THIS IS THE ACCEPTED VERSION OF THE MANUSCRIPT PUBLISHED

IN

Research in International Business and Finance, Volume 39, Part A,

January 2017, Pages 546-552

TO BE CITED AS

Anderloni, L., & Tanda, A. (2017). Green energy companies: Stock performance and IPO returns. *Research in international Business and Finance*, *39*, 546-552.

https://doi.org/10.1016/j.ribaf.2016.09.016

Green energy companies: Stock performance and IPO returns

Luisa Anderloni*, Alessandra Tanda*^

*Università degli Studi di Milano, Department of Economics, Management and Quantitative Methods, FinGro Lab – Laboratory onFinance and Growth, Via Conservatorio 7, 20122 Milano, Italy

^Corresponding author. alessandra.tanda@unimi.it

Abstract

This study aims at investigating the performance of energy companies at IPO and highlighting the differences in underpricing and stock return trends of green energy companies compared to non-green ones. We select all energy stock IPOs between 2000 and 2014 on the main European markets and evaluate first day and long run performance to shed light on the differences of the two groups of firms. As further refinement, we evaluate the determinants of short and long term performance. Evidence shows that green companies have a lower underpricing, which nevertheless disappears after few days of trading and when controlling for underpricing determinants. In the long run, performances of green and non-green are similar and empirical results show that the traditional risk factors explain return dynamics.

To the best of our knowledge, this is the first paper to analyse the underpricing and stock performance of green energy companies.

JEL code: G14, G24

Keywords: Green energy, Start-up, IPO, Underpricing, Stock performance

1. Introduction

Underpricing is a common phenomenon for companies newly listed on stock exchanges that have a high positive return due to the difference between the offer price and the first trading day price (Ibbotson and Ritter, 1995). The issue has received a relevant attention by the theoretical and empirical literature (Ritter and Welch, 2002; Loughran and Ritter, 2004; Chambers and Dimson, 2009). The empirical investigations nevertheless provide contrasting evidence (Daily et al., 2003) and underline that the degree of underpricing is determined by various firm, market and country specific factors, such as firm age, size, the bull or bear market and the existence of market bubbles at IPO, as well as the overall economic conditions (Engelen and van Essen, 2010) which are all able to influence asymmetries of information and uncertainty at IPO. In fact, despite there are different theories explaining underpricing, most of them state that this phenomenon is related to asymmetries of information (Ibbotson and Ritter, 1995; Engelen and van Essen, 2010; Banerjee et al., 2011). Hence if a company is more difficult to evaluate, because it is younger, smaller or produces less established products or services, it might be more subject to asymmetries of information, both concerning the company and the business, and, as a consequence, suffer a higher underpricing at IPO.

This study evaluates the underpricing at IPO and the performance in the long run for a sample of firms operating in the energy industry that listed between 2000 and 2014. We investigate the role of green energy companies and start-ups in the market of IPOs.
Our results show a statistical significant difference in the behaviour of green and non-green companies. Both groups of firms exhibit underpricing for the first day and for the first week of trading, but green show a lower performance than other companies. When controlling for other firm and market specific factors and the economic cycle, differences between the two disappear. In the long run, green energy companies show a lower performance, but again, when testing for the determinants of stock returns, these seem to be affected by the market return and size effect, rather than being green or not green.
To the best of our knowledge, this is the first paper to analyse the underpricing and long run performance of green energy companies and start-ups. This research contributes to the literature providing further insight on the underpricing phenomenon for the energy industry, with special attention to the green companies. Additionally, we provide specific new evidence on the stock performance of energy companies, both green and traditional.
Section 2 discusses the theoretical framework and the empirical evidence provided in the literature; Section 3 describes the data and the methodology; Section 4 presents the results and the last section concludes.

2. Theoretical and empirical framework

When firms go public for the first time, on average their offering price at the time of IPO is below the price prevailing on the first trading day (or days) (Ibbotson and Ritter, 1995). This means that the offer price was set below the "fair" price for the company; in other words, the issue is underpriced. This effect of underpricing can persist over time for few days or weeks of trading (Ibbotson and Ritter, 1995).
The rationale for underpricing has to be found in the asymmetries of information characterising the new debuting firms. Several theories have discussed the origin of underpricing and, among the others, we just cite some of the most relevant. The "winner's curse hypothesis" (Rock, 1986) that states that when there are two types of investors, one of which has incomplete information about the firm, the offering price has to be set at a lower level in order to compensate for the incomplete information. The "costly information hypothesis" by Benveniste and Spindt (1989) maintains that investment banks underprice the issue in order to get private information from investors in the pre-offer period. The "cascade hypothesis" by Welch (1992), stems from the hypothesis that markets are subject to cascades, and hence investors have to be induced to buy, underpricing the offer, in order to induce other investors to buy.
Several factors can influence the extent of underpricing at IPO. Among these, the literature has identified those firm, market and country characteristics that appear to impact the most. Firm age and size can influence the level of asymmetries of information and, as a consequence, underpricing. The younger and the smaller are the firms, the higher is the degree of potential undisclosed information (Megginson and Weiss, 1991; Daily et al., 2003; Hoque, 2014). The more difficult is to evaluate the business of the company, the higher will be the underpricing: among the others, high tech or innovative companies will experience higher initial returns (Walker et al., 2015). Nevertheless, asymmetric information can be softened by the presence of a reputable underwriter or by the VC backing, as the latter act to signal the quality of the company issuing the stocks on the market (Gompers, 1996; Jain and Kini, 2000; Daily et al., 2003; Belghitar and Dixon, 2012; Anderloni and Tanda, 2015).
With reference to long run performance, the literature finds that IPOs tend to underperform

other more mature stocks in the long run (Ibbotson and Ritter, 1995). The evidence on green energy companies is limited, while a strand of literature analyses green or social responsible companies in its widest sense. Green companies might underperform other companies if the cost of investing in new technologies translates into lower profits and hence lower expected stock returns (Brammer and Brooks Pavelin, 2006; Cai and He, 2014). Other studies find that green companies do not underperform other companies and have similar or higher returns (Cohen et al., 1997; Guenster et al., 2010; Heinkel et al., 2001; Belghitar et al., 2014), especially in the long run, as the intangible asset of being green and sustainable displays its effects only after few years (Cai and He, 2014). A strand of literature also analyses the type of investors backing green energy companies. As sustainability becomes a more urgent issue, some investors might find investments in green energy a suitable manner to employ their capital satisfying their investment objectives (for a recent discussion, see Kaminker and Stewart, 2012). The role for private investors increases as public funds become lower and the financing gap widens and private capital have indeed started to flow into this industry lately (BNEF, 2012 BNEF, 2016). This holds not only for Socially Responsible Funds, but also for pension funds and insurances. Nevertheless, according to OECD estimates, just a very small portion of funds from these investors is allocated to green energy projects (Kaminker and Stewart, 2012).

In this study, we focus on green energy companies, which produce and distribute alternative energy. This might imply the implementation of new technologies which are not widespread in the market and hence might involve higher initial costs and higher continuous research and development costs than traditional energy producers, that include both oil and gas firms and traditional electricity producers.

3. Data and methodology

We select all the Initial Public Offers (IPOs) concluded between 2000 and 2014 on the main European stock exchanges by European companies operating in the energy industry. The IPOs are individuated through Bloomberg, which is also the source of the initial offer price. Time series are retrieved through Datastream and balance sheet and other company information are obtained from Orbis. Missing data are complemented with other official sources, such as stock exchanges prospects and news releases. Macroeconomic information is obtained from the OECD database.

The final sample is made of 144 energy firms listed on the stock exchanges of the following European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain and UK.

To evaluate performance of green and non-green energy stocks, we investigate underpricing and long run performance as well, starting from the financial theory and hence employ the traditionally measures used to evaluate underpricing and performance in the stock markets[1]. Additionally, we investigate what variables contribute to performance.

IPO underpricing corresponds to the returns of the first day of trading (P_i,1) relative to the offering price (P_i,IPO) (1). We also compute the underpricing for the first week of trading

[1] We are nevertheless aware that a growing body of literature has shown that under certain circumstances, performance can be influenced by behavioural biases, especially in the short run. The literature on efficiency and inefficiency has been flourishing both on developed and developing markets (for recent contributions see Arshad et al., 2016; Chiang et al., 2010; Jovanovic et al., 2016; Lillo and Valdés, 2016; Sohel Azad, 2009). Nevertheless in this paper we start from the hypothesis of efficient markets and from the traditional theories of finance that still find strong support in the literature (Fama, 1998; Lo, 2004; Worthington and Higgs, 2004; Torun and Kurt, 2008; Borges, 2010; Lim and Brooks, 2011).

(wgr) (2).

$$dgr_i = \frac{P_{i,1} - P_{i,IPO}}{P_{i,IPO}} \quad (1)$$

$$wgr_i = \frac{P_{i,6} - P_{i,IPO}}{P_{i,IPO}} \quad (2)$$

To account for market movements, we also compute market adjusted (net) returns, as follows:

$$dnet_i = \frac{P_{i,1} - P_{i,IPO}}{P_{i,IPO}} - \frac{P_{m,1} - P_{m,0}}{P_{m,0}} \quad (3)$$

$$wnet_i = \frac{P_{i,6} - P_{i,IPO}}{P_{i,IPO}} - \frac{P_{m,6} - P_{m,0}}{P_{m,0}} \quad (4)$$

We additionally perform a multivariate analysis according to the following Eq. (5) to evaluate which factors more severely affect first day return.

$$Per_i = a_0 + a_1 X_i + a_2 IPO_i + a_3 Y_i + e_i \quad (5)$$

Where

- Per_i is the performance of firm i.
- a_0 is the constant; a_1, a_2 and a_3 are the coefficients.
- X_i is a matrix that includes firm's characteristics at time of the IPO. More in detail, we control for age, size, and green and start-up dummies. These respectively identify green energy companies (whose activity is in alternative energies and not in oil, gas or traditional energy producers) and start-ups (in this paper defined as firms concluding an IPO within 5 years after the incorporation date).
- IPO_i contains the offer characteristics, such the lag between the announced date and the completion date of the IPO and a dummy isolating IPOs occurring on alternative markets, where underpricing is found to be generally higher (Hoque, 2014). We also control for the offer size, computed as the offer size divided by the market value at IPO.
- Y_i includes the economic and market conditions at IPO, which might influence initial returns. We control for the market momentum, computed as the three-month performance of the market index before the IPO for each listing stock, and industrial production index, as a proxy for the overall country economic conditions.
- e_i represents the errors.

For long term performance we both employ buy and hold returns and monthly returns up to 36 months after the IPO. We test the determinants of long run stock performance with a three-factor market model (Fama and French, 1993). The first factor is the market excess return, computed using the DJ Stoxx Europe 600 and the UK Treasury bill rate, as well as the Eonia interest rate. The second factor controls for size effects (SMB) and corresponds to the difference of small companies' returns and large companies' returns (respectively, using the Stoxx Europe TMI Small 200 Index for small stocks and the DJ Stoxx Europe TMI Large 200 Index for the large companies). The third factor (HML) proxy growth opportunities and it is based on DJ Stoxx Europe TMI Value Index for high book to market firms and the DJ Stoxx Europe TMI Growth Index for low book to market stocks. We also differentiate between green energy companies and traditional energy companies through the dummy green.

Table 1
Underpricing descriptive statistics.

performance	full sample	Green	Non-green	Difference (p-value)
dgr	14.60%[a]	10.90%	17.10%	6.21%[b] (0.079)
dnet	14.69%[a]	10.81%	17.83%	6.52%[b] (0.069)

wgr	22.03%[a]	15.17%	26.65%	11.47%
				(0.153)
wnet	22.45%[a]	15.67%	27.07%	11.40%
				(0.154)

p-values are reported for unilateral tests only.

[a] Significance at 1%.

[b] Significance at 10%.

1. Results

1.1. Descriptive statistics

The sample is made of a cross-section of 144 European energy companies of which 86 are non-green (or traditional) and 58 are green energy companies[2]. Of these, 105 are start-ups, respectively 69 are traditional and 36 are green. Start-ups are listed on average after 1.24 years of incorporation (the median is 1 year), while older companies are listed after 17 years (the median is 11 years).
Most of the IPOs in the sample have occurred between 2004 and 2008, and most on alternative markets, where under- pricing is generally higher mainly because of the characteristics of the firms listing in these segments, being smaller and younger (Hoque, 2014).
When comparing green energy companies to traditional ones, we see that the first are smaller, with an average market value at IPO of 273 million of euros, while for traditional ones the figure is around 1.53 billion euros. Green energy companies are also slightly younger at IPO (5 years old on average compared to 6).
Start-ups at IPO are younger (as expected) and also smaller: at IPO they have on average a market value of 215 million euros, while non start-ups reach 3 billion euros of market value on average. Medians are much lower, but start-ups still appear smaller (42 mln vs 133 mln).

1.2. Performance at IPO

The stocks in the sample show a positive and significant first day and first week underpricing (Table 1). Differences between the two groups of firms (green and non-green) are significant at 10% only for first day performance. Underpricing persists over the first days of trading, but differences between green and non-green companies disappear. Results remain similar when controlling for market movements (dnet and wnet).
The differences in underpricing between the two groups of firms could derive from firms specific characteristics related to green or non-green companies (such as size or age). Hence we control the determinants of underpricing using three sets of variables, as already discussed: firm, offer and economic cycle characteristics. Results are presented in Table 2.
Being green seems to affect underpricing only when we do not control for offer characteristics or economic cycle at the time of IPO. Size and market conditions, in fact are the two variables which appear to influence underpricing the most. Also the number of days passing between the announce day of the IPO and the completion of the issue has a significant negative coefficient, but the economic impact seems really modest (the coefficient is very close to zero).

1.3. Stock performance

Stock performance in the long run is evaluated using buy and hold returns for 1, 2 and 3 years. Despite there are some statistical significant differences, these disappear when considering market trends together with stock returns. The two groups of firms show hence similar returns in the long run (Table

[2] Nuclear energy is classified as non-green.

3).
Also when differentiating between start-ups and other companies, returns appear similar.
To better investigate the trends of stock performance in the long run, we employ a Fama and French multifactor market model (Fama and French, 1993) which controls for three main risk factors: market excess return over the risk free rate, a size risk factor (computed as the difference in returns of small and large companies) and a growth opportunity factor (computed considering low and high book-to-market value companies). On average monthly returns amount to 7.08% but have several outliers. Hence we winsorise the variable at 1%. Results for the Fama and French model are in Table 4. In regression (1) we test for the basic CAPM using a panel regression and find that the constant and the market excess return are both significant and determine stock performance. We control both for fixed effects and random effects, but the Hausman test yields us to prefer the random effects.

Table 2

Determinants of underpricing.														
dgr	(1.1)		(1.2)		(2.1)		(2.2)		(2.3)		(3.1)		(3.2)	
	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-
valueIntercept	0.339[a]	0.000	0.350[a]	0.001	0.346[a]	0.000	0.357[a]	0.001	0.330[a]	0.000	0.257	0.866	0.328[a]	0.000
Firm characteristics														
Green	−0.072[c]	0.097	−0.073[c]	0.098	−0.059	0.195	−0.063	0.171	−0.061	0.178	−0.063	0.146	−0.060	0.149
Age	−0.017	0.421	−0.021	0.561	0.001	0.988	−0.010	0.799	−0.001	0.954	−0.024	0.487	−0.003	0.880
Size	−0.034[a]	0.004	−0.034[a]	0.005	−0.032[b]	0.050	−0.030[b]	0.014	−0.030[b]	0.013	−0.033[a]	0.004	−0.034[a]	0.003
Start-up			−0.010	0.904			−0.024	0.780			−0.063	0.443		
Offer characteristics														
Main					−0.049	0.370	−0.053	0.328	−0.055	0.300				
Days between announcementand IPO					−0.000[b]	0.073	−0.000[c]	0.078	−0.000[c]	0.080	−0.000[b]	0.029	−0.000[b]	0.036

Offer size			−0.001	0.732					
Economic cycle									
Momentum						0.900[a]	0.002	0.882[a]	0.002
IP						0.003	0.927		
Adj-R2	9.11%	8.47%	10.65%	10.16%	10.76%	15.47%		16.33%	
obs	144	144	142	144	144	144		144	

[a] Significance at 1%.

[b] Significance at 5%.

[c] Significance at 10%.

Table 3
Long run stock performance statistics.

performance	full sample	Green	Non-green	Difference (p-value)
Yr1gr	9.83%	−11.88%	18.19%	36.34%[c] (0.061)
Yr1net	12.23%	−2.91%	22.56%	25.48% (0.134)
Yr2gr	12.94%	−12.05%	29.79%	41.84%[c] (0.098)
Yr2net	19.70%	6.72%	28.55%	21.83% (0.244)
Yr3gr	18.41%	28.07%	49.76%	77.82% [b] (0.042)
Yr3net	30.36%	52.84%	−2.57%	55.40% (0.104)

p-values are reported for unilateral tests only.
b Significance at 5%.
c Significance at 10%.

Table 4
Regression results for performance determinants.

performance	(1)		(2)		(3)		(4)			
	coeff	p-value	coeff	p-value	coeff	p-value	green		non-green	
							coeff	p-value	coeff	p-value
Constant	0.011[a]	0.001	0.004	0.277	0.005	0.227	0.002	0.742	0.005	0.258
Market	0.906[a]	0.000	0.744[a]	0.000	0.744[a]	0.000	0.739[a]	0.000	0.757[a]	0.000
SMB			0.956[a]	0.000	0.955[a]	0.000	0.773[a]	0.000	1.100[a]	0.000
HML			0.180	0.291	0.180	0.292	0.098	0.696	0.237	0.314
green					−0.004	0.586				
Wald t-stat	272.37		319.64		319.89		127.18		193.38	
Wald p-value	0.000		0.000		0.000		0.000		0.000	

[a] Significance at 1%.

When introducing the other two factors, results show that energy stock returns are influenced by the market and by the size effect, which have both high statistical significance and economic meaning. Also in this case, the Hausman test induces us to prefer the random effects.
If we control for the dummy green or run the regression for the two groups separately, results remain similar with the dummy green taking a small and negative coefficient, but not significant (results are reported in Table 4, columns 3 and 4); the same holds when using a different proxy for the risk free rate (results are omitted).

5.Conclusions and discussion

The paper has investigated the behaviour of energy companies at IPO and in the long run, with a special focus on the differences between green energy companies and traditional energy firms.
To this end we selected the IPOs concluded by energy firms between 2000 and 2014 and computed underpricing for the first day and week of trading, as well as long run stock returns. The two groups of firms follow similar trends both in the short and long run, despite green energy companies show a significant lower underpricing at IPO.
Nevertheless, this effect disappears after a week and, additionally, green energy companies do not show different returns when controlling for market conditions. When analysing the determinants of performance, in fact, the dummy green does not take a significant value. The same arises when investigating the stock performance over one, two or three years after IPO. In this case, the traditional risk factors individuated by the literature are able explain stock performance of energy companies, with a special relevance of the market excess return and size factors.
These results show that the market is not apparently able to differentiate between green and non-green companies, providing a premium for more sustainable energy producers. This might be because of various reasons.
Among them, we find the role of specialised investors. In fact, given that non-green companies are generally older and more known on the market, they might be able to attract more reputable investors and underwriters, that are able to lower asymmetries of information at IPO. This might not happen for young and unknown companies. Additionally, further data might clarify the role of institutional investors in sustaining the issue of stocks by clean energy companies. This asset class might in fact be attractive not only for socially responsible investors, but also for long term investors, such as pension funds and insurance companies, which nevertheless so far have invested only little funds in this sector, probably due to the heavy regulatory environment (both for financial intermediaries and green energy industry) and difficulties in evaluating the green energy companies without specific knowledge on the field.
With reference to the absence of differences in stock performance after IPO, in this framework, green energy stocks might display their intangible value added in the very long run (after the time horizon here investigated). Besides, some behavioural argument might be provided to support these findings for short run performance. Although this lies outside the scope of the paper, it might be a hint for further research.
Finally, it has to be questioned if “green” energy companies are truly green and sustainable. Future research might clarify which of the green energy techniques have these characteristics. For instance, green energy companies in our sample include photovoltaic companies which do not rely on fossil energy, but employ distilled water, which also has sustainability issues.

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