestic origin to countries abroad, while Guisinger (1973) defines them as firms with any operations in two or more countries.

Over the years, various strategic perspectives on MNCs have been formulated. The resource-based view is often used to describe the international diversification strategy. This view argues that firms need to have heterogeneous strengths by developing unique resources and capabilities that are difficult to copy in order to perform well (Barney, 1991). MNCs are contemplated as social communities whose knowledge defines a comparative advantage; once these firms succeed in having more experience, this will result in a competitive advantage compared to others (Nelson and Winter, 1982). Furthermore, international business theory suggests that foreign direct investment (FDI) determines a firm's desire to exploit firm-specific assets such as technological advantages, management skills and geographical advantages (Hymer, 1976). When having a competitive advantage, it is also beneficial for a firm to exploit this advantage abroad.

The transaction cost theory implies that detrimental effects go along with international diversification. Examples of reasons that restrain a positive impact of international diversification are opportunistic behavior of partners, liability of foreignness, limited flexibility and different requirements to enter or leave markets (Hitt *et al.*, 1997). Moreover, it is argued that international diversification is associated with higher monitoring costs, varying legal systems and higher auditing costs in attempts to reduce agency costs (Burgman, 1996). An opposing view to the transaction cost theory is that firms can use the traits, rules and regulations of other countries to their advantage. For instance, tax policies, transfer pricing opportunities or product prices might be beneficial compared to the home country, and therefore more profit may be generated.

Conflicting views have been portrayed in the literature regarding international diversification. Authors argue that international diversification is a way to reduce the firm's risk exposure (Agmon and Lessard, 1977). However, a more recent school of thought has indicated that diversification increases a firm's risk due to fluctuation in exchange rates, agency costs and institutional risks (Reeb *et al.*, 1998). Investors consistently favor firms that are international and diverse (Balcılar *et al.*, 2015). Yet, Berger and Ofek (1995) show that more global diversification has a negative impact on firm value, and hence less global diversification positively affects firm value.

The literature shows that the degree of internationalization is significantly related to a firm's performance (Geringer *et al.*, 1989). Qian *et al.* (2008) summarize relevant studies with various measurements and performance indicators on international diversification and firm performance, but cannot draw a conclusion because the empirical findings differ among studies. In this paper, we will focus on the energy industry when formulating our hypothesis related to international diversification. The energy market in Europe is mature, and firms need to look across borders to increase their performance. Also, the EU makes it easy to cross borders since there are no regulations involved. Thus, our second hypothesis is formulated as follows:

H2. There is a positive relation between international diversification and firm performance in the energy industry.

2.3 Industrial diversification

Most of the literature shows that industrial diversification has a negative impact on firm performance caused by agency costs (Aggarwal and Samwick, 2003), internal capital markets (Shin and Stulz, 1998) and market microstructure issues (Habib *et al.*, 1997). According to Aggarwal and Samwick, and in the spirit of the agency theory, it implies that since managers have no corporate claims, they make decisions that are best suited for themselves and may not enhance firm value. Thus, they do not act in the interest of their shareholders. Regarding industrial diversification, two different explanations have been presented. First, managers diversify because they want to mitigate unsystematic risk. Second, managers are always on the lookout for private benefits (Stulz, 1990). Leading a more diversified firm may result in more status, more power, more money, more interesting future career possibilities or the feeling of being valuable and irreplaceable (Jensen and Murphy, 1990; Aggarwal and Samwick, 2003).

Considering the internal capital market, some studies claim that industrial diversification leads to inefficient allocation of resources because of information asymmetry (Martin and Sayrak, 2003) and can be explained as follows (Shin and Stulz, 1998). A wish for power leads to a biased allocation of resources in the internal capital market. Moreover, a diversified company lacks responsiveness for, and is less sensitive to, investment opportunities. Another way of reasoning argues that managers of specialized firms have a better and more realistic perspective on operations and no presence of information asymmetry in contrast to managers of diversified firms that receive biased information, which may negatively affect firm value in the end (Habib *et al.*, 1997).

On the contrary, some studies show a positive relation of industrial diversification on firm performance because of using internal capital markets efficiently (Gertner *et al.*, 1994). Through reallocation of funds, capital can be invested in projects with positive net present values. Next to using the internal capital market, firms may obtain a diversification discount (Mansi and Reeb, 2002; Campa and Kedia, 2002), and hence, prior studies document a positive relation between industrial diversification and a firm's value.

There are different forms of industrial diversification and a major difference is the relation to the firm's industry. Markides and Williamson (1994) argue that related diversification only improves a firm's performance when it acquires competitive advantage by gaining access to strategic assets. Moreover, and in general, firms with a related diversification strategy perform better than firms employing an unrelated diversification strategy (Bettis, 1981; Rumelt, 1982). Li *et al.* (2016) report a significant and negative relation between industrial diversification and firm performance in the energy industry in China. Based upon prior studies, we therefore formulate our third hypothesis as follows:

H3. Firms with a related industrial diversification strategy perform better than firms with an unrelated industrial diversification strategy.

3. Data and methodology

3.1 Data

In order to examine the relation of diversification on performance, we extracted a sample of firms from Datastream. The data consist of listed energy firms in Europe and included in the Orbis database. Specifically, we examine firms from Austria, Belgium, Switzerland, Denmark, Germany, Cyprus, Spain, Finland, France, The United Kingdom, Greece, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Sweden and Turkey. The firms are classified into (1) conventional energy firms (Orbis Code 0610, 0620, 1920) or (2) renewables energy firms (Orbis Code 3511, 3512, 3514). We exclude firms that have been delisted and those that went bankrupt during the sample period. For some of the firms, no data are available and data are missing with quite some others. Therefore, our original sample is reduced from 193 to 129 energy firms, with total 789 observations that cover 7 years. Our sample period is from January 2009 to December 2015.

3.2 Definition of variables

Our primary variable of interest is net profit divided by assets, return on assets (*ROA*), which is commonly used as an indicator for firm performance (Geringer *et al.*, 1989). Relying upon accounting values, ROA is a more pure performance indicator than *Tobin's Q* (defined as market value of assets divided by book value of assets), which we also use. We employ several control variables, including industrial diversification *IND*, which is a binary variable with the value of 1 if the firm operates in the renewable energy sector, and zero otherwise. We also use the degree of industrial diversification in our model, measured by a binary variable with a value of 0 when firms do not make use of industrial diversification, 1 if they operate in an unrelated industry (*Unrel. div.*) and 2 if they (also) operate in a related industry (*Rel. div.*). Another measure for industrial diversification is the number of segments, based on the NACE REV 2 code. These are sorted into four different groups: group 1 equals one or two segments, group 2 equals three or four segments and group 3 equals five or six segments and group 4 equals more than six segments. We label these groups as *Low Segments*, *Moderate Segments* and *High Segments,* respectively. Unfortunately, measures for various concentration variables cannot be used in this study because markets cannot be clearly defined since sample firms reflect only listed companies located in several countries with different definitions. We use the ratio of foreign sales to total sales, *FS/TS*, as a proxy for international diversification. Previous literature on regional diversification and firm performance has also used this ratio (Qian *et al.*, 2008).

We use three variables to control for firm characteristics. To control for the size of a firm, the natural logarithm of the total assets (*TA*) is used. Large firms tend to be more stable in earnings than smaller firms are, and therefore are less likely to default (Harris and Raviv, 1991). Furthermore, we control for the profitability of a firm, using earnings before interests and taxes (*EBIT*), which we standardize by dividing it by total sales (*TS*). Capital expenditures (*CAPEX*), standardized by total sales (*TS*), reflect the firm's investments. Another control variable we use is the leverage of firm defined as total debt to total assets (*LEV*). Since the sample contains many different countries, we will control for two country-level variables. Countries in Europe tend to be similar but can be characterized by the annual change in consumer prices, proxied by inflation (*INFL*) and real gross domestic product (*GDP*), which we use as additional control variables. To reduce the impact of extreme values, our continuous variables have been winsorized at the 1% level.

3.3 Methodology

Univariate and multivariate regression analyses will be used to determine a plausible relation of industrial and international diversification on corporate performance. Moreover, the difference between renewable energy firms and conventional energy firms will be explored. Similarly, possible differences between countries can be identified. A Wooldridge test shows no autocorrelation in the sample. Fixed effects modeling is not applied because of time-invariant variables, dummies and factor variables in the regressions. A linear regression is used where the dependent variable is *ROA* or *Tobin's Q*. Visual inspection of the plotted residuals compared to the fitted values along with the Breusch–Pagan test indicates heteroscedasticity in the sample, which leads to biased standard errors and significance levels. To correct for heteroscedasticity, we use robust Huber-White standard error estimators of variance and clustered by firm.

Our baseline regression, using *ROA* as the dependent variable, is as follows:

$$ROA_i = \alpha_i + \beta_1(FS/TS) + \beta_2(TA) + \beta_3(CAPEX/TA) + \beta_4(EBIT/TS) + \beta_5(LEV) + \beta_6(INFL) + \beta_7(GDP) + \varepsilon_i\,, \tag{1}$$

where *FS/TS* is the ratio of foreign to total sales, *TA* is total assets, *CAPEX/TS* is capital expenditures divided by *TS*, *EBIT/TS* is earnings before interests and taxes divided by total sales, *LEV* is debt divided by *TA*, *INFL* is the change in consumer price index and *GDP* is the change in the gross domestic product. In addition to our baseline model, we use dummy variables, where *IND* takes the value of 1 for a conventional firm and 0 for a renewable energy firm. Since the energy sector in the United Kingdom shows specific features, we control for this by a dummy variable (*UK*), with a value of 1 if the firm is located in the United Kingdom, and zero otherwise. We also add two additional dummy variables with the value of 1 if the firm can be associated with diversification (*DIV*) and segments (*SEG*), respectively, and zero otherwise.

4. Results

As shown in Panel A of Table 1, for the 2009–2015 period, the mean *ROA* is negative at −0.69%, whereas the median value is positive (3.03%) for the overall sample reflecting 129 energy firms. We find that the mean *ROA* is higher in renewables firms compared to conventional firms. Using *Tobin's Q*, we find lower values for renewable than for conventional energy firms. Interestingly, the table also shows that the median profitability, measured by *EBIT*/*TS*, is higher for renewables firms than for conventional firms, which mirrors the results when we use the *ROA* as reported in the first row.

Panel B of Table 1 shows, using a univariate analysis, significant differences between renewable and conventional energy firms (denoted as R-C in the table). The differences in the means and the medians of our primary variable of interest, *ROA*, are 4.45 and 1.17%, respectively, and both of these differences are statistically significant at the 5 and 10% levels, respectively. We also see that the differences in the means as well as the medians for *LEV* are statistically significant at the 5% level. In addition, we see that renewable energy firms have a lower overseas activity as indicated by their lower *FS*/*TS*. These results suggest that profitability and leverage are higher in renewable energy firms while foreign activities are lower.

Before we present results from our multivariate analysis, Table 2 reports the correlation coefficients for variables used. Multicollinearity is not of a concern since the estimated correlation coefficients are in general low. However, and also as expected, the correlation between *ROA* and *TA* is positive and considerable (0.42), whereas the correlation between *CAPEX*/*TS* and *EBIT*/*TS* is negative (−0.48). Both of the variables are statistically significant at the 5% level.

4.1 Determinants of ROA

Table 3 reports results of six multivariate ordinary-least-squares (OLS) regressions of *ROA* on different variables related to our sample firms. As reported in the first column (1), representing 789 firm-year observations, we see that firm size, *TA* and *EBIT*/*TS* are positively correlated to *ROA*, whereas we document negative relationships to *LEV* and *FS*/*TS* and are, in general, consistent with prior literature. In column (2), we add the dummy variable for the renewable industry, *IND,* and find that the estimated coefficient is positive (0.94) but statistically insignificant. Moving to the right, we find that in column (3), the estimated coefficient for energy firms in the United Kingdom is negative but statistically insignificant. The estimated coefficients on whether diversification takes the form to be unrelated or related are both statistically insignificant and indicate that this variable is not related to profitability for our sample firms. Interestingly, and as reported in specification (5), the variable on firms with more than six business segments, reported as *High Segments* in the table, is negatively correlated to profitability and also statistically significant at the 5% level (estimated coefficient = −3.99). The last column in the table shows, when we pull all variables together into one a single regression, that the estimated coefficient on *FS/TS* is negative and statistically significant at the 1% level. In other words, when a firm has foreign sales, its *ROA* is approximately 6% lower than for firms without foreign sales, which suggests that international diversification negatively influences firm performance. We also see, in all models, that firm size has a significant positive impact on *ROA*. Further, our variable *EBIT*/*TS* has a significant positive impact on the *ROA*, whereas leverage, *LEV*, is negatively related

Table 1.
Sample statistics

Panel A. Descriptive statistics

Variable	Total (n = 129) Mean	Median	#-Obs.	Renewable firms (n = 77) Mean	Median	#-Obs.	Conventional firms (n = 52) Mean	Median	#-Obs.
ROA (%)	−0.69	3.03	853	1.17	3.30	496	−3.28	2.13	357
Tobin's Q	0.62	0.43	875	0.51	0.36	514	0.79	0.53	361
Ln TA	14.45	14.69	875	14.62	14.79	514	14.21	14.21	361
LEV (%)	42.26	43.30	874	47.40	51.38	514	34.92	34.06	360
FS/TS (%)	35.92	26.02	818	27.12	2.28	478	48.28	50.37	340
CAPEX/TS (%)	49.12	10.52	846	49.25	11.29	505	53.37	9.52	341
EBIT/TS (%)	−0.74	0.08	859	−0.24	0.10	514	−1.49	0.04	345

Panel B. Univariate analysis

Variable	Renewable firms (R) Mean	Median	Conventional firms (C) Mean	Median	Difference (R-C) Mean	Median
ROA (%)	1.17	3.30	−3.28	2.13	4.45**	1.17*
Tobin's Q	0.51	0.36	0.79	0.53	−0.28**	−0.17*
Ln TA	14.62	14.79	14.21	14.21	0.41	0.58
LEV (%)	47.40	51.38	34.92	34.06	12.48**	17.32**
FS/TS (%)	27.12	2.28	48.28	50.37	−21.16***	−48.09***
CAPEX/TS (%)	49.25	11.29	53.37	9.52	−4.12*	1.77*
EBIT/TS (%)	−0.24	0.10	−1.49	0.04	1.25	0.06

Note(s): This table provides basic statistics for our sample. The final data set contains 129 energy firms representing 77 renewable firms and 52 conventional firms. Return on assets (*ROA*) is the ratio of the net profit divided by assets, and *Tobin's Q* is market value of assets divided by book value of assets. The natural logarithm of total assets (*TA*) is a proxy for the firm size, and leverage (*LEV*) is the ratio between market value of debt divided by market value of equity. *FS/TS* is foreign sales divided by total sales. *CAPEX/TS* is the ratio between capital expenditures divided by total sales. Finally, *EBIT/TS* is the ratio between earnings before interest and taxes divided by total sales. All data are recorded at the end of each calendar year between 2009 and 2015. ***, ** and * denote significance at the 1%, 5 and 10% levels, respectively

	ROA	*Tobin's Q*	Ln TA	LEV	FS/TS	CAPEX/TS	EBIT/TS
ROA	1						
Tobin's Q	*−0.21*	1					
Ln TA	*0.42*	*−0.38*	1				
LEV	0.03	*−0.41*	*0.24*	1			
FS/TS	*−0.16*	*0.10*	*0.03*	*−0.15*	1		
CAPEX/TS	*−0.21*	*0.13*	*−0.23*	*−0.07*	*0.07*	1	
EBIT/TS	*−0.45*	*−0.33*	*0.33*	*0.20*	*−0.07*	*−0.48*	1

Note(s): This table reports the correlation coefficients between the variables used. Correlation coefficients in italicsface are significant at the 5% level. Variable definitions are provided in Table 1

Table 2. Correlation matrix

to *ROA*. Further, our results indicate that *ROA* for firms with seven or more segment codes (*High Segments*) is lower than for firms that only have one or two segment codes (*Low Segments*), ceteris paribus. This implies that focused firms perform better than highly industrially diversified firms, suggesting that industrial diversification has a negative influence on performance. Finally, in our six specifications, the adjusted R^2 indicates that roughly one-third of the variation of *ROA* can be explained by our models. In sum, our results do not show any support for our first hypothesis that renewable firms have a higher profitability than conventional firms in the energy sector using a multivariate approach after controlling for firm-specific characteristics, and thus differ from our results using univariate analysis. A natural follow-up question is what happens when we instead focus on *Tobin's Q* as the dependent variable. Table 4 shows the estimation results. Of particular interest is that the estimated coefficient on international dimensions of business, *FS/TS*, is statistically insignificant in all specifications compared to the results when *ROA* is used as the dependent variable. The estimated coefficient on *IND* is negative in model (2), statistically significant at the 5% level, suggesting a lower *Tobin's Q*.

Next, we perform a multivariate analysis for conventional and renewable energy firms separately. Table 5 shows estimation results. The first two columns show results for conventional energy firms, and the last two columns show results for renewable energy firms. Our second hypothesis conjectures a positive relationship between firm performance and the degree of international diversification. As reported in row 4, the estimated coefficient on *FS/TS* is negative in all specifications and statistically significant at the 5% level for renewable energy firms. Thus, firms with higher overseas activities have lower profitability, and hence, this is not supportive of our second hypothesis. Also as reported, the estimated coefficient on *LEV* is negative in all regressions and significant in model (2) and (4). Further, it also appears that conventional energy firms with an unrelated industrial diversification strategy perform better than firms that do not make use of such an industrial diversification strategy. The other indicator for industrial diversification, the amount of segments, relates negative to *ROA* and is statistically significant at the 5% level. Table 6 reports estimation results on *Tobin's Q*. As reported, the estimated coefficient on *FS/TS* is statistically insignificant in all models. For renewable energy firms, we document a positive association to firms in the United Kingdom and a negative association to diversification strategies (*Rel. div.*). We interpret this as the market preferring renewable energy firms to stick to their core business. Also, as reported in the last row, the adjusted R^2 values are higher for renewable energy firms than for conventional energy firms.

Our third hypothesis posits that firms with a related diversification strategy have a higher profitability than firms that use an unrelated diversification strategy. Interestingly, our findings in Table 5 show a difference between conventional and renewable energy firms. Specifically, we find a positive relation on an unrelated diversification strategy for

Table 3.
OLS estimates of the impact on profitability (ROA)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	−20.71*** (6.19)	−21.18*** (6.45)	−19.22*** (6.67)	−20.93*** (6.18)	−21.55*** (6.21)	−20.44*** (7.44)
Ln *TA*	1.79*** (0.39)	1.79*** (0.38)	1.71*** (0.41)	1.82*** (0.40)	1.82*** (0.38)	1.76*** (0.44)
LEV	−0.08** (0.04)	−0.08** (0.04)	−0.08** (0.04)	−0.08** (0.04)	−0.09** (0.04)	−0.09** (0.04)
FS/TS	−0.06*** (0.02)	−0.06** (0.02)	−0.06*** (0.02)	−0.06*** (0.02)	−0.06*** (0.02)	−0.06*** (0.02)
CAPEX/TS	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
EBIT/TS	1.31*** (0.39)	1.31*** (0.39)	1.30*** (0.39)	1.30*** (0.39)	1.29*** (0.39)	1.28*** (0.39)
GDP	−0.01 (0.15)	−0.01 (0.15)	−0.01 (0.15)	−0.01 (0.15)	−0.01 (0.15)	−0.02 (0.15)
INFL	0.19 (0.21)	0.19 (0.21)	0.21 (0.21)	0.18 (0.22)	0.18 (0.22)	0.20 (0.21)
UK			−1.63 (1.83)			−1.24 (2.14)
IND		0.94 (1.45)				−0.22 (1.88)
Unrel. div				0.31 (1.82)		1.01 (3.00)
Rel. div				−1.48 (1.28)		−2.06 (2.34)
Low Segments					1.32 (1.59)	1.53 (1.71)
Moderate Segments					1.63 (1.69)	2.45 (3.18)
High Segments					−3.99** (1.98)	−3.96 (3.79)
N	789	789	789	789	789	789
R^2-adj	0.34	0.34	0.34	0.34	0.34	0.34

Note(s): This table presents ordinary-least-squares estimation results for regressing firms' characteristics on profitability. The data set contains 129 energy firms representing 77 renewable firms and 52 conventional firms. Return on assets (*ROA*) is the ratio of the net profit divided by assets. The natural logarithm of total assets (*TA*) is a proxy for the firm size, leverage (*LEV*) is the ratio between market value of debt divided by market value of equity, *FS*/*TS* is foreign sales divided by total sales, *CAPEX*/*TS* is the ratio between capital expenditures divided by total sales, *EBIT*/*TS* is the ratio between earnings before interest and taxes divided by total sales, *GDP* is the change in the gross domestic product, *INFL* is the change in the consumer price index, UK is a dummy variable with the value of 1 if the company is based in the United Kingdom and zero otherwise, IND is a dummy variable with a value of 1 if the firm is classified as a renewable energy firm and zero otherwise, Unrel. div. and Rel. div. are dummy variables with a value of 1 if the firm use unrelated or related diversification strategies, respectively, and zero otherwise, finally, Low, Moderate and High Segments are dummy variables with a value of 1 if the firms have low, moderate or high number of segments, respectively, and zero otherwise. All data are recorded at the end of each calendar year between 2009 and 2015. Standard errors are presented in parentheses. ***, ** and * denote significance at the 1%, 5 and 10% levels, respectively

Table 4. OLS estimates of the impact on *Tobin's Q*

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	1.83*** (0.27)	1.90*** (0.28)	1.71*** (0.27)	1.81*** (0.26)	1.81*** (0.26)	1.75*** (0.29)
Ln *TA*	−0.06*** (0.01)	0.06*** (0.01)	−0.06*** (0.01	−0.06*** (0.01)	−0.05*** (0.02)	−0.05*** (0.02)
LEV	−0.01*** (0.00)	−0.01*** (0.00)	−0.01*** (0.00)	−0.01*** (0.00)	−0.01*** (0.00)	−0.01*** (0.00)
FS/TS	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
CAPEX/TS	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
EBIT/TS	−0.03* (0.02)	−0.03* (0.02)	−0.03* (0.02)	−0.03* (0.02)	−0.03 (0.02)	−0.03 (0.02)
GDP	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
INFL	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)
UK			0.13 (0.10)			0.10 (0.11)
IND		−0.14* (0.07)				−0.06 (0.08)
Unrel. div				−0.06 (0.11)		−0.11 (0.18)
Rel. div				−0.04 (0.07)		−0.07 (0.09)
Low Segments					−0.18* (0.01)	−0.13 (0.11)
Moderate Segments					−0.13 (0.12)	−0.00 (0.18)
High Segments					−0.18 (0.17)	−0.07 (0.21)
N	789	789	789	789	789	789
R^2-adj	0.29	0.30	0.29	0.28	0.30	0.30

Note(s): This table presents ordinary-least-squares estimation results for regressing firm characteristics on profitability. The data set contains 129 energy firms representing 77 renewable firms and 52 conventional firms. *Tobin's Q* is the ratio of market value of assets to book value of assets. The natural logarithm of total assets (*TA*) is a proxy for the firm size, leverage (*LEV*) is the ratio between market value of debt divided by market value of equity, *FS/TS* is foreign sales divided by total sales, *CAPEX/TS* is the ratio between capital expenditures divided by total sales, *EBIT/TS* is the ratio between earnings before interest and taxes divided by total sales, *GDP* is the change in the gross domestic product, *INFL* is the change in the consumer price index, UK is a dummy variable with the value of 1 if the company is based in the UK and zero otherwise, IND is a dummy variable with a value of 1 if the firm is classified as a renewable energy firm and zero otherwise, Unrel. div. and Rel. div. are dummy variables with a value of 1 if the firms use unrelated or related diversification strategies, respectively, and zero otherwise, finally, Low, Moderate and High Segments are dummy variables with a value of 1 if the firms have low, moderate or high number of segments, respectively, and zero otherwise. All data are recorded at the end of each calendar year between 2009 and 2015. Standard errors are presented in parentheses. ***, ** and * denote significance at the 1%, 5 and 10% levels, respectively

Variables	Conventional energy firms (1)	(2)	Renewable energy firms (3)	(4)
Intercept	−33.70*** (10.60)	−42.36*** (14.91)	−7.10 (6.62)	−9.13 (7.24)
Ln *TA*	2.62*** (0.67)	3.47*** (1.05)	0.92** (0.44)	0.89*** (0.36)
LEV	−0.12 (0.09)	−0.17* (0.10)	−0.07 (0.04)	−0.08* (0.04)
FS/TS	−0.05* (0.02)	−0.05 (0.03)	−0.05** (0.02)	−0.05** (0.02)
CAPEX/TS	0.00 (0.01)	−0.00 (0.01)	0.01 (0.01)	0.01 (0.01)
EBIT/TS	0.80* (0.46)	0.73 (0.47)	2.33*** (0.46)	2.25*** (0.55)
GDP	−0.38* (0.21)	−0.41* (0.22)	0.12 (0.18)	0.14 (0.18)
INFL	0.84* (0.47)	0.94** (0.44)	−0.17 (0.18)	−0.14 (0.20)
UK		−0.90 (3.60)		−0.11 (2.17)
Unrel. div		6.48* (3.70)		−3.50 (2.99)
Rel. div		2.89 (4.93)		−4.08 (2.99)
Low Segments		−6.59** (3.20)		3.08 (3.39)
Moderate Segments		−8.97 (0.98)		8.16* (4.10)
High Segments		−18.25** (8.31)		1.96 (3.86)
N	332	332	457	457
R^2-adj	0.33	0.35	0.46	0.47

Note(s): This table provides basic statistics for our sample. The final data set contains 129 energy firms representing 77 renewable firms and 52 conventional firms. Return on assets (*ROA*) is the ratio of the net profit divided by assets. The natural logarithm of total assets (*TA*) is a proxy for the firm size, and leverage (*LEV*) is the ratio between market value of debt divided by market value of equity. *FS/TS* is foreign sales divided by total sales. *CAPEX/TS* is the ratio between capital expenditures divided by total sales, *EBIT/TS* is the ratio between earnings before interest and taxes divided by total sales and *INFL* is the change in consumer price index. UK is a dummy variable with the value of 1 if the company is based in the United Kingdom, and zero otherwise, IND is a dummy variable with a value of 1 if the firm is classified as a renewable energy firm, and zero otherwise, Unrel. div. and Rel. div. are dummy variables with a value of 1 if the firms use unrelated or related diversification strategies, respectively, and zero otherwise, finally, Low, Moderate and High Segments are dummy variables with a value of 1 if the firms have low, moderate or high number of segments, respectively, and zero otherwise. All data are recorded at the end of each calendar year between 2009 and 2015. Standard errors are presented in parentheses. ***, ** and * denote significance at the 1%, 5 and 10% levels, respectively

Table 5. OLS estimates of the impact on profitability (ROA)

conventional firms (statistically significant at the 5% level), whereas we find a negative relation (although not statistically significant) for renewables firms. Furthermore, conventional energy firms that operate in three or four segments perform worse than firms operating in one or two segments do. In addition, firms that operate in seven or more segments do perform, according to this model, worse than firms that operate in one or two segments. A difference between conventional energy firms and renewable energy firms can be seen in the relation between the number of segments and *ROA*. Specifically, we find that renewable energy firms with five or six segments perform better than firms with only one or two segments. In addition, we find that renewable energy firms located in the United Kingdom and firms in (other) Europe show no particular strong links to profitability.

4.2 Additional insights on Tobin's Q *and ROE*

To reinforce and advance our analysis, we replace *ROA* by *Tobin's Q* as the dependent variable, in line with the study on the performance of different business strategies in the Chinese energy industry as reported by Li *et al.* (2016). *Tobin's Q* is used as a proxy for performance when measuring the influence of industrial diversification (Berger and Ofek, 1995). Furthermore, *Tobin's Q* is in contrast with ROA, based on the market value of a firm, and indicates capital market forecasts on future profit and growth.

In model (2) of Table 4, the results show a statistically significant negative association between *Tobin's Q* and *IND* and suggest that firms in the renewable energy sector have a

Variables	Conventional energy firms (1)	(2)	Renewable energy firms (3)	(4)
Intercept	1.88*** (0.42)	1.62*** (0.41)	1.69*** (0.37)	1.59*** (0.38)
Ln *TA*	−0.06*** (0.02)	−0.03 (0.03)	−0.06*** (0.02)	−0.05** (0.02)
LEV	−0.01*** (0.00)	−0.01** (0.01)	−0.01*** (0.00)	−0.01*** (0.00)
FS/TS	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)
CAPEX/TS	−0.00 (0.00)	−0.00 (0.01)	−0.00 (0.00)	−0.00 (0.00)
EBIT/TS	−0.02 (0.02)	−0.02 (0.02)	−0.04* (0.02)	−0.04 (0.03)
GDP	−0.00 (0.01)	−0.00 (0.01)	0.02 (0.01)	0.02 (0.01)
INFL	0.02 (0.03)	0.02 (0.02)	−0.02 (0.01)	−0.02 (0.01)
UK		−0.04 (0.18)		0.25* (0.14)
Unrel. div		0.01 (0.23)		−0.25** (0.11)
Rel. div		−0.02 (0.14)		−0.13* (0.07)
Low Segments		−0.29 (0.20)		−0.03 (0.16)
Moderate Segments		−0.19 (0.26)		0.24 (0.18)
High Segments		−0.26 (0.31)		0.17 (0.21)
N	334	334	470	470
R^2-adj	0.24	0.25	0.30	0.32

Note(s): This table provides basic statistics for our sample. The final data set contains 129 energy firms representing 77 renewable firms and 52 conventional firms. *Tobin's Q* is the ratio of market value of assets to book value of assets. The natural logarithm of total assets (*TA*) is a proxy for the firm size, and leverage (*LEV*) is the ratio between market value of debt divided by market value of equity. *FS/TS* is foreign sales divided by total sales. *CAPEX/TS* is the ratio between capital expenditures divided by total sales, *EBIT/TS* is the ratio between earnings before interest and taxes divided by total sales, *GDP* is the growth in the gross domestic product, and *INFL* is the annual change in the consumer price. UK is a dummy variable with the value of 1 if the company is based in the UK, and zero otherwise, IND is a dummy variable with a value of 1 if the firm is classified as a renewable energy firm, and zero otherwise, Unrel. div. and Rel. div. are dummy variables with a value of 1 if the firms use unrelated or related diversification strategies, respectively, and zero otherwise, finally, Low, Moderate and High Segments are dummy variables with a value of 1 if the firms have low, moderate or high number of segments, respectively, and zero otherwise. All data are recorded at the end of each calendar year between 2009 and 2015. Standard errors are presented in parentheses. ***, ** and * denote significance at the 1%, 5 and 10% levels, respectively

Table 6. OLS estimates of the impact on *Tobin's Q*

lower *Tobin's Q*. However, when we use model (6), the estimated coefficient is still negative but statistically insignificant. To shed light on whether the degree of diversification is related to *Tobin's Q*, we find no strong support except that in model (5) the estimated coefficient on *Low Segments* is negative and statistically significant at the 10% level. Taken together, the results are broadly consistent with our prior findings.

The difference in the results between *ROA* and *Tobin's Q* as a dependent variable can be that the latter one is related to various corporate governance issues. For instance, entrenched managers have the possibility to layback, underinvest and take no risks (Bertrand and Mullainathan, 2003). However, if the firm's net present value is reduced, underinvestment causes *Tobin's Q* to increase (Dybvig and Warachka, 2012). This makes them less vulnerable and keeps them safer from being fired. This can make sense in our situation as we use the financial crisis years 2009 until 2015. Firms, also in the energy sector, had a tough time and were not eager to invest. The difference between *ROA* and *Tobin's Q* as performance measures is furthermore most easily explained in that *Tobin's Q* relates to market values and hence is related to expected firm performance [1].

5. Discussion

We find that firms in the renewable energy sector do not show a higher profitability than firms in the conventional energy sector, and hence, this is not supportive of our first hypothesis. Next, we investigate if there is a positive relation between profitability and international diversification where we proxy the latter by *FS*/*TS*. We find the opposite in our empirical analysis – a higher *FS*/*TS* is accompanied by a lower *ROA*. Several reasons might have led to this negative relation.

First, the financial crisis potentially had a bigger impact on renewable energy firms than on conventional energy firms. Younger firms, more levered firms and a higher amount of firms are possible arguments that underlie this idea. Next to this, there was a crisis in the renewable energy market as well. Several government subsidies were cut in 2012, and major player, Vestas Wind Systems (Denmark), almost collapsed. As the financial crisis continued to affect the energy sector, countries were eager to cut on subsidies for green energy. Also, firms can use traits, rules and regulations of other countries to their own advantage. An example is Enel (Italy) that switched its attention by looking at new markets, especially in developing countries. Further, there is much potential in Italy, with a growing domestic market and high subsidies for replacing conventional energy (Scott, 2012). Also, going abroad does go along with potentially detrimental corporate governance issues.

Moreover, some countries possibly favor their own companies and energy market through subsidies and regulations. The European energy market is complicated, since companies and customers not only deal with the local government but also with the EU. Sometimes the free market principle is neglected, which exemplifies the transaction cost theory in that not every firm has the same opportunities on the market. For example, for some years, the EU has been warning Germany for possible illegal price discrimination. In Germany, consumers pay a premium on both domestic and foreign electricity. However, this capital is only invested in domestic energy firms, which results in an unfair market system. Renewable energy firms are more dependent on external finance and subsidies; foreign activities involve more risk and lower return.

For firms in the conventional energy sector, our models show no significant relation between international diversification and firm performance. Firms can easily export their oil and gas, and the *ROA* of a firm does not significantly depend on the amount it has sold in foreign countries. However, the supply and demand ratio is not balanced, and oil prices have sharply dropped. This price change does not vary substantially between countries and regions, nor does the homogeneous product, and for that reason the resource-based view does not hold up in the case of conventional energy firms. This also explains the non-significance in the relation.

There is a significant positive relation between the *ROA* of companies in the conventional energy industry and their unrelated diversification strategy. Also, for these firms, operating in more segments has a negative effect on firm performance. The optimal situation for a conventional energy firm is to operate in one or two segments. This is in line with our hypothesis that firms that do not employ an industrial diversification strategy perform better than firms that do make use of an industry diversification strategy.

Next to possible causes lined out in the literature review, a more direct and feasible impact for the lower performance of more industrially diversified firms is due to the global financial crisis. The data show that larger conventional energy firms perform better when operating in as few as possible segments, during the period 2009–2015. This can be related to the agency theory. Managers tend to make decisions to benefit themselves, which may not be in the firms' best interest. During crises, this affects the company, since managers want to remain in position and secure their jobs. This may especially hold in the conventional energy industry, where firms are relatively older. In those firms, it is more difficult to change and to respond to new circumstances.

Two arguments can explain a better performance with related industrial diversification compared to unrelated industrial diversification. First, economies of scope give related diversification an advantage; knowledge and resources can more easily be used in the related industry as well. Moreover, costs can be saved on management, as it needs less time and possesses more relevant information already (Li *et al.*, 2016). Also, a company's market value is better described when it is a specialized firm, as there is no information asymmetry as opposed to managers in diversified firms that receive biased information (Habib *et al.*, 1997).

Based on our analysis, no strong and general conclusions can be drawn for the difference on firm performance between companies in the United Kingdom and other European companies in the energy sector. The only direction, according to this model, is that renewable energy firms in the United Kingdom have higher market values than firms in the rest of Europe. This can be explained by the industry being more liberalized in the United Kingdom. Firms are less dependent on the government, have more possibilities and can respond to changes and prospects more easily. Nevertheless, after the period studied, the United Kingdom needs to speed up its transition to renewables. Its share of renewable energy was lower than in other member states. This means that there are many chances for renewable energy firms in the near future, as the United Kingdom has set specific targets through the Climate Change Act 2008 and the EU has set energy targets for each country for 2020.

6. Conclusions

This study examines the influence of industrial and international diversification on firm performance, as proxied by *ROA*, for a sample of 129 energy firms located in Western Europe over the period 2009 to 2015. A univariate analysis shows that renewable energy firms perform better than conventional energy firms do, but a multivariate analysis does not confirm this. We document that both industrial diversification and international diversification have a significant negative relation with firm performance. A split sample analysis shows a significant negative relation between international diversification and performance for renewable energy firms only. For conventional energy firms, a modest positive relation is documented between firm performance and unrelated diversification strategies. No such relation can be detected for renewable energy firms.

We acknowledge several limitations to this analysis. There are different definitions to measure international diversification, which may generate other results. Future research can possibly take into account the degree of foreign assets to total assets. Next to this, it would make sense to make a distinction between a firm's amount of operations in renewable energy and conventional energy. Our analysis is based on the main industry code, but firms might have a significant share in the other energy sector. In addition, the years covered in this research (2009–2015) are impacted by the financial crisis, and hence, it might be helpful to extend our sample period. Also, additional analysis of potential substitution effects between conventional and renewable energy firms should be of interest. Finally, the growth of renewable energy firms might be an issue accompanied by certain types of businesses (e.g. vertically integrated ones), which *per se* may impact firm performance. In summary, additional research on these issues, and beyond, should be fruitful as there are opportunities to fill the void in the literature related to the energy sector.

Note

1. In unreported tests we also replaced *ROA* with Return on Equity (*ROE*) that indicates shareholder returns. The estimated coefficients, available upon request, are not much different from the figures we report. They move in the same direction but are more extreme. The international diversification proxy is still negative. The firm size has an impact on *ROE* as well. No conclusions regarding industrial diversification can be drawn, as is also the case for the general model. We find indications that firms with more than seven segments have a lower *ROE* than firms with only one or two segments. Furthermore, the adjusted R^2 is lower in these specifications.

References

Aggarwal, R.K. and Samwick, A.A. (2003), "Why do managers diversify their firms? Agency reconsidered", *The Journal of Finance*, Vol. 58 No. 1, pp. 71-118.

Agmon, T. and Lessard, D.R. (1977), "Investor recognition of corporate international diversification", *The Journal of Finance*, Vol. 32 No. 4, pp. 1049-1055.

Balcılar, M., Demirer, R. and Hammoudeh, S. (2015), "Global risk exposures and industry diversification with shariah-compliant equity sectors", *Pacific-Basin Finance Journal*, Vol. 35, pp. 499-520.

Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17, pp. 99-120.

Berger, P.G. and Ofek, E. (1995), "Diversification's effect on firm value", *Journal of Financial Economics*, Vol. 37 No. 1, pp. 39-65.

Bertrand, M. and Mullainathan, S. (2003), "Enjoying the quiet life? Corporate governance and managerial preferences", *Journal of Political Economy*, Vol. 111 No. 5, pp. 1043-1075.

Bettis, R. (1981), "Performance differences in related and unrelated firms", *Strategic Management Journal*, Vol. 2, pp. 379-393.

Burgman, T.A. (1996), "An empirical examination of multinational corporate capital structure", *Journal of International Business Studies*, Vol. 27 No. 3, pp. 553-570.

Campa, J.M. and Kedia, S. (2002), "Explaining the diversification discount", *The Journal of Finance*, Vol. 57 No. 4, pp. 1731-1762.

Doupnik, T. and Perera, H. (2011), *International Accounting*, 3rd ed., McGraw-Hill, New York.

Dybvig, P.H. and Warachka, M. (2012), "Tobin's q does not measure firm performance: theory, empirics, and alternative measures", Washington University, pp. 1-28.

Geringer, M.J., Beamish, P.W. and DaCosta, R.C. (1989), "Diversification strategy and internationalization: implications for MNE performance", *Strategic Management Journal*, Vol. 10 No. 2, pp. 109-119.

Gertner, R.H., Scharfstein, D.S. and Stein, J.C. (1994), "Internal versus external capital markets", *The Quarterly Journal of Economics*, Vol. 109 No. 4, pp. 1211-1230.

Guisinger, S. (1973), "The rise of the multinational corporation and United States trade policy", *Social Science Quarterly*, Vol. 54 No. 3, pp. 552-567.

Habib, M.A., Johnsen, D.B. and Naik, N.Y. (1997), "Spinoffs and information", *Journal of Financial Intermediation*, Vol. 6 No. 2, pp. 153-176.

Harris, M. and Raviv, A. (1991), "The theory of capital structure", *The Journal of Finance*, Vol. 46 No. 1, pp. 297-355.

Helpman, E. (1984), "A simple theory of international trade with multinational corporations", *The Journal of Political Economy*, pp. 451-471.

Hitt, M.A., Hoskisson, R.E. and Kim, H. (1997), "International diversification: effects on innovation and firm performance in product-diversified firms", *Academy of Management Journal*, Vol. 40 No. 4, pp. 767-798.

Hymer, S. (1976), *The International Operations of National Firms: A Study of Direct Foreign Investment*, MIT Press, Cambridge, MA.

International Energy Agency (2013), *Energy Policies of IEA Countries: Germany, 2013 Review*, International Energy Agency secretariat, Paris.

Jensen, M.C. and Murphy, K.J. (1990), "Performance pay and top-management incentives", *Journal of Political Economy*, Vol. 98 No. 2, pp. 225-264.

Kogut, B. and Zander, U. (1993), "Knowledge of the firm and the evolutionary theory of the multinational corporation", *Journal of International Business Studies*, Vol. 24 No. 4, pp. 625-645.

Li, Q., Wang, W., Lou, Y., Cheng, K. and Yang, X. (2016), "Diversification and corporate performance: evidence from China's listed energy companies", *Sustainability*, Vol. 8 No. 10, p. 983.

Mansi, S.A. and Reeb, D.M. (2002), "Corporate diversification: what gets discounted?", *The Journal of Finance*, Vol. 57 No. 5, pp. 2167-2183.

Markides, C.C. and Williamson, P.J. (1994), "Related diversification, core competences and corporate performance", *Strategic Management Journal*, Vol. 15 No. S2, pp. 149-165.

Martin, J.D. and Sayrak, A. (2003), "Corporate diversification and shareholder value: a survey of recent literature", *Journal of Corporate Finance*, Vol. 9 No. 1, pp. 37-57.

Nelson, R.R. and Winter, S.G. (1982), *An Evolutionary Theory of Economic Change*, Belknap Press, Cambridge, MA.

Pätäri, S., Jantunen, A., Kyläheiko, K. and Sandström, J. (2012), "Does sustainable development foster value creation? Empirical evidence from the global energy industry", *Corporate Social Responsibility and Environmental Management*, Vol. 19 No. 6, pp. 317-326.

Porter, M.E. (1986), *Competition in Global Industries*, Harvard Business Press, Boston MA.

Qian, G., Li, L., Li, J. and Qian, Z. (2008), "Regional diversification and firm performance", *Journal of International Business Studies*, Vol. 39 No. 2, pp. 197-214.

Reeb, D.M., Kwok, C.C. and Baek, H.Y. (1998), "Systematic risk of the multinational corporation", *Journal of International Business Studies*, Vol. 29 No. 2, pp. 263-279.

Rumelt, R.P. (1982), "Diversification strategy and profitability", *Strategic Management Journal*, Vol. 3 No. 4, pp. 359-369.

Scott, M. (2012), "Europe, green energy takes a hit from debt crisis", The New York Times, available at: http://www.nytimes.com (accessed November 13).

Shin, H. and Stulz, R.M. (1998), "Are internal capital markets efficient?", *The Quarterly Journal of Economics*, Vol. 113 No. 2, pp. 531-552.

Stulz, R. (1990), "Managerial discretion and optimal financing policies", *Journal of Financial Economics*, Vol. 26 No. 1, pp. 3-27.

United Nations (2015), *Adoption of the Paris Agreement*, United Nations Framework Convention on Climate Change secretariat, United Nations Framework Convention on Climate Change secretariat (UNFCC), Bonn.

Van den Heuvel, S., De Jong, J. and Van der Linde, C. (2010), *Energy Company Strategies in the Dynamic EU Energy Market (1995-2007)*, Clingendael International Energy Programme, The Netherlands.

Appendix

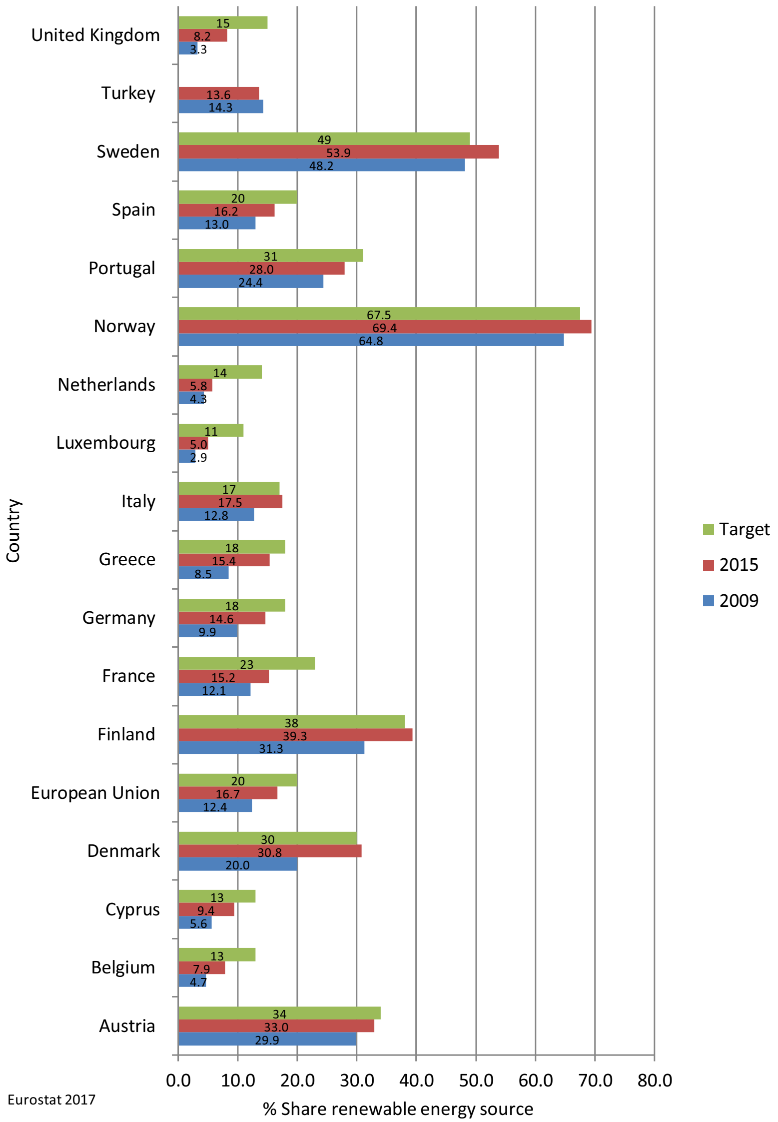

Figure A1.
Renewable energy sources

Corresponding author
Wim Westerman can be contacted at: w.westerman@rug.nl