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SOCIAL ISSUE APPLIED TO ENERGY SECTOR: FROM CORPORATE SOCIAL RESPONSIBILITY TO COLLECTIVE SWITCHING

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Introduction

Abstract

This chapter introduces the two papers that compose this PhD thesis. The two papers explore the energy market according different aspects and with different methodologies: the first paper is an econometric analysis of the relation between corporate social responsibility and economic performance; the second one explores the business ecosystem around the collective switching phenomenon. In this section, it is explained thesis structure, defining the major contest, providing a short summary of the two papers and clarifying why there where used different methodological approaches.

1. Introduction

This thesis explores the social themes in the energy sector. The corporate social responsibility (CSR) in the last years assumed a growing attention and several companies, operating in different sectors, adopted CSR strategies as a core part of their business model. In Europe, companies, in the last two decades, began to develop ethical business practices. Furthermore, with the rise of the Industrial Revolution, criticisms quickly emerged about the factory system and its treatment of employees. From these concerns, an industrial welfare movement progressed with the aim of preventing labour problems, improving performance, and giving back to various stakeholders of business (Carol, 2008). These years are also characterized by an increasing concern about the climate change and about the efficient use of energy resources. For these reasons, especially the energy companies are increasingly stimulated to deal with the social and environmental issues, like the most impacting on public wellness and environmental stability (Stjepcevic and Siksnelyte, 2017). The energy industry, more than others, is pressed to fit its CSR activity to the society pressures. The environmental and government organizations, in fact, define social responsibility as duty. That means that for the energy companies CSR is a requirement. A company operating in the energy sector should understand social, environmental and economic impacts created in all the regions affected by its activity.

In the two papers the social aspect is declined in different ways: the first paper "A multidimensional analysis of the relationship between firms' Corporate Social Responsibility activities and their economic performance" investigates the relationship between CSR and economic performance, taking into account the firms' specificities, The previous studies, in fact, analysed this relationship without considering the sector in which the firm operates. We believe that the CSR activities depend on the company nature, its size, the types and characteristics of products or services it delivers, the organisation of its work and so on. The aim of this study is to evaluate the relationship between CSR and economic performance, taking into account company and sectorial specificities and distinguishing across financial and accounting measures in a dynamic way. In the existing literature the CSR is explored from different point of views and with different approaches; it is for this reason that there is confusion about its definition (Dahlsrud, 2008). Generally speaking, it is possible to describe it as the positive or "responsible" attitude of a company towards its internal and external stakeholders or, taking the Commission of the European Community definition (CEC, 2001), as the company responsibility of its impact on society. The company became socially responsible following the law, but especially integrating social, environmental, ethical, consumer and human rights concerns into their business strategy and operations. In particular, in the first paper, it is possible to see that the CSR is deconstructed into seven macro categories, which are explained later.

The second paper, "Policy innovation in the energy sector: exploring the role of intermediaries in European collective switching campaigns", analyses a policy innovation developed by the consumer association, focused on consumer protection.The "social theme", investigated in the second paper regards the consumer protection during the energy supplier switch. A large number of empirical studies affirm that the 27%-38% of suppliers switches lost surplus through their confusion with the choice of supplier (Wilson and Price, 2007). The energy market in fact, especially after the liberalization process, has become increasingly difficult to understand for consumers. Marketing strategy, offer packages, additional service development generate consumer confusion on the energy price. Some consumer associations, in different countries, developed a policy innovation, the collective switching, with the aim to solve this problem and to stimulate

the energy retail market that is dominated in most cases by big retailers, which possess the majority of the market share.

The methodology used in these two papers is very different. The first paper is characterized by an econometric analysis, that provides statistical evidence on the impact of the various dimensions of CSR on a company's economic and financial performance indicators. In particular through a dynamic panel model, it is evaluated the impact of full engagement in CSR activities over a three-year horizon, accounting for the dynamics of the economic and financial performance indicators as well as for the lagged impact of CSR indicators on the dependent variables.

The research design of the second paper is based on a multiple cases approach. The case selection is made in accordance with "purposeful sampling" outlines and based on the principle of theoretical replication or namely the repetition of the analysis on different cases with distinct variables (Eisenhardt 1989). In particular a semi-structured interviews are conducted to understand how the consumer associations and energy suppliers make their strategy operational, how consumer associations create relationships with the energy supplier and relationship (long-term or short-term) with the territory/consumers and the policy implication of this phenomenon (for example if it is helpful to people with energy poverty, if it favours the switch to renewables energy and so on).

This methodological difference resides in the diversity of topics and in the available data. In the first case there were merged two different datasets: the first was composed by stock market-based and accounting-based measures (source: Datastream), the second by CSR indicators taken from the MSCI ESG KLD STATS Dataset. In the first case the amount of available data allowed us to make an empirical analysis. In the second case, there was used a qualitative approach that fits with the exploratory aim of this research, because collective switching is a new phenomenon on which there are not so many data yet. The case study, in fact, aims to answer research questions that address the "how" and "why" in unexplored research areas.

The following subparagraphs provide additional information about the two papers.

1.1 First paper summary

The first paper investigates the relationship between CSR and economic performance: it is a very discussed topic, but it has not yet reached a consensus. It is noticed that this discrepancy lies in the timing of the analysis: the CSR programs require a big economic investments; for this reason in the short run the relationship is always negative, but in the long run the investments have a positive return (Yang, 2016 and Comincioli et al., 2012). Nevertheless, the empirical literature used different CSR and economic performance measures. In particular, it is possible to evaluate the economic performance taking into consideration the accounting and the market based measures. The indicators are related and focused on different aspects: the first ones are the measure of a company's economic life; the second ones reflex market evaluations. Both categories of indicators present some weakness (McGuire et al. 1987): the accounting-based measures, for example, consider only the historical aspects of firm performance and are subject to bias from managerial manipulation and differences in accounting procedures (Briloff, 1976). The stock market-based measures, on the contrary, represent investors' evaluation of a firm's ability to generate future economic earnings, rather than past performance; they need to not reflect a fair evaluation of investors in conditions of market distortion such as limited competition or asymmetric information (McGuire et al.1988). In this paper both measures and company and sectorial specificity are taken into account. In addition, assuming that the relation between CSR and economic performance is not constant over time, it has constructed a model that aims to capture these dynamic non-linear aspects. For the CSR indicators it was used the MSCI ESG KLD STATS Dataset that is one of the most complete existing CSR Dataset and the CSR activities were deconstructed into seven macro categories:

- Environmental (ENV), which evaluates the existence of clean energy programmes, pollution prevention programmes and environmentally proactive activities;
- Community (COM), which measures community engagement programmes;
- Human rights (HUM), which considers if the company has undertaken human rights initiatives;
- Employee relations (EMP);
- Diversity (DIV), which identifies gender diversity in the company's top management;
- Product (PRO), which evaluates the existence of quality control programmes and if the company invests in R&D and innovation;

- Governance (CGOV), which analyses the existence of transparency programmes and policies to prevent corrupt business dealings.

It is constructed a panel of 988 US companies from 2003 to 2015 (for a total of 12,844 observations), standardized the CSR indicators to make them coherent over time and sectors, considered both lagged and non-linear variables to better capture the dynamics of the relationship, considered both market (total stock return and financial risk) and accounting-based measures (ROI, ROE, ROA and ROS) and, finally, tested the statistical significance as well as the overall impact of a company's CSR activities by dimension over a three-year horizon.

The result suggests strong positive correlations with the total stock return indicator and a significantly positive reduction in financial risk and these results are common to all sectors. The accounting based measures, instead, show less clear results. Oil & Gas sector, for instance, invest more in CSR activities. A possible explanation might be that companies in this sector are far more subject to external controls (both by the government and non-governmental organisations) compared to others. The Consumer Goods and Consumer Services sectors are relatively more correlated to the macro-category of Community. This might imply that companies operating in these sectors support non-profit organisations, make donations to charities, have volunteer programmes etc., and this impacts their economic performance. The macro-category of Governance is relatively more correlated to all economic performance indicators in the Financial and Industrial sectors. The Health Care sector, instead, shows a strong relationship between the CSR macro-category of Product and market-based indicators. This could signal that companies in this sector pay attention to chemical safety and quality products, provide opportunities for access to health and nutrition, invest in R&D etc., all of which improves their book values. In the future researches each sector will be considered to explain the different pattern that is discovered.

1.2 Second paper summary

The second paper explores the main variables that could affect the development of a policy innovation in an energy business ecosystem and the role of the intermediaries in encouraging its dissemination. The business ecosystem is an economic community composed by mutually supportive organizations that interact among them to produce goods and services (Moore 1996, 1998).

The business ecosystem concept is always related to digital or technology sectors and it is the first time that it is used into the energy sector. The business ecosystem has an adaptable nature and the innovation is tied to business ecosystem players' actions. To answer the main questions – What are the main variables that could affect the development of a policy innovation in a business ecosystem? What is the role of intermediaries? Is this policy innovation replicable into other sectors? If yes, under what conditions? – it has been considered one of the most disruptive policy innovation that has spread in Europe in recent years, called "collective switching".

The collective switching is a policy innovation developed in Europe from 2011. It is a result of fundamental changes that took place in those years in the energy market (like liberalization and subsequently privatization). The collective switching is characterized by a group of people with common features that, through an intermediary, negotiate with the energy suppliers and, thanks to their bargaining power, are able to obtain much more advantageous contracts. This policy innovation reflects the European Commission concerns that, through the "Clean Energy for All Europeans" package presented on 30 November 2016, tries to improve customer experience, to help consumer to switch and to incentive the competition among energy providers. This paper considers as intermediaries the eleven consumer associations that are part of BEUC (Bureau Européen des Unions de Consommateurs) and organizes collective switching campaigns in their respective countries. A multiple case study approach (Yin, 2003) is used to study the variables that in different ways could affect the development of an energy policy innovation in a business ecosystem. For each case study it is used a large source of information, collected through semi-structured interviews, company profiles, company energy profiles and other external sources. As analytical framework it is used the 6C framework (context, cooperation, construct, configuration, capability, change) proposed by Rong et al. (2015):

- The context macro area considers the main environmental characteristics (driving force, main barriers, key mission);
- The configuration macro area studies the construction element of the network;
- The capability macro area takes into consideration the key success features of the supply network;

- The cooperation macro area analyses all the mechanism by which partners interact;
- The construct macro area defines key structure and infrastructure for the business ecosystem;
- The change macro area underlines how a business ecosystem, at the end of its lifecycle, is renewed with the new pattern.

From the case studies analysis it emerges that the context and the cooperation create the prerequisites for a policy development. In particular, if the electricity and gas prices are high, the competition is high and if the intermediaries have the capacity to support the campaign, there are the main factors for a successful campaign. Construct, configuration and capability present a more static configuration, but are crucial to achieve a change: the marketing investment (necessary to overcome social and market barriers), the supplier and the demand side interest, the "post switching" management "(how the switching process is handle) and the company capability to replicate the acquired expertise into other sectors are the main drivers of change. Finally, in the change macro area it is noticed that closed business ecosystem limited the policy innovation development; the opposite is true for an open business ecosystem. The open business ecosystem is in fact characterized by virtuous contamination of other intermediaries and into other sectors.

Even if in the closed business ecosystem the major energy suppliers decide to not participate, it is interesting to understand that something happens; they, in fact, adjust their offers taking into account the winner tariff. From the case studies analysis, it is clear that this policy innovation has the power to rebalance companies' position in the market. This could happen not only in the energy market but, under some conditions (group of people with common characteristics, intermediaries, downhill auction), also in other sectors such as telecommunications sector or financial services.

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A multidimensional analysis of the relationship between firms' Corporate Social Responsibility activities and their economic performance

Abstract

This paper analyses the relationship between firms' Corporate Social Responsibility activities and their economic performance, taking into account seven macro-categories of corporate social responsibility (CSR), six market-based and accounting-based performance indicators and by disaggregating for the firms' sector of activity. In particular, through a representative sample of 988 US-based companies from nine different sectors (Basic Materials, Consumer Goods, Consumer Services, Financials, Health Care, Industrial, Oil & Gas, Technology and Utilities), we study the dynamics of possible endogenous and non-linear relationships through the Arellano-Bond technique in the dynamic panel. The results show some common patterns and sectorial specificities—CSR engagement in general raises firms' total stock returns and reduces financial risks, but this depends on the area of CSR in which the firms invest. The results of an accounting-based figure analysis are less univocal, showing patterns that depend both on the specific area of CSR and the sectorial activities conducted.

1. Introduction

Corporate social responsibility (CSR) can be broadly defined as the positive or "responsible" attitude of a company towards all its stakeholders. The definition is itself inherently linked to the idea that firms or companies can benefit from positively engaging with their various stakeholders, both internal and external, such as employees, board members, communities, workers' families and so on, as well as by caring for the (broadly defined) environments in which they operate. According to Sheldon (1924), CSR is voluntary engagement in social and environmental programmes. Ever since this seminal study, CSR has been considered a common practice to be promoted by governments, non-governmental organisations and consumers (Lee, 2008). However, the impact of CSR on the economic performance of companies has not always been viewed in a positive light. Milton Friedman (1972b), for instance, saw CSR as an unfair and costly burden to shareholders. Benabou and Tirole (2010) discuss three different visions of CSR and the rationale for both a positive and a negative link between CSR and companies' performances. Thus, it is of no surprise that a large body of literature has been devoted to the empirical analysis of the relationship between CSR and economic performance, without any definitive conclusion. Some scholars have shown a positive relationship between CSR and economic performance —Margolis and Walsh (2003), Orlitzky et al. (2003), Rettab et al. (2009), Lin et al. (2009) and Sun (2012) showed that companies involved in CSR take advantage of the positive environments they have created. Also, Chen and Wang (2011), Alafi and Hasoneh (2012) and Galbreath and Shum, (2012) statistically assessed the positive impact that CSR has on its stakeholders. Quazi and Richardson (2012) conducted a meta-analysis of 51 prior studies included in Orlitzky et al. (2003) and showed that by increasing the sample size, the level of significance between the economic and CSR variables rises as well. However, other scholars found a negative relationship between the two. Vance (1975), Wood and Jones (2005), Brammer and Millington (2008), Anginer et al. (2008), Brammer at al. (2005) and Nejati and Ghasemi (2012) show that the market punishes companies' efforts to improve their CSR activities.[1] Ahamed et al. (2014), Aupperle et al. (1985) and McGuire et al. (1988) argue that the relationship between CSR and economic performance is unclear. A possible explanation lies in the timing of the analysis: there can be a short-run negative relationship, but the positive long-run relationship will ultimately dominate, according to Yang (2016) and Comincioli et al. (2012).

The empirical literature that considers the relationship between CSR and economic performance is not univocal also with regards to the economic measures used to test it. Indeed, it is possible to evaluate economic performance by looking at market values or companies' accounting values. The two families of variables are related but focus on different elements—the former represents the market evaluation that depends on firms' economic perspectives, management quality and so on, while the latter is the measurement of a company's economic life. CSR influences, in different ways, different aspects of firm performance and therefore different indicators may lead to inconsistent results when evaluating the relationship between economic results and CSR activities (McGuire et al. 1988). Each type of economic indicator is subject to particular biases (McGuire et al. 1987). Accounting-based measures, for example, consider only the historical aspects of firm performance and are subject to bias from managerial manipulation and differences in accounting procedures (Briloff, 1976); they should also be adjusted for risk, industry characteristics and other variables (Aaker and Jacobson, 1987). Stock market-based measures, on the contrary, represent investors' evaluation of a firm's ability to generate future economic earnings, rather than past performance; they need not reflect a fair evaluation of investors in conditions of market distortion such as limited competition or asymmetric information (McGuire et al.1988). Moreover, market values such as stock prices refer only to financial stakeholders and therefore might not be suitable to represent a multidimensional concept like CSR, which refers to both economic and non-economic values (Mc Williams et al. 2006). Perhaps not surprisingly, taking into account these differences, the meta-analysis of the empirical studies, conducted by Horvathova (2010), shows mixed results in assessing the relationship between CSR and companies' performances.

All these studies consider CSR without taking into account the firms' specificities. However, the definition of CSR itself refers to the broad set of multiple activities that companies can undertake in order to improve their relationships with their stakeholders. This is strongly influenced by the sector in which the firm

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[1] See also Lioui and Shama (2012), who consider the relationship between the environmental dimension of CSR and the companies' economic performances, and the references therein.

operates, since it impacts the nature of the company, its average size, types and characteristics of products or services it delivers, the organisation of its work and so on. There exist some studies that have focused on the empirical relations between the two variables in specific sectors, e.g., the banking and financial sectors (Mallin et al. (2014); Comincioli et al. (2012), Soana (2011); Jo et al. (2014); Platonova et al. (2016)); the tourist sector (Theodoulidis, (2017); Gu, et al., (2013); Zhang, (2014)). However, these studies do not compare the results across sectors, taking into account the possible impact on the empirical relationship due to differences in performance measures and the dynamic nature of the CSR-performance relationship. The aim of this study is to evaluate the relationship between CSR and economic performance, taking into account company and sectorial specificities and distinguishing across financial and accounting measures in a dynamic way. The latter is especially important since it is entirely possible that a company's engagement in CSR activities has an impact over time in a non-linear way. As discussed, engagement in CSR activities can have a cost and can also generate benefits, and these two components can change over time. Our model aims to capture these dynamic non-linear aspects as well.

We stress that our aim is not to provide a theoretical accounting of all the possible relationships between CSR and each financial or economic performance measure in each sector but simply to provide an empirical evaluation of these relationships, without involving or assuming any pre-defined model for CSR. However, we do acknowledge the multidimensional nature of CSR, which considers both internal and external stakeholders. CSR, for its nature, is difficult to measure (Carini et al. 2017). For this reason the economic literature has introduced the concept of Corporate Social Performance (CSP, hereafter), which is a way of making CSR applicable and useful to put it into practice (Maron, 2006). In particular the literature differentiates the CSP into three categories (Carini et al. 2017): social disclosure about social concern (Orlitzky et al., 2003 and Wu, 2006); corporate actions, such as philanthropy, social programs and pollution control; corporate reputation ratings or social indices that may be provided by social rating institutions. This paper refers to the third category. In particular, it was followed the Scholtens (2008) approach, which studies the economic performance of 289 companies listed in the MSCI ESG KLD STATS Dataset and its relationship with seven dimensions of CSR activities, as reported in this Dataset:

- Environmental (ENV), which evaluates the existence of clean energy programmes, pollution prevention programmes and environmentally proactive activities;
- Community (COM), which measures community engagement programmes;
- Human rights (HUM), which considers if the company has undertaken human rights initiatives;
- Employee relations (EMP);
- Diversity (DIV), which identifies gender diversity in the company's top management;
- Product (PRO), which evaluates the existence of quality control programmes and if the company invests in R&D and innovation;
- Governance (CGOV), which analyses the existence of transparency programmes and policies to prevent corrupt business dealings.

There exist several sources of information on CSR provided by different companies. Most of them include reviewing public and private information, including interviews to companies. We use the MSCI ESG KLD STATS Dataset and not others CSR datasets, because, at present, provides the largest available survey on CSR.[2] It contains reviews of more than 2600 firms in the US, for a panel that for a subset of the firms is up to 25 years long. This allows a deep longitudinal analysis of the firms' CSR activities. In particular, we extend Scholtens' (2008) work along several dimensions:

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[2] A stream of literature focuses on testing to what extent social rating in the environmental dimension of MSCI ESG KLD STATS correlates with objective measures such as harmful emissions. Chatterji et al. (2009) finds that MSCI ESG KLD STATS does a reasonable job in aggregating past environmental performances, yet the level of correlation between the environmental performances and the scoring provided by MSCI ESG KLD STATS shows unclear evidence. Chatterji and Toffel (2010) show that poor environmental ratings induce firms to improve their environmental performances more than other firms. This literature is rather new and further research on the link between the social rating and objective social performances is needed.

- We create a panel of 998 US-based companies, from 2003 to 2015, for a total of 12,844 observations;
- We elaborate on the CSR indicators to provide a standardised absolute index of CSR engagement, coherent over time and sector;
- We consider both lagged and non-linear variables to better capture the dynamics of the relationship and employ a statistical methodology that captures the endogenous dynamics;
- We consider both market-based financial values as well as accounting-based ones;
- We test the statistical significance as well as the overall impact of a company's CSR activities by dimension over a period of time.

In particular, and in line with our aims, this study provides statistical evidence on the impact of the various dimensions of CSR on a company's economic and financial performance indicators. By means of a dynamic panel model, we evaluate the impact of full engagement in CSR activities over a three-year horizon, accounting for the dynamics of the economic and financial performance indicators as well as for the lagged impact of CSR indicators on the dependent variables. Our approach being purely empirical will focus on the evaluation of the statistical significance of functions of parameters in the estimated dynamic panel model.

This study yields interesting results regarding the nature of the relationship between CSR activities and economic performance, which suggests some sectorial specificity. For instance, firms in the Oil & Gas sector invest more in all areas of CSR with an almost always-positive return on financial performance and a reduction of financial risk. This can be explained by the fact that Oil & Gas production significantly costs society in terms of air pollution, oil spills and so on; thus, in line with the stakeholder engagement view, the Oil & Gas industry invests in CSR to improve its economic and financial performance. Another sector that gives more attention to CSR is the Financial sector. As the Oil & Gas sector, also the Financial sector shows an always-positive return on financial performance and a reduction of financial risk. The Financial sector is traditionally viewed as relatively non-polluting. Furthermore, in the last years, this sector improved its internal processes related to environmental and social management, invested in CSR initiatives in bank lending, in project financing, in micro-credit programs and supported CSR activities as part of its identity (Hagenah 2009). Firms belonging to different sectors, such as Basic Materials, Consumer Goods and Technology, invest even less in CSR. In the Consumer Services, Health Care, Industrial and Utilities sectors, firms focus their investments only in specific areas of CSR. In general, firms belonging to all sectors focus broadly on three areas of CSR—Governance, Community and Diversity—involving both internal and external stakeholders. In the other four areas, sectorial specificities emerge more clearly. Considering the different economic measures, we see that Total Stock Return (TSR) has a positive relationship with almost all CSR macro-categories, especially with Governance, Community and Diversity. Financial Risk reduces as well. Accounting-based measures yield more ambiguous results than market-based ones.

This paper is organised as follows: Section 2 presents the data and the economic and social performance measures; Section 3 explains the methodology used; Section 4 presents the results. The paper ends with the conclusion and references. Finally, the Appendix contains several detailed tables.

2. Data

The dataset is constructed by merging two different data sources: economic data, composed of stock market-based and accounting-based measures (source: Datastream) and CSR data taken from the MSCI ESG KLD STATS Dataset. The latter database divides CSR activities into seven macro-categories: governance, community, diversity, employee relations, environmental, human rights and product. Each macro-category is composed of a different number of entries (that take the value of 1 or 0 if the answer to specific questions is yes or no, respectively), which are further disaggregated into positives (strengths) and negatives (concerns). Positive indicators capture the company's good practices, negative indicators the bad ones (see appendix A for further details). Each company receives a score on each macro-category in a given year, based on the assessment provided by MSCI ESG KLD STATS for each entry that composes a given macro-category in that year. Appendix A contains a list of all entries for all macro-categories for the year 2015.

Sector	Number	Percent	Cum.
Financials	222	22.47	22.47
Industrials	210	21.26	43.73
Consumer Services	118	11.94	55.67
Technology	103	10.43	66.10
Consumer Goods	101	10.22	76.32
Health Care	83	8.40	84.72
Utilities	49	4.96	89.68
Basic Materials	47	4,.76	94.44
Oil & Gas	47	4.76	99.20
Telecommunications	8	0.81	100.00
Total	**988**	**100.00**	

Table 1: Frequency and cumulative distribution of sectors

The dataset is composed of different universes of companies, based on the duration of the observations and the number of firms. We used Universe D, composed of 2400 observations of US-based companies, ranging from 2003 to 2015. We reduced the number of firms by eliminating duplicates and firms from the dataset that were not followed throughout the whole duration of the panel. Moreover, the number of firms further decreased after merging with the economic indicators' dataset, in order to generate a merged and balanced pooled dataset. This process left 998 firms in the pool. Each company is categorised in one of ten economic sectors listed by the US Industry Classification Benchmark (ICB), as reported in Datastream. These ten sectors are Basic Materials, Consumer Goods, Consumer Services, Financials, Health Care, Industrial, Oil & Gas, Technology, Telecommunications and Utilities. In our panel, we do not include the Telecommunications sector because of its limited size. Table 1 describes the frequency and cumulative distribution of each sector in our panel.

One problem with the positive and negative indicators in the dataset is that the number of entries that form each indicator is not constant over time. Some entries have been added over the years while some others have been discontinued. However, the number of macro-categories remains constant for the whole panel. We accounted for this issue by constructing a normalised measure of the relative CSR performance in each category. First, in each year, in each category and separately for strengths and concerns, we divided each company's score by the maximum number of possible entries. This yields a number ranging from 0 to 1, representing the normalised score a company can get in a given year in a given category for strengths and concerns. Then, we subtracted the score of the negative aspects (concerns) from the positive ones (strengths):

$$norm\_diff\_X_{i,t} = norm\_X_{i,t}^{STR} - norm\_X_{i,t}^{CON} , \qquad (1)$$

where

$$norm\_X_{i,t}^{STR} = \frac{\sum_{j=1}^{z} X_{i,t,j}^{STR}}{Z(X,t,STR)}, \text{ and } norm\_X_{i,t}^{CON} = \frac{\sum_{j=1}^{z} X_{i,t,j}^{CON}}{Z(X,t,STR)}.$$

and where i is the company index; t is the year; STR denotes strengths; CON identifies concerns; X refers to the CSR macro-category (CGOV for governance, COM for community, DIV for diversity, EMP for Employee Relations, ENV for environment, HUM for human rights and PRO for product); z is the number of questions for each CSR macro-category X in year t and type CON or STR.

In this way, we obtain a measure that is independent from the number of entries considered in each category and in each year. That measure represents a standardised metric that evaluates the relative strength of the engagement of a company in each CSR macro-category with respect to the highest possible engagement. By construction, $-1 \leq norm\_diff\_X_{i,t} \leq 1$, for all CSR macro-categories.

The indicators included in the dataset contain, in some cases, several missing values. The missing values might generate distortions to the analyses as they impact on the level of the normalized indicator we use. Note, however, that, on the one side, given that we are interested in the relative comparison among economic

sectors which are all affected by the same distortion, the missing values, despite present, have limited impact on our analyses. On the other side, in order to reduce the impact of distortions, we limit our analyses to the indicators with an amount of missing values below the 50% of the available observations and treat a missing observation in an entry as a zero in order to balance the impact that missing observations can have on the CSR macro-indicator.[3] Consequently, in a given year, for a given company and a given aspect of CSR, a missing observation is not treated as a concern or as a strength. This minimises ex-ante the possible bias induced by missing observations in the distribution of the normalised indicators. If a company has no observation at all in a given macro-category, we remove it from the panel.

As explained in the introduction, we consider both stock market-based and accounting-based economic measures of economic performances, downloading from Datastream a collection of standard performance accounting and financial indicators.[4] It was decided not to use mixed measures, such as Market Value Added (MVA, hereafter) or Tobin'q measure, because studies that relate CSR to these variables are still limited and do not provide sufficient evidences (Carini et al. 2017). For the stock market-based measures, we use the TSR (annual yield of the stock price, calculated as log P_t - log P_{t-1}) and the Financial Risk (standard deviation of returns, calculated as the standard deviation of daily observations over t). Note that for the latter, it is common to use the volatility of returns as a proxy for the financial market risk (see, among many others, the seminal contributions of Markowitz, 1952, and Sharpe, 1966). For the accounting-based measures, we consider Return on Equity (ROE), net income/shareholder equity (measured as percentages); Return on Asset (ROA), net income/total asset (measured as percentages); Return on Investments (ROI), net income/investment (measured as percentages); Return of Sales (ROS), total revenues/sales (measured in dollars). Both ROE and ROA measure a company's ability to generate earnings from its investments. They differ in terms of the role of financial leverage or debt. Shareholder equity is equal to the difference between assets and liabilities, so if a company has no debt, its shareholders' equity and its total assets will be the same. When ROA is high, a high ROE means that managers are doing a good job generating returns from shareholders' investments. On the other hand, if ROA is low, a high ROE can give investors a false impression about the company's fortunes (Bodie et al., 2012). ROI is a measure of profit or loss that a company made in a fiscal year, expressed in term of investments, while ROS represents the per share amount of the company's revenues, proxied by sales per share (measured in dollars).

Table 2 presents the summary statistics of the CSR macro-categories and economic performance indicators. Focusing on the summary statistic of the CSR macro-categories, we see that there are no companies that reach the highest possible normalised score in the macro-categories of EMP and ENV. The mean is (almost) centred around the null value, but the distribution is quite asymmetric, as can be seen in the last column that reports the number of companies for which the standardised indicator is negative. The distribution is also quite asymmetric for the economic variables. ROI is the parameter with the highest mean and that is relatively more dispersed. Note that the total number of observations for Total Stock Return, Financial Risk and ROA are less than the total number of observations relating to CSR, ROE, ROI and ROS indicators because of issues with data availability.

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[3] Table 8 in Appendix C reports the entries included in our analyses that have missing observations and the number of missing over years.

[4] For further information on the indicators, please refer to Datastream (https://www.fm.wi.tum.de/fileadmin/w00bno/www/IBES_on_Datastream_ver_5.0.pdf)

Variable	Obs	Mean	Std. Dev.	Min	Max	N° of negative scores
norm_diff_CGOV	12844	-0.03	0.19	-0.75	1.00	3669
norm_diff_COM	12844	0.02	0.19	-1.00	1.00	917
norm_diff_DIV	12844	-0.04	0.31	-1.00	1.00	4309
norm_diff_EMP	12844	-0.01	0.17	-1.00	0.83	3408
norm_diff_ENV	12844	0.03	0.15	-0.71	0.83	1315
norm_diff_HUM	12844	0.00	0.11	-0.75	1.00	665
norm_diff_PRO	12844	-0.03	0.18	-1.00	1.00	2267
Total Stock Return	8307	0.03	0.18	-1.62	1.12	2739
Financial Risk	8307	0.92	0.80	0.00	10.86	-
ROE (%)	12508	0.16	1.67	-21.56	121.09	1397
ROA (%)	7647	0.09	0.24	-0.96	18.21	165
ROI (%)	12668	9.28	14.87	-396.33	251.73	1147
ROS ($)	12809	36.79	131.15	0.00	5587.54	-

Table 2. Summary statistics of CSR macro-categories and economic performance indicators

3. Methodology

We undertake several regression analyses with economic performance indicators as dependent variables and normalised indexes for CSR macro-categories as the independent ones. In a standard regression approach, CSR performance linearly affects the economic/financial performance. However, we cannot exclude a-priori the possibility of non-linear effects. Therefore, in order to verify whether the relation is linear or if the data show evidence of possible non-linear effects, we augment our regression model with squared normalised indexes of CSR, which we include among the set of explanatory variables. The following steps describe our methodology in detail:

a) We start our analyses by investigating the pairwise correlation between the dependent variables and regressors. Then, we undertake a cross correlation analysis to understand if there is a time-lagged relationship between social and economic indicators. For the series $x_{X,i,t}$ and $y_{i,t}$, where $x_{X,i,t} =$ norm _diff_ $X_{i,t}$ (as described above) and $y_{i,t}$ is one of the economic performance indicators of company i at time t, the cross correlation at the delay d is defined as:

$$R_d = \frac{\sum_{i,t}\left[(x_{X,i,t}-\mu_x)(y_{(i,t-d)}-\mu_y)\right]}{\sqrt{\sum_{i,t}(x_{X,i,t}-\mu_x)^2}\sqrt{\sum_i(y_{i,t-d}-\mu_y)^2}},$$

where μ_x and μ_y are the mean of $x_{X,i,t}$ and $y_{i,t}$, respectively. In our analyses, we consider values of d up to *2* because of the limited temporal dimension of the sample (note that for d equal to zero, we obtain the standard linear correlation). The evidence that emerges from the cross correlations shows the need to include in the model the lag in the CSR macro-categories' variables. Appendix B presents the aggregate results for the entire dataset and for each sector.

b) On top of the lagged impact of CSR normalised indicators, as suggested by the cross-correlation analysis, we can conjecture that economic performance indicators could depend, at least in part, on their own values in previous periods. To test this, we include the lagged dependent variables in the model. Therefore, the model we consider is:

$$y_{i,t} = \rho_1 y_{i,t-1} + \rho_2 y_{i,t-2} + \beta_0' \, x_{i,t} + \beta_1' \, x_{i,t-1} + \beta_2' \, x_{i,t-2} + \delta_0' \, x_{i,t}^2 + \delta_1' \, x_{i,t-1}^2 + \delta_2' \, x_{i,t-2}^2 + \varepsilon_{i,t} \qquad (2)$$

where $x_{i,t}$ and $x_{i,t}^2$ are the vectors of the seven CSR macro-categories normalised indexes in the levels and in the squares, respectively. Moreover, ε_{it} is the error term of company i at time t, while the scalars ρ_1 and ρ_2, and the vectors β_0', β_1', β_2', δ_0', δ_1', and δ_2' are the parameters to be estimated. Note that we include two lags of the explanatory variables, coherently with the cross-correlation analyses and, similarly, we include two lags of the dependent variables. Given the presence of the lagged dependent on the right-hand side, we obtain parameter estimates by means of the Arellano-Bond estimators for the dynamic panel data (Arellano and Bond, 1991).

The panel regressions have a large number of explanatory variables. In fact, we have seven CSR dimensions, for each of which we have standardised indexes, and we include those indexes in the levels and in the squares, both contemporaneous and up to two lags. Clearly, not all these explanatory variables might be relevant, and the inclusion of irrelevant variables might have consequences on the efficiency of the estimators that, in turn, might impact the identification of the impact of the statistically relevant aspects of CSR. Therefore, we use a backward stepwise elimination procedure. In particular, we start with all the explanatory variables in the model and recover the significance tests (standard t-tests). We identify the non-significant variables at the 5% level and remove the less significant ones, i.e. the variables with the highest p-value. We repeat the procedure (estimation, t-stat computation and variable deletion) until the model contains only variables that are statistically significant at the 5% confidence level.

c) Following the previous procedure, it might happen that, at a given iteration, the lagged dependent variables are no more included in the model. For those cases, where no endogenous dependent variable is found significant ($\rho_1 = \rho_2 = 0$), we replace the dynamic panel estimation with a simple OLS analysis in the pooled dataset. We then follow the same coefficient selection procedure described in (b) to further reduce, if needed, the number of explanatory variables to the statistically significant ones.

d) The betas and deltas parameters that remain after the model specification procedure measure the impact that a given CSR macro-category has on the given economic/financial performance variable. However, the model includes, potentially, lagged dependent terms, linear and quadratic explanatory variables. Therefore, the simple analyses of the estimated coefficients might not provide a complete picture of the impact of the various aspects of CSR on firms' economic/financial performances. In fact, the impact might be lagged, might be non-linear and might be affected by the auto-regressive dynamic of the dependent variables. Therefore, the impact is not simply related to the sign and size of the estimated coefficients. In order to test the impact of a given category of CSR on a given dependent variable, we consider a three-year horizon and define the total impact over three years as follows:

$$\frac{\partial y_{i,t,t+2}}{\partial x_{j,i,t}} = \frac{\partial y_{i,t}}{\partial x_{j,i,t}} + \frac{\partial y_{i,t+1}}{\partial x_{j,i,t}} + \frac{\partial y_{i,t+2}}{\partial x_{j,i,t}}$$

where $x_{j,i,t}$ is a given CSR normalised index (j refers to one of the seven CSR dimensions), and we measure the impact of a change in $x_{j,i,t}$ at time t on the dependent variable $\partial y_{i,t,t+2}$ (a given economic or financial performance measure for company i) both in year t as well as in years $t+1$ and $t+2$.

Given the model structure, we compute the quantity above as follows:

$$\frac{\partial y_{i,t}}{\partial x_{j,i,t}} = \beta_{0,j} + 2\delta_{0,j}x_{j,i,t} + \rho_1 \frac{\partial y_{i,t-1}}{\partial x_{j,i,t}} + \rho_2 \frac{\partial y_{i,t-2}}{\partial x_{j,i,t}} = \beta_{0,j} + 2\delta_{0,j}x_{j,i,t}$$

$$\frac{\partial y_{i,t+1}}{\partial x_{j,i,t}} = \beta_{1,j} + \delta_{1,j}2x_{j,i,t} + \rho_1\frac{\partial y_{i,t}}{\partial x_{j,i,t}} + \rho_2\frac{\partial y_{i,t-1}}{\partial x_{j,i,t}} = \beta_{1,j} + \delta_{1,j}2x_{j,i,t} + \rho_1(\beta_{0,j} + 2\delta_{0,j}x_{j,i,t})$$

$$\frac{\partial y_{i,t+2}}{\partial x_{j,i,t}} = \beta_{2,j} + \delta_{2,j}2x_{i,t} + \rho_1\frac{\partial y_{i,t+1}}{\partial x_{j,i,t}} + \rho_2\frac{\partial y_{i,t}}{\partial x_{j,i,t}}$$
$$= \beta_{2,j} + \delta_{2,j}2x_{i,t} + \rho_1\left[\beta_{1,j} + \delta_{1,j}2x_{j,i,t} + \rho_1(\beta_{0,j} + 2\delta_{0,j}x_{j,i,t})\right] + \rho_2(\beta_{0,j} + 2\delta_{0,j}x_{j,i,t})$$

Therefore, the net effect in the three years *t*, *t+1* and *t+2* reduces to:

$$\frac{\partial y_{i,t,t+2}}{\partial x_{j,i,t}} = \beta_{j,0} + \beta_{j,1} + \beta_{j,2} + \rho_1(\beta_{j,0} + \beta_{j,1}) + \rho_1^2\beta_{j,0} + \rho_2\beta_{j,0} + \left[2(\delta_{j,0} + \delta_{j,1} + \delta_{j,2}) + 2\rho_1(\delta_{j,0} + \delta_{j,1}) + 2\delta_{j,0}(\rho_2 + \rho_1^2)\right]x_{j,i,t}.$$

(3)

Equation (3) provides the overall measure for the impact of the change in a given aspect of CSR (a normalised index) on an economic/financial performance indicator over the three-year horizon.

The normalisation of the CSR macro-categories' variables allows us to calculate the net effect in the three years of the full engagement in a given macro-category X as a non-linear combination of the parameters estimated in the regressions (3) and setting $x_{j,i,t} = 1$. Moreover, note that whenever the endogenous dynamics parameters of the Arellano-Bond estimators are not significant (i.e. $\rho_1 = \rho_2 = 0$), equation (3) simplifies to:

$$\frac{\partial y_{i,t,t+2}}{\partial x_{j,i,t}} = \beta_{j,0} + \beta_{j,1} + \beta_{j,2} + 2(\delta_{j,0} + \delta_{j,1} + \delta_{j,2})x_{j,i,t}$$

(4)

Assuming that the estimators of the parameters are asymptotically normal, we can easily recover the asymptotic distributions for the quantities in equations (3) and (4) by means of the delta method (Papke and Wooldridge, 2005). The distribution remains normal, and this allows designing a test statistic to evaluate the significance of $\frac{\partial y_{i,t,t+2}}{\partial x_{j,i,t}}$, a standard significance test. To verify if there is a statistically significant net effect over a three-year horizon of the full engagement in a given CSR macro-category (and if so, of which sign), we thus test the hypothesis $\frac{\partial y_{i,t,t+2}}{\partial x_{j,i,t}} = 0$. The impact of full engagement might be either positive or negative, as the quantities in (3) and (4) might be either positive or negative; we do not impose any restriction on the estimated coefficients. Therefore, besides a simple two-sided significance test, we design one-sided tests contrasting the null hypothesis of no impact with an alternative of a positive (or negative) impact. In our results, we provide the information on the significance of the impact of CSR as well as on the sign of the quantities in (3) and (4).

4. Results

Table 3 summarises the results of the analysis undertaken following the steps described above for the whole dataset, without disaggregating for economic sectors.

		Sectors								Row Sum		
		CGOV	COM	DIV	EMP	ENV	HUM	PRO	+	'	TOT
Economic Variables	**TSR**	+	+	(0)	-	+	-	+	4	2	6
	FR	-	-	-	(0)	-	(0)	-		5	5
	ROE			+^					1		1
	ROA	(0)^		-^	+^	(0)^	+^		2	1	3
	ROI	+	-	-	-	-			1	4	5
	ROS		-		+	+	-	(0)	2	2	4
	Sum								10	14	24

Legend:

Each cell indicates if for the specific economic variable, the particular aspect of CSR has a significant impact over the three years and, if yes, if the sign is positive or negative. The symbol + indicates that the impact at the end of the three years is positive; - indicates that the impact is negative; (0) indicates that although there is an impact significantly different from zero for at least one of the variables (current, delayed, linear / or quadratic), we accept the null hypothesis that the net effect at the end of the three years is not significantly different from zero. ^ denotes estimators obtained from pooled OLS regressions (no endogenous correlation).

Table 3: Aggregate results for the whole dataset

Community, Diversity, Employment and Environment are the CSR macro-categories that are the most related to economic performance, while Product is, perhaps unsurprisingly, related to it the least and related only to financial variables. When looking at economic performance indicators, the market-based measures, contrary to the accounting-based ones, are relatively more related to CSR. TSR, for instance, is positively related to almost all CSR macro-categories (the only exception is Diversity in which even though isolated CSR variables are correlated to TSR, the overall net effect of each CSR macro-category is not significantly different from zero). For the financial risk, there is almost always a negative correlation. Notice however that this is an algebraic measure showing that when the CSR macro-category increases, the financial risk reduces, which is a positive consequence for the company. For the accounting-based measures, the results are more ambiguous. ROE is correlated only with Diversity. The relationships between ROA and ROS with the CSR macro-category are less univocally determined. ROI is almost always negatively correlated with the CSR indicators. In line with Friedman (1972b) and Sun (2012), this seems to denote that CSR programmes increase costs without yielding sufficient monetary benefits.

Table 4 and 5 show the results disaggregated per sector, grouped for sectors and for CSR macro-categories, respectively.

Economic Variables	Financials							Industrials							Consumer Services							Technology							Consumer Goods							Health Care							Utilities							Basic Materials							Oil & Gas							Row sum		
	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	CGOV	COM	DIV	EMP	ENV	HUM	PRO	+	-	TOT
TSR	+	+	(0)	-^		+		+	+	-				+	+		(0)		+			+	+	+^	-				+	+			(0)			+^							-	+	(0)				+	+^	+^	-^					+	+	+			-^		21	6	27
FR	-			-^	-^		-	-	-	-	-	-	-	-	-	-	-	(0)	+^	+		-	-	(0)^	(0)				-	-	+	-	+	+	-	-	-^				-		-		-^		-^		-	-^	-^		-		(0)^	-	-^	-^		-	(0)^		-	7	36	43
ROE	+^						-^																						+	+		-			-	+^					+^		-^	-	-							-^					+	-	-^	-	+	-	+	8	10	18
ROA	(0)^	+^		+^			+^				-^	-^			-			-	+^					+^		-^		+	-	-	(0)^	(0)^		-^	+						+^			-^		-^		-^								-^	-^	(0)^	+^				8	13	21
ROI	+	-		-			+	+^			+^	+^			-	+	+			+^		-	+^	+^	(0)	-	(0)	-^	+	+						+^	(0)^		-^		+^	+^	(0)^			-^									+^	+	-	-		-^	-	+	18	12	30
ROS	+	+	+^	+^	-	+	-	+^	(0)^		-^	+^	+^		-^	-		+	-	-^		(0)	-^		+^	-			-^	+^	+^	-^				-^	(0)	+	-^	-		+	-		-^			-		-^							(0)	-		-	+	-		15	21	36
sum																																																																77	98	175

	Financials	Industrials	Consumer Services	Technology	Consumer Goods	Health Care	Utilities	Basic Materials	Oil & Gas			TOT
TOT +	13	10	9	7	12	8	3	5	10			77
TOT -	10	12	10	9	10	7	15	7	18			98

Legend:

Each cell indicates if for the specific economic variable, the CSR dimension (row) in that sector (column) has a significant impact over the three years and, if yes, if the sign is positive or negative.

The symbol (+) indicates that the impact at the end of the three years is positive; (-) indicates that the impact is negative; (0) indicates that, although there is an impact significantly different from zero for at least one of the variables (current, delayed, linear / or quadratic), we accept the null hypothesis that the net effect at the end of the three years is not significantly different from zero. The total shows the total number of times in which there is a significant impact for each sector (column) and for each CSR dimension (row). ^ denotes estimators obtained from pooled OLS regressions (no endogenous correlation).

Table 4: Aggregate results grouped by sector

CSR macro-category

Economic Variables	CGOV									COM									DIV									EMP									ENV									HUM									PRO									SUM		
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	+	-	TOT
TSR	+	+		+	+	+^	-	+^	+	+	+	+	+	+	+		+	+^	(0)	-		+^			(0)	-^	+	-^		(0)										-	(0)					+		+						-^		+					+			21	6	27
FR	-	-	-	-	-3	6		-		-^	-	-	-	-	-			-	-^	-	-	-	(0)^	+	-^	-^	+	-^	-	(0)		-			+^	-	-^	-	+^	(0)	+		-^	-		-	+		+			-	(0)^	-	-			-	-	-	-	-	7	36	43
ROE		+^							+				+		-			-					+^	-	-^	-^					+		-		-									+	-^								-			-	+^					+	8	10	18
ROA	(0)^				-					+^		-		-								(0)^		-^			-^	+^			+^	(0)^			-^		-^	-				-^				-^	+^	-^	-^				(0)^	+^			+	+^	-^			+^	8	13	21
ROI	+	+^	-	-			+^		+	-		+	+^	+^	+^	(0)^			-		+	+^	+^	(0)^			-	-	+^		(0)					+^		-		-^		-^		+^	(0)						-	+		-^		+^	-^	+^	+	18	12	30
ROS	+	+^	-^		-^	-^	-	-^	(0)	+	(0)^	-	(0)	+^	(0)			-	+^			-^		+			+^	-^	+	+^	-^	-^		-	-^	+^	-	+^	-^	-			+	+	+^	-^	-^				-	-					+	-				15	21	36
Sum																																																															77	98	175
TOT +				15									16									10									8									7									8									13								77
TOT -				16									15									14									13									15									12									13								98

Legend:

The table shows for which sectors the particular aspect of CSR (row) has a significant impact on the economic variables (column) at the end of three years and if the sign is positive or negative. It also shows the total number of times this happens for each dimension of CSR (line) and for each economic variable (column).

The symbol (+) indicates that the impact at the end of the three years is positive; (-) indicates that the impact is negative; (0) indicates that, although there is an impact significantly different from zero for at least one of the variables (current, delayed, linear / or quadratic), we accept the null hypothesis that the net effect at the end of the three years is not significantly different from zero. The total shows the total number of times in which there is a significant impact for each sector (column) and for each CSR dimension (row). ^ denotes estimators obtained from pooled OLS regressions (no endogenous correlation).

Letters A to I are the 9 analysed sectors: A = Financials; B = Industrials; C = Consumer Services; D = Technology; E = Consumer Goods; F = Health Care; G = Utilities; H = Basic Materials; I = Oil & Gas.

Table 5: Aggregate results grouped by CSR macro-categories

Looking at Table 4, we can see that companies in the Oil & Gas Sector show the highest number of correlations to CSR macro-categories, with 28 non-null relationships between CSR macro-categories and economic performance variables. A possible rationale might be that the Oil & Gas sector has a complex set of social institutions, norms and expectations. Some of these expectations take the form of legal requirements, but others reflect ethical norms that may turn out to be as important to companies in the long run as laws (Spence, 2010). Society might look at the Oil & Gas sector suspiciously, since it is an industry that imposes many externalities onto society—air pollution, oil spills, social dislocation and conflicts. This leads governments, NGOs and people to pay close attention to the companies in this sector and, as a response to these external pressures, the companies tend to invest in CSR and engage with both environmental issues like emission reduction programmes and non-environmental issues like human rights, educational opportunities and workplace/employment practices. Beyond the Oil & Gas sector, the sectors that show a rather high number of correlations with CSR are Financial, Consumer Goods and Industrial, followed by Consumer Services and Utility. The sectors showing the least correlation are Technology, Health Care and Basic Materials with 16, 15 and 12 correlations, respectively. For Consumer Goods and Consumer Services, the CSR macro-category of Community is the most correlated to the economic performance variables, while for Financial and Industrials, Governance is the most related. For companies in the Health Care sector, there are few correlations between CSR and economic performance variables, with the notable exception of the CSR macro-category of Product: indeed, it is the sector that has the highest correlation for this CSR macro-category among all the sectors. In the Utilities sector, most correlations are negative, while for the other sectors there is no clear pattern in the correlations, with perhaps the exception of the Oil & Gas sector with 18 negative and 10 positive correlations. For all sectors, looking at the sign of correlations, different patterns emerge when comparing financial variables with accounting variables. For financial variables, whenever there is a significant correlation, this is almost always positive (remember that for financial risk, a negative correlation means that there is a reduction in the risk, i.e. a positive impact). On the contrary, for the accounting variables, the evidence is more mixed.

Table 5 presents results grouped by the CSR macro-categories. TSR has a positive relationship with the CSR macro-categories of Governance and Community and, to a lesser extent, with Diversity and Human rights. There is hardly any correlation for the other CSR macro-categories. Further, for Financial Risk, we can say that an improvement in each of the CSR macro-categories leads to a risk reduction; the only exceptions are the CSR macro-category of Human Rights and Environment for the Consumer Service and Consumer Goods sectors. There is also an increase in risk for the Consumer Goods sector when the CSR macro-category Diversity rises, and this is true also for the Basic Materials sector. The accounting-based measures show more ambiguous results compared with the market-based ones in terms of numbers and signs of correlations. Indeed, there are 36 and 30 correlations between ROS, ROI and CSR macro-categories, respectively, a comparable number of correlations for financial variables and a much smaller number of correlations for ROE and ROA. The pattern of the signs is much less clear. The numbers of positive and negative correlations are almost evenly distributed within CSR macro-categories for accounting-based measures. Even if ROE, ROA and ROS seem to be relatively more negatively correlated to all CSR macro-categories, while for ROI it is the opposite, the difference between the positive and negative relationship is not as clear as for the financial variables. When looking at the sign of the correlations between a given CSR macro-category and the accounting-based variables, the only pattern that seems to emerge is a positive correlation between Employment and ROS and a negative correlation between Environment and ROS, but this depends also on the sector in which the companies are active. For ROI, there is a relatively higher number of positive correlations with CGOV, COM and PRO. This can indicate a positive impact due to improvements in the company's reputation induced by a rise in the quality of internal governance, responsibility to the community and quality of products.

5. Conclusions

In this paper, we analyse the relationship between firms' CSR activities and their economic performance. More precisely, we test the existence of a dynamic, non-linear, endogenous relationship between CSR and economic performance, taking into account sector specificities, differences in economic performance measures and macro-categories of CSR. We consider seven different measures of CSR engagement, as provided by MSCI ESG KLD STATS. We standardise and normalise the indicators provided by KLD, generating a measure of the relative goodness or badness of the performance of each company in each aspect

of CSR that is independent of the way the performance in that category and year is measured. We consider different economic performance measures, since there can be different biases arising from market-based or accounting-based measures of economic performance. The endogeneity and the lagged possible impact of each CSR macro-dimension on the economic performance variables are accounted for using the Arellano Bond technique in the dynamic panel that we construct. We find strong positive correlations with the TSR indicator and a significantly positive reduction in Financial Risk due to investments in almost all dimensions of CSR. These results are common to all sectors. The accounting-based measures, instead, show less clear results. The interaction between the various aspects of CSR and economic variables is not the same across sectors. The Oil & Gas sector, for instance, has more correlations than any of the others. A possible explanation might be that companies in this sector are far more subject to external controls (both by the government and non-governmental organisations) compared to others. The Consumer Goods and Consumer Services sectors are relatively more correlated to the macro-category of Community. This might imply that companies operating in these sectors support non-profit organisations, make donations to charities, have volunteer programmes etc., and this impacts their economic performance. The macro-category of Governance is relatively more correlated to all economic performance indicators in the Financial and Industrial sectors. The Health Care sector, instead, shows a strong relationship between the CSR macro-category of Product and market-based indicators. This could signal that companies in this sector pay attention to chemical safety and quality products, provide opportunities for access to health and nutrition, invest in R&D etc., all of which improves their book values.

A caveat must be placed when interpreting these results. As an anonymous reviewer has rightly pointed out, we are considering the CSR as measured by the specific approach followed by the data provider that measures CSR, namely, MSCI ESG KLD STATS, rather than the CSR itself. There exist several possible indicators of CSR. Chatterji et al.(2016) consider the rankings of CSR provided by six different social ratings, including the one we use here, and find little correlation among them, calling for caution when interpreting the connection between ratings and actual CSR. We share their point of view. However, we point out that this is not a peculiar phenomenon of CSR: any ratings based on subjective interpretation of public and private data can and do suffer from different conceptualization of the phenomenon as well as data collection and management issues. Replicating our work with different source of information can shed new light on the relationship between performance measures, sectorial activities and CSR measures. We welcome future research on this.

Nevertheless, the analyses performed here point out the importance of considering sectorial specificities when assessing the empirical relationship between CSR and firms' performance. We call for further theoretical research that focuses on each sector to account for and explain the different and somehow unclear pattern of relationships that we discovered. In particular, these studies should consider how sector differences in firms' types, natures and sizes, product chains, working environments, level and types of innovations and other variables impact firms' economic performance and how this could be influenced by engagement in CSR activities.

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Appendix A: MSCI ESG KLD STATS Social performance indicators

The table below presents a summary of the methodology of the MSCI ESG KLD STATS Database. It is composed of seven CSR macro-categories, each of which is represented by an indicator that is constructed by summing up the answers to a list of entries that refer to each positive and negative indicator of each dimension. The researchers working on MSCI ESG KLD STATS make these evaluations based on a mix of sources (macro data from academic, government and NGO datasets; company disclosure; 1600+ media, NGO other stakeholder sources, surveys). Companies are invited to participate in a formal data verification process. The scoring rule of each entry is 1 if the company complies with the given criterion, 0 if it does not NR if it is not reached. For instance, if a company has a good social reporting system, it receives a 1 in the macro-category of Governance for its strengths. The sum of all the 1s in each category yields the score of a company in that year for the macro-category of Governance—Strengths. The list of entries changes over time. The following table summarises these entries for each category and for the last available year. For further reference, see:

https://www.msci.com/eqb/methodology/meth_docs/MSCI_KLD_400_Social_Index_Methodology_May_20 16.pdf

Governance	
Positive performance indicators analyse if the company:	Negative performance indicators analyse if the company:
- Has a good social reporting system; - Has limited level of compensation to its top manager or its board members; - Owns the 20%-50% of another social responsible company (according KLD); - Has an accountability system based on transparency; - Supports public policy; - Has an anti-corruption policy, a compliance program, an ethical business practices and transparency around government spending; - Increases regulatory scrutiny as a result of its contribution to systemic risk in financial market; - Has other initiatives not covered by KLD indicators.	- Has high level of compensation to its top manager or its board members; - Has been involved in tax disputes; - Owns the 20%-50% of a company involved in social concerns (according KLD); - Has been involved in accounting system controversies; - Has an incomplete social reporting system; - Has been involved in controversies about public policies and has a not transparent reporting system; - Does not support public policies; - Has few severity about controversies related to a firm's corporate governance practices; - Has been involved in bribery and fraud cases; - Has other concerns not covered by the above indicators.
Community	
Positive performance indicators analyse if the company:	Negative performance indicators analyse if the company:
- Has made generous donations to charities; - Supports non profit organizations; - Has public private partnership to support housing initiatives; - Has a program to support primary and secondary education; - Brings contribution in non US country; - Has volunteer programs; - Has other programs not covered by KLD indicators.	- Is a financial institution, whose lending or investment practices have led to controversies; - Has controversies born by the interaction with society; - Has been involved in tax disputes; - Has other concerns not covered by KLD indicators.
Diversity	
Positive performance indicators analyse if the company:	Negative performance indicators analyse if the company:
Has a woman or a member of a minority group	Has controversies related to workforce diversity;

as chief executive officer; • Has at least one woman inside the executive management team; • Has women inside the board of directors; • Has introduced work/life benefits; • Has contracts with women and/or minority-owned businesses; • Has an innovative hiring program for disable; • Has policies toward its gay and lesbian employees; • Promotes diversity in its workforce; • Has other programs not covered by KLD indicators.	• Has no women on its senior line managers; • Has no women on its board of directors; • Has no minorities on its board of directors; • Has other concerns not covered by KLD indicators.

Employee Relations	
Positive performance indicators analyse if the company:	Negative performance indicators analyse if the company:
• Has no-layoff policies; • Has strong retirement benefit programs; • Has employees' compensation and benefit programs; • Has practices to develop employees' relations; • Has employees training and develop programs; • Has human capital develop programs; • Has labour management programs; • Has human right policies and initiatives; • Has other programs not covered by KLD indicators.	• Has controversies related to firm's union relations practices; • Has controversies related to the health and safety of a firm's employees; • Has workforce reduction programs; • Has inadequate retirement benefits programs; • Has controversies related to workers' conditions; • Has child labour controversies; • Has controversies related to a firm's labour-management relations; • Has other concerns not covered by KLD indicators.

Environment	
Positive performance indicators analyse if the company:	Negative performance indicators analyse if the company:
• Has a positive environmental impact and invests in green technologies; • Has programs to reduce emissions and wastes; • Has recycling programs; • Invests in low carbon technologies; • Has environmental reports; • Maintains its properties, plants and equipment with above average environmental performance for its industry; • Has an environmental management system; • Has a water management strategy; • Has programs regard biodiversity, land use, community impact; • Has environmentally intensive agricultural raw materials, sustainable sourcing policies, commitments, certifications; • Includes ESG risk management policies into company's structure; • Puts effort to increase green building certifications across portfolios of real estate assets; • Develops renewable power production;	• Has paid penalties for waste management violations; • Has paid penalties due to non-compliance with U.S. environmental regulations; • Is the top manufacture of ozone depleting chemical; • Has controversies related to accidental spills or release; • Produces agricultural chemicals (pesticides, etc.); • Has insufficient energy policies and initiatives; • Has controversies related to the environmental impact of firm's products and services; • Has a negative environmental impact; • Has controversies regards firm's non-hazardous and non-toxic operational waste; • Uses inputs that have a negative environmental impact; • Has inadequate water management practices; • Has other concerns not covered by KLD indicators.

• Develops program to collect and recycle electronic waste (only for the company that produce and sell electronic products); • Has programs to reduce the energy consumption over time; • Has programs to reduce carbon footprint; • Integrates climate change risks into product strategy and risk management process; • Has other programs not covered by KLD indicators.	
Human Rights	
Positive performance indicators analyse if the company:	Negative performance indicators analyse if the company:
• Has positive record in South Africa; • Has labour right innovative initiative.	• Has controversies about its operations in South Africa; • Has operations in Northern Ireland; • Supports controversial regimes; • Has operations in Mexico; • Has low labour standards in its supply chain; • Has been involved in controversies about the indigenous people; • Has operations in Sudan; • Damages in any way Civil Liberties; • Violates human rights; • Has other concerns not covered by KLD indicators.
Product	
Positive performance indicators analyse if the company:	Negative performance indicators analyse if the company:
• Has safe and quality products; • Has a leader in its industry for R&D; • Provides social opportunity access; • Provides finance access; • Provides communications access; • Provides opportunities in health and nutrition access; • Has chemical safety products; • Has financial safety products; • Provides products protect by privacy and data security; • Invests responsibly; • Insures health and demographic risks; • Has other programs not covered by KLD indicators.	• Has controversies related to the quality and/or safety of products; • Has controversies related to firm's marketing and advertising practices; • Has anticompetitive business practices; • Has controversies related to how the company treated its customers and its prospects.

Source: Our elaborations on KLD data

Table 6:Summary of MSCI ESG KLD STATS CSR macro-categories.

Appendix B: Cross-correlations analysis

The following table reports the aggregate results of the cross-correlation analysis. We write dependent variables in columns and independent variables in rows, and we consider only values not included between the range -0.6 and 0.6. To simplify the reading of the table, we do not report values but simply indicate sectors for which the value respects the condition specified above. The sectors have been denoted as follows:

- 0: the entire database;
- A: Financial sector;
- B: Industrial sector;
- C: Consumer Services sector;
- D: Technology sector;
- E: Consumer Goods sector;
- F: Health Care sector;
- G: Utilities sector;
- H: Basic Materials sector;
- I: Oil & Gas sector

As we can see from the table, the accounting-based measures especially show an "instantaneous" relationship between the two time-series but also a delayed and distributed relationship across the years—this is a case of ROI and ROS indicators. The Financial Risk is related to CSR indicators at time t+2, especially for the category Diversity; in fact, almost all sectors show a delayed response.

														CORR	
TOTAL STOCK RETURN	LAG	TOTAL STOCK RETURN	CGOV	CGOV^2	COM	COM^2	DIV	DIV^2	EMP	EMP^2	ENV	ENV^2	HUM	HUM^2	PRO	PRO^2
	-2															
	-1															
	0	1,0000														
	1															
	2		I													

	LAG	Financial Risk	CGOV	CGOV^2	COM	COM^2	DIV	DIV^2	EMP	EMP^2	ENV	ENV^2	HUM	HUM^2	PRO	PRO^2
Financial Risk	-2															
	-1															
	0	1,0000								E					I	I
	1															
	2		D, I	D, I	A	A, G	0, A, B, D, E, F, G, H, I	0, A, D, E, F, G, H, I			A	D	D, E	E	C, E	

	LAG	ROE	CGOV	CGOV^2	COM	COM^2	DIV	DIV^2	EMP	EMP^2	ENV	ENV^2	HUM	HUM^2	PRO	PRO^2
ROE	-2			C					G							
	-1			C		B							F	F	B	B
	0	1,0000							E, H	E	E	E			E	E
	1								E	E					E	E
	2							0	0						E	

	LAG	ROA	CGOV	CGOV^2	COM	COM^2	DIV	DIV^2	EMP	EMP^2	ENV	ENV^2	HUM	HUM^2	PRO	PRO^2
ROA	-2								C, G	C						
	-1									C	D		E	E		
	0	1,0000							B, D	B, C, D	D		E	E		
	1			H		0	0, E		0	A	A, B						
	2						B	A					C		C	

	LAG	ROI	CGOV	CGOV^2	COM	COM^2	DIV	DIV^2	EMP	EMP^2	ENV	ENV^2	HUM	HUM^2	PRO	PRO^2
ROI	-2								G	G	I	I				
	-1	D, E							I		E, I	E, I		G	I	
	0	1,0000					H, I	H, I	I	I	E	E	E, I	E, I		
	1	D, E					F	F	E	B, E	D, E	D			E	E
	2						0, B, D	0	E		D	0, C, D	D	D	E	E

	LAG	ROS	CGOV	CGOV^2	COM	COM^2	DIV	DIV^2	EMP	EMP^2	ENV	ENV^2	HUM	HUM^2	PRO	PRO^2
ROS	-2										H, I	I	B, C		E	E
	-1	0, B, C, D, E, F, H					H		H		0, B, C, E, F, H	0, B, F, H	0, B, C, D, H	0, B, D, F, H	B, C, E	B, C, E
	0	1,0000	0, A, B, C, E	0, C, E, H				E	0, B, C, E, H	0, B, E, H	0, A, C, E, F, H	0, B, C, F, H	0, A, B, D, H	0, B, D, F, H	0, B, C, E, G	0, B, C, E, G
	1	0, B, C, D, E, F, H		0					0, B, C, E, G, H	0, E, H			0, A, H	0, A, B	E	E, G
	2												A			

Table 7: Aggregate results for cross section analysis

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Appendix C: MSCI ESG KLD STATS missing observations

MSCI KLD STATS 2015 Column Headers	Year Initiated	Missing 2010	Missing 2011	Missing 2012	Missing 2013	Missing 2014	Missing 2015
ENV-str-A	1991	308	292	-	-	-	-
ENV-str-B	1991	219	196	64	43	228	77
ENV-str-D	1991	2	0	202	339	242	72
ENV-str-G	2006	2	0	-	-	-	-
ENV-str-H	2012	0	0	4	37	249	87
ENV-str-X	1991	26	6	-	-	-	0
ENV-con-H	2010	250	232	0	0	0	0
ENV-con-I	2010	301	282	0	0	0	0
COM-str-H	2010	152	-	-	-	245	0
COM-con-B	1991	1	0	0	0	0	1
HUM-str-X	1994	4	1	-	-	-	-
EMP-str-A	1991	-	-	-	-	184	0
EMP-str-C	1991	-	-	-	-	183	-
EMP-str-D	1991	-	-	-	-	65	341
EMP-str-G	2003	3	0	64	45	247	80
EMP-str-H	2010	4	0	-	-	-	-
EMP-str-L	2012	0	0	10	-	-	-
EMP-str-M	2013	0	0	0	29	184	221
EMP-str-N	2013	0	0	0	-	-	-
EMP-str-X	1991	2	0	0	0	-	333
DIV-str-B	1991	-	-	0	0	0	524
DIV-str-C	1991	-	-	5	0	0	0
DIV-con-C	2010	2	0	0	0	0	0
PRO-str-A	1991	18	10	387	-	-	-
PRO-str-C	1991	250	252	0	0	0	0
PRO-con-D	1991	239	240	0	0	0	0
PRO-con-E	1991	2	0	0	0	0	0
PRO-con-G	2015	0	0	0	0	0	1

Table 8. missing observations for entries that were used to form the Normalized indicator in Equation 1 (0 means that there was no missing observation for that entry in that year; - means that the specific entry in that year has been removed from the calculation. The table does not report the entries that were discontinued after some years or that were activated after the beginning of the sample observation)

Policy innovation in the energy sector: exploring the role of intermediaries in European collective switching campaigns

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Abstract

The purpose of this paper is to study the main variables that, in different ways, could influence the development and the dissemination of an energy policy innovation in a business ecosystem. This objective has been achieved by the examination of collective switching cases in Europe. The 6C framework is adopted in order to perform a cross-country analysis of differences in the collective switching ecosystems. Collective switching is a very new phenomenon that the recent literature has not yet investigated. It is characterised by a group of people with common characteristics that, through an intermediary, negotiate with the energy suppliers and, thanks to their bargaining power, is able to obtain much more advantageous contracts. The analysis begins by exploring the role of the intermediaries for the development of a policy innovation and explaining the 6C framework (context, cooperation, construct, configuration, capability and change) that is used to investigate the complex network that characterises a business ecosystem in each country. Using a multiple case study approach, the analysis provides evidence of how collective switching campaigns are organised. In particular, in order to identify the main actors and relationships between the components of the business ecosystem, semi-structured interviews have been conducted with all consumer associations (BEUC members), which, in different countries, organise collective switching campaigns. Finally, some policy implications are discussed.

1. Introduction

Recently, the literature has shown an increasing interest in research focused on new services and policy innovations adopting as unit of analysis the business ecosystem, instead of the single company (Adner and Kapoor, 2010; Teece, 2010; Clarysse et al. 2014). In the business ecosystem, contrary to a single company, the innovation comes through the sharing of expertise, capabilities and resources from different fields (Heikkilä and Kuivaniemi, 2012). The development of a policy innovation in the business ecosystem depends on the players' actions: knowing the market and the potential risks is a necessary requirement to avoid policy innovation failure (Adner, 2006). The aim of this paper is to study the variables that could affect the development of a policy innovation in an energy business ecosystem and the role of the intermediaries in encouraging its dissemination. To do that, the study examines one of the most disruptive policy innovation that spread in Europe in recent years, called "collective switching".

Collective switching is a policy innovation developed in Europe from 2011 and it is the result of a big change in the energy sector (like liberalisation and subsequently privatisation). Collective switching is characterised by a group of people with common characteristics that, through an intermediary, negotiates with the energy suppliers and, thanks to its bargaining power, is able to obtain much more advantageous contracts. This policy innovation is developed at country level, but it is the result of pressure by the European Commission to improve customer experience, help consumers to switch, and to encourage competition among energy providers. In this context, intermediaries, who work in the business ecosystem and create the environment for its dissemination, play a central role. This work considers as intermediaries consumer associations that are part of BEUC (Bureau Européen des Unions de Consommateurs) and organise collective switching campaigns in their respective countries.

This work lies at the intersection between previous research on the business ecosystem (Moore, 1993, 1996, 1998; Iansiti and Levien, 2004; Lewin and Regine, 1999; Chesbrough, 2003; Gawer and Cusumano, 2002) and on innovation intermediaries (Geels and Deuten, 2006; Raven, 2006; Bos and Grin, 2008; Medd and Marvin, 2008; Moss, 2009). Despite the emerging need to look at the diffusion of policy innovation through the perspective of business ecosystems, there is a lack of empirical work, which blinds these two approaches. In particular, being an ecosystem built upon relationships between heterogeneous agents, it is important to detect the role played by each component. It is well known in the innovation management literature that intermediaries are crucial for the diffusion of innovations (Hägerstrand, 1952; Rogers, 1962). Therefore, an analysis of the intermediaries in the business ecosystems is desirable. This work contributes to the present understanding of the business ecosystem that fuels an innovation in the energy sector by answering the following research question: what are the main variables that could affect the development of a policy innovation in a business ecosystem? What is the role of intermediaries? Is this policy innovation replicable in other sectors? If yes, under what conditions?

A multiple case study approach (Yin, 2003) is used to study the variables that in different ways could have an impact on the development and the dissemination of an energy policy innovation within a business ecosystem. For each case study, a large sample of information from different sources is collected. Information comes from semi-structured interviews, company profiles, company energy profiles and other external sources. The collected data is organised using the 6C framework (context, cooperation, construct, configuration, capability and change) proposed by Rong et al. (2015). This framework explores the complex network that composes a business ecosystem, taking into account different indicators related to intermediaries. The main aspects under scrutiny are: the stage of development of the company, its mission, its internal capabilities and the characteristics of the external business environment, the availability of partners, marketing expenditures, post switching management practices and the consequent overall changes in the ecosystem.

The paper proceeds as follows: section 2 presents the theoretical context, section 3 explains the research context and the methodology and section 4 presents the results. Conclusion and references follow.

2. Theoretical contexts

2.1 The Business Ecosystem

The business ecosystem concept was introduced for the first time by Moore (1996; 1998), who defined it as an economic community composed by mutually supportive organisations that interact to produce goods and services. The Business Ecosystem concept has been analysed by the existing literature from different points of view, which can be classified into three categories: the individual actors (typically a company), the relationship between the actors (typically a dyadic inter-company relationship) and the ecosystem (Järvi, 2017).

The individual actors can be customers, delivery channels, sellers of complementary products and services, suppliers, policy makers and so on. Each actor can play different roles in the ecosystem; in particular, it could have a central position (Moore, 1993; Iansiti and Levien, 2004; Lewin and Regine, 1999) or a marginal one (Pierce, 2009). The studies on the central position have examined business ecosystem leaders or keystones, as in the studies of Moore (1993) on Wal-Mart and Iansiti and Levien (2004) on Microsoft, where the authors describe how these companies develop competitive advantages by having a strategy to build a business ecosystem around their value proposition. There are also other studies of technology or platform owners (Gawer and Cusumano, 2002, 2014; Iyer and Davenport, 2008; West and Wood, 2013; Wareham et al. 2014) focused on main companies in ecosystems.

The second line is more focused on the relationship among individual actors (Pierce, 2009; Adner and Kapoor, 2010; Kapoor, 2013; Ethiraj and Posen, 2013; Kapoor and Furr, 2015). Authors that observe this relationship are interested in strategic interactions with independent complements. Nevertheless, there are also other studies that investigate the way users adopt technological platforms in ecosystems (Xu et al. 2010; Mäkinen et al. 2014; Kang and Downing, 2015). Finally, relationships between companies in the same market are examined (Pierce, 2009).

The studies on business ecosystems are various and investigate them from different points of view. They include business ecosystems (Moore, 1993; Heikkilä and Kuivaniemi, 2012), digital business ecosystems (Tsatsou, Elaluf-Calderwood and Liebenau, 2010; Selander et al. 2013), innovation ecosystems (Adner, 2006; Adner and Kapoor, 2010; Wessner, 2007; Nair, 2007; Almirall and Casadesus-Masanell, 2010; Chesbrough, 2003), technology ecosystems (Wareham at al. 2014), platform ecosystems (Ceccagnoli et al. 2012; Thomas et al. 2014) and supply ecosystems (Ketchen et al. 2014).

At the moment, there are no papers that apply the business ecosystem concept to the energy sector. It is used in this case for its flexible nature and its ability to adapt to different scenarios. As proposed by Weber and Hine (2015), the business ecosystem is considered as a structure of relationships between interacting actors. The ecosystem is not static, it should be considered as a dynamic system, which evolves through the interaction between ecosystem actors (Wallner and Menrad, 2011; Mercan and Goktas, 2011). The business ecosystem concept goes further than a conventional industry value chain and includes funders, resources and complementary innovators, who make it possible to the ecosystem actors to generate value together. In the business ecosystem, the exchange of knowledge and collaborations to develop innovative services is clearly visible. The sharing of goal and objective, trust, and transparency, are the main factors of success for innovation (Nambisan, 2013). The ecosystem also has a social dimension and is made possible by the generation of social value and the shared economy (Porter and Kramer, 2011).

2.2 The role of intermediaries in innovation

The role of intermediaries in the innovation process has emerged in the last twenty years. The literature stresses the idea that intermediaries have a more complete knowledge about the various technological domains in which they operate. In particular, the focus is on four main topics: diffusion and technology transfer, innovation management, system and network, intermediaries and services organisations (Howells, 2006). The literature related to the diffusion and technology transfer was the first that explored the intermediaries' role in relation to innovation. Hägerstrand (1952) and Rogers (1962) were the first that

studied the importance of the intermediaries in the information dissemination and in the adoption rate. After their works, different authors focused their attention on the role of intermediaries in the technology transfer process and investigated this aspect from different points of view (Watkins and Horley, 1986; Seaton and Cordey-Hayes, 1993; Shohert and Prevezer, 1996). The second group, the innovation management, considers the intermediaries as organisations and explores the principal activity in which they are involved (Hargadon and Sutton, 1997; McEvily and Zaheer, 1999). However, both authors took into consideration the intermediaries' role in technology transfers as a key function. The system and network group identifies the role of intermediaries in the adoption of specialised solutions (Carlsson and Stankiewicz, 1991) and investigates the role of the intermediaries in providing collective goods to their members and facilitating and coordinating the flow of information (Lynn et al. 1996). Finally, the last group explores the role of intermediaries in the context of service activities and service innovation, in particular in relation to the growth of KIBS – knowledge intensive business services – (O'Farrell and Moffat, 1991; Miles, 2000; Bettencourt et al. 2002).

In general, the role of the intermediaries is less investigated (Geels and Deuten, 2006). The predominantly literature explores *ex post-facto* case studies (Raven, 2006; Bos and Grin, 2008) and only a niche of these paper analyses the intermediaries' role in the energy context, but not in the energy business ecosystem (Geels and Deuten, 2006; Medd and Marvin, 2008). Moss (2009) highlights that, in all these papers, intermediaries are a boundary organization involved in relational work to connect different actors: "whether facilitating dialogue, providing guidance, bridging gaps, advocating reform, or pioneering novel forms of interaction, their arenas of action are defined in-betweenness" (Moss, 2009, p. 1481). In particular, the intermediaries work as boundary organizations aiming to connect local projects between them and to generate infrastructures in support to the development of the innovation in question. Geels and Deuten (2006) identify three key roles of intermediaries: aggregation, creation of institutional infrastructures, reversal role. The aggregation role is the ability to transform limited knowledge into shared knowledge. The second role concerns the intermediaries' ability to create an institutional infrastructure useful to the development and the circulation of the shared knowledge. Finally, the third role regards the ability to transform the "shared knowledge" into guidance for local projects. Geels and Deuten (2006) explore in depth also the role of intermediaries in the energy field. In particular, they underline the intermediaries' effort to learn and adapt new support services for the local community energy projects. In recent years, in fact, intermediaries jave formed an alternative technology movement, have managed the spending of public money in support of community energy initiatives and have created new advocacy figures for the community energy. The result of this process is the creation of different organisations that work in the energy sector with their own history, aims and objectives.

3. Analytical framework

In this paper, we adapt the 6C framework used (Rong et al. 2015) to investigate the complex network that makes up the Internet of Thinking (IoT)-based business ecosystem. The Rong et al. papers extend the 3C framework (Zhang et al. 2007 and Lin et al. 2009) making it useful to analyse the network system in general. The 3C framework is composed by context, configuration and capability.
The **context** considers the main environmental characteristics (driving force, main barriers and key mission). The aim of this macro category is to investigate why a supply network emerges over another. It is important to include the industry lifecycle in order to understand the company's statuses at different stage (Moore, 1993). In addition, this macro category considers the non-direct partners (government, industry associations and other stakeholders) to explore how an organisation in a business ecosystem expands its perspective beyond its core business supply-chain partners (Rong et al. 2013c).
The **configuration** includes the construction element of the network (role structure, process structure, information architecture). This category explores the external relationship among partners and its configuration patterns. (Hayes and Wheelwright, 1984) used the process and the products to categorise different patterns of the manufacturing system. (Shi and Gregory, 1998), then, extended the concept including the geographical dispersion and the manufacturing coordination. In recent years, the configuration macro area is considered an essential dimension in the study of global engineering networks (Zhang et al. 2007), supply network (Srai and Gregory, 2008), modular supply network (Lin et al. 2009).

The **capability** concerns key success features of the supply network (design, production, inbound logistics and information management). This macro area explains why one network operates better than another (Lin et al. 2009; Zhang et al. 2007; Shi and Gregory, 1998) subdivided the capability into four aspects: strategic targets accessibility, thriftiness ability, manufacturing mobility and learning ability. (Srai and Gregory, 2008) included the capability of communication and sharing, integration and synergising, innovation and learning and adaptation and restructuring.

Rong et al. add to this framework cooperation, construct and change dimensions. **Cooperation** includes all the mechanisms by which partners interact. The relationship is not only companies-customers, but it could be also between two or more different companies that cooperate to reach their strategic goals (Iansiti and Levien, 2002; Iansiti and Levien, 2004; Moore, 1996; Power and Jerjian, 2001). The cooperation process could vary along the lifecycle of a business ecosystem (Rong et al. 2015).

The **Construct** dimension defines the key structure and infrastructure for the business ecosystem. (Hayes and Wheelwright, 1984) are the first to introduce the construct category to study the constructive elements that have an impact on the system-manufacturing strategy. To reach their objective, they introduced a "structure-infrastructure" framework. In line with traditional theories, a structure-infrastructure framework is adopted in this paper to deconstruct the business ecosystem.

Finally, the **change** dimension underlines how a business ecosystem, at the end of its lifecycle, is renewed with the new pattern. The new patterns will include a new configuration and a cooperation evolution.

All of these macro areas are detailed in Table 1.

Context
• Electricity and gas retailers prices
• Retailers to final consumers (natural gas)
• Market share (natural gas)
• Retailers to final consumers (electricity)
• Market share (electricity)
• History and development of the company
Cooperation
• Partner relationships (has the association organised other auction with the same energy supplier before? Does the consumer association have a relationship with the other consumer association that organises the auction?)
• Customer base (What relationship did you have with the associate? Has the relationship with the associate been consolidated over time?)
Construct
• Business Ecosystem structure and infrastructure
Configuration
• External relationships
• Platform of strategies
Capability
• Special team
• Internalised technical capability
• Experience acquired during the editions
• Platform used into other sectors
Change
• Δ Retailers to final consumers (natural gas)
• Δ Market share (natural gas)
• Δ Retailers to final consumers (electricity)
• Δ Market share (electricity)
• Presence of other intermediaries
• Collective switching internalised at government level
• Auction regarded renewable energies

Table 1: variables considered in the analysis

Looking at Table 1, it is possible to notice that the 6C framework considers the internal and the external variables that in different ways have an impact on the business ecosystem. The contest macro area takes into consideration the external factors at the time when the collective switching begins as well as the internal company characteristics. The aim of this macro area is to understand why a phenomenon emerged and what are the principal drivers of the innovations. This considers not only company characteristics, but also other external factors and non-direct partners (Rong, et al., 2013c). The cooperation macro area considers how the company interacts with its stakeholders and partners to reach common goals; for these reasons, it considers not only the relationship with the partner but also the relationship with the customer. The cooperation may

vary during the business ecosystem lifecycle (Rong et al., 2015). The construct macro area concerns the structure and the supportive infrastructure of the business ecosystem; it takes into consideration also the stakeholders involved in the business ecosystem and their role. The configuration area was mentioned, but not as well explored as in the previous studies (Shi and Gregory, 1998; Zhang et al, 2007). It is important to define the business model and the platform strategy of consumer associations. Through this area, configuration patterns of each business ecosystem were defined. The capability macro area, in accordance with Srai and Gregory (2008), include the capability of communication, the activated synergy, the knowledge acquired and the adaptation capacity. The change macro area takes place at the end of lifecycle and, for this reason, it considers how the business ecosystem is renewed; in particular, if there are some changes in the retail energy market (electricity and natural gas), if the phenomenon is replicated by other intermediaries or internalised at the governmental level and if it pushes for the development and use of renewable energy.

4. Research context and methodology

4.1 Industry specificities

In most European countries, the energy industry is undergoing radical change. The energy market liberalisation, for example, started in 1980s and stimulated competition between energy suppliers. Horizontal and vertical mergers and acquisition took place; numerous electricity brands were created and independent energy sector regulators were established (Walsh et al. 2005). In the oil and associated upstream gas sectors, the liberalisation has involved the full or partial privatisation of state owned companies, often in countries that were net importers of fossil fuels (e.g. the privatisation of ENI in Italy) (Wolf and Pollitt, 2008). In the electricity and downstream gas industry, the liberalisation was followed by privatisations and by structural reforms with the aim to create competition among wholesalers in the retail market. Energy liberalisation led to positive and globally efficiency gains across all sectors, but also to a lack of visible direct benefits to households. However, it improved the governance of monopolistic utilities, the prospect for competition and innovation and the quality of policy instruments for environmental emission control (Pollitt, 2012).

The result of these changes, which started more than thirty years ago, is also the possibility, for consumers, to purchase energy from the suppliers that they choose. However, in many countries, the switching rate is low and consumers are reluctant to switch energy supplier. The reasons are various: customer inertia, cost of finding alternative suppliers, risk aversion and lack of market transparency for customers (Graehl et al. 2001). It is also possible to consider the switching decision as an optimisation problem: consumers choose an energy supplier, which gives them the maximum utility for a given input of their resources (Reardon and McCorkle, 2002). After the market liberalisation, a large number of consumers decided to stay with their energy supplier. Gwinner et al. (1998) explain this behaviour by identifying the interpersonal relation as a barrier to switching, but is it also true that consumers are little incentivised to switch because they consider the energy market non-transparent and too complex.

In Europe, the European Commission's "Clean Energy for All Europeans" package, presented on November 30, 2016, is the first positive step towards improving conditions for consumers within the energy market. In particular, the "Clean Energy for All Europeans" aims to (BEUC, 2017):
- Improve consumer experience through transparent and easily comparable offers, clear contracts, accurate bills in a user-friendly format;
- Help the consumer compare different offers providing additional rules for comparison tools and bundled offers. Energy supply, in fact, is increasingly bundled with other services that obscure the price of energy, making it harder for consumers to switch or to compare offers;
- Set rules to facilitate switching supplier;
- Ensure effective market surveillance and dispute resolution to break up monopolies and incentive a dynamic competition.

The policy innovation that we take into consideration fits perfectly to the European Commission roles proposed in 2016. Collective switching, in fact, was born to improve the consumer switching behaviour; in particular, it is possible to see how intermediaries (in this cases consumer associations) are able to overcome

consumer and market barriers, to allow the development of a policy innovation in a business ecosystem. Collective switching is a new phenomenon that recent literature has not yet investigated and that has spread in recent years in the United Kingdom, Netherlands, Ireland, Belgium, Denmark, Austria, France, Italy, Slovenia, Spain and Portugal. Collective switching is characterised by a group of people with common characteristics that, through an intermediary, negotiates with energy suppliers and, thanks to their bargaining power, is able to obtain a much more advantageous contract. The intermediaries (consumer associations, local authorities, private companies) mediate between consumer and energy suppliers, organise a price lowering auction and send to the consumer the "winning offer" and the details of the new tariff. There is no obligation to switch and, if they decide to switch, they enter into a contract with their new supplier (ACER, 2015). The main difference between switching and collective switching is that the first does not involve a group of people, but only a single consumer that decides to choose another supplier, while the second does. Studies about consumer's behaviour affirm that consumers are often reluctant to switch their energy supplier (Konkurrencestyrelsen, 2009). However, the collective switching campaign is changing the existing scenario. With the introduction of the liberalised market in 2007, suppliers started to propose several offers. Offers' differentiation includes contract duration, price preservation periods, dual-fuel offers, additional services, renewable/green features and so on. This means that whilst the consumer can choose different products and services, the level of transparency is subsequently reduced, because the comparison between offers becomes more difficult. Consequently, 27-38% of switching consumers have lost surplus through their confusion with the choice of a supplier (Wilson and Price, 2007). In this contest, collective switching could be considered a policy innovation aimed at creating "better protection" for consumers. Over the past few years, in fact, collective switching campaigns have become increasingly effective, due to their potential to remove perceived barriers to switching, such as the time-consuming switching process, the risk of not obtaining the best deal and the distrust in new suppliers.

Collective switching is not a "simple" purchasing group. In both cases, consumers obtain a discount thanks to their buying power, but the purchasing group takes place from a spontaneous initiative of consumers. The purchasing group can be: "informal", if a group of people organises purchasing groups without the formalisation of the constitution of the group in an association; with the support of an existing association/cooperative (in this case consumers must become members of the association they support); an association (typically if the group is large). In the purchasing group, there is not a price lowering auction, the "intermediary" is usually the point of reference chosen within the group that informs the purchasing group about how to purchase, collect orders, forward the overall order and make the payment. In collective switching, consumers are more protected, the intermediaries create the group with common characteristics, collect information about energy suppliers, manage communications, the auction and the switch. The intermediaries work in the business ecosystem and create the preconditions for the development of the policy innovation. Figure 1 provides a graphic explanation of the collective switching process.
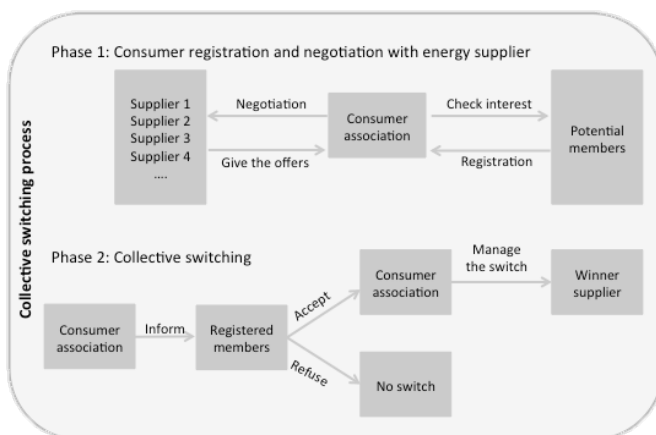

Figure 1: the collective switching process

4.2 Research methods

The research uses a case study approach (Eisenhardt, 1989; 1991; Yin, 1994; 2003; 2013). The purpose of the case study research is to use empirical evidence from real people in real organisations to make an original

contribution to knowledge. The case study method is amongst the most flexible of research designs, it includes different sources of evidence, for example direct observations and interviews, and it is particularly useful in this case because this is a new phenomenon, which has not been investigated by the existing literature; in addition, there is few data about it. In particular, the multiple case study approach is useful in the early stage of a phenomenon (Eisenhardt K. M., 1989) and when "the boundaries between phenomenon and context are not clearly evident" (Yin, 1981). The methodology of analysing case studies is certainly, at the theoretical level, a holistic research strategy directed at understanding the internal dynamics of a single specific context (Eisenhardt K. M., 1989).

In particular, this work relies on a research design based on multiple cases, carried out using more than one unit of analysis (Yin 1994). The multiple case study approach generates results that are more robust and compels arguments even though it requires more resources. This methodology fits with the exploratory aim of this research. The case selection is made in accordance with "purposeful sampling" outlines and based on the principle of theoretical replication or namely the repetition of the analysis on different cases with distinct variables (Eisenhardt 1989). According to Eisenhardt and Graebner (2007), case research is a theory-building approach that is deeply embedded in rich empirical descriptions of particular instances of a phenomenon, based on a variety of data sources. The case study aims to answer research questions that address the "how" and "why" in unexplored research areas. Consequently, the results from this research cannot be subject to statistical generalisation or theory testing, but they can be used to generate theoretical construct propositions and/or midrange theories (Eisenhardt, 1989; Yin, 2003).

A list of questions was constructed taking into account the 6C dimensions. The interviews were conducted by phone and face to face (in the Altroconsumo case). In this case, the questions work as conversation guide. Questions were not strictly followed, allowing interesting discussions between the interviewees and the interviewer. The administration of semi-structured interviews collected information on: how the consumer associations and the energy suppliers make their strategy operational, how consumer associations create relationships with the energy supplier and its typology (long term or short term relationship), what is the relationship with the territory/consumers and the policy implication of this phenomenon (it is helpful to people with energy poverty, it favours the switch to renewables energy, and so on). The interviews were conducted from April to the end of September and were carried out in person, for the Italian sample, and by phone for the other countries. The interviews varied from thirty minutes to one hour and they were conducted with the respective managers in charge for the coordination of the collective switching campaign (head of communications, coordinators of the partnership and loyalty areas, director s of information and services and heads of public affairs and media relations, marketing managers and directors of the retail market and operations). A BEUC Senior Economic Officer was interviewed to better understand the phenomenon and the BEUC role inside these ecosystems. BEUC is more focused on the policy development. They do not have an active role in collective switching campaigns, but they monitor collective switching campaigns organised by their members, analyse conditions that affect collective switching campaigns and also analyse contracts and offers. Data triangulation was implemented to increase the validity of this qualitative research (Rice and Ezzy, 1999). In particular, Country statistical profile (OECD, 2017) and energy profile (EC, 2017) were analysed to enrich personal and telephone interviews. The study considered data from 2011 to 2016 (for further information see Appendix A and B). These years were considered because they cover the collective switching period and, for this reason, they could provide additional information about the development of the phenomenon in different countries.

4.2.1 Data collection

This paper considers consumer associations that are part of BEUC (Bureau Européen des Unions de Consommateurs) and organise collective switching campaigns in their countries. Table 2 specifies the consumer associations that compose our sample and provides additional information about collective switching campaigns.

Countries	Consumer Association	Sector Covered	Energy supplier that won the auction	Date	Number of consumers who signed up for the campaign	Number of consumer that switched	% Over the population	% Of consumers that switched	Total saving
Austria	VKI	Electricity and gas	-	2013-2014	260,584	70,000	3,08%	26,86%	€12.6m
				2015	48,410	12,500	0,57%	25,82%	€2.8m
				2015-2016	-	15,200	-	-	€5.3m
				2016-2017	-	20,000	-	-	€5.9m
Belgium	Test-Achats	Electricity and gas (Gas only contracts were not possible) Photovoltaic panel	Elegant; Eneco; Essent; Lampiris; Mega; Octa+; Poweo – direct energy	2012	151,586	46,753	1,36%	30,84%	€16.9m
				2013	138,299	32,995	1,24%	23,86%	€6.8m
				2014	70,008	33,883	0,62%	48,40%	€6.9m
				2015	94,787	16,154	0,84%	17,04%	€2.6m
Chez Republic	dTest	Electricity and gas	Europe easy energy	2015-2016	74,000	22,229	0,70%	30,04%	€6.4m
				2017	55,775	-	0,53%	-	-
Denmark	Forbrugerrådet Tænk	Electricity and gas, Green energy from wind turbines	Vindstød	2012	-	4,000	-	-	-
				2013	-	2,000	-	-	-
France	UFC-Que Choisir	Gas	Lampiris	2013-2014	-	71,000	-	-	€13.7m
				2015	-	60,000	-	-	€5.0m
				2016	-	106,784	-	-	€15.7m
Italy	Altroconsumo	Electricity and gas	Dolomiti Energia; Alma Energy Trading; Gala; Engie	2013	197,000	40,000	0,75%	20,30%	€9.1m
				2014	84,000	13,229	0,31%	15,75%	€1.8m
				2015	68,000	11,500	0,25%	16,91%	€3.9m
				2016	60,000	12,000	0,22%	20,00%	€2.4m
Netherlands	Consumentenbond	Electricity and gas	-	2011	135,227	58,294	0,81%	43,11%	€14.1m
				2012	308,508	110,186	1,84%	35,72%	€34.7m
				2013	282,401	60,547	1,68%	21,44%	€16.1m
				2014	295,493	53,059	1,76%	17,96%	€16.0m
				2015	-	79,375	-	-	€32.6m
				2016		78,216	-	-	€27.9m
Portugal	DECO	Electricity and gas	Endesa, Goldenergy and Galp	2013	587,080	40,433	5,61%	6,89%	€0,7m
				2014	176,030	28,160	1,68%	16,00%	€1,8m
				2016	74,697	6,361	0,71%	8,52%	€0.3m
Slovenia	ZPS	Electricity and gas	Gen-I	2014-2015	-	12,300	-	-	€1,0m
				2017	-	-	-	-	-
Spain	OCU	Electricity and gas	Endesa	2013	486,254	27,300	1,04%	5,61%	€1.4m
				2014	120,000	15,000	0,26%	12,50%	€0.4m
				2016		12,200			€0.8m
United Kingdom	Which?	Electricity and gas	Cooperative Energy	2012	287,365	38,000	0,46%	13,22%	€ 11,81

Table 2: BEUC members' collective switching campaigns

Sources: http://www.beuc.eu/publications/beuc-x-2017 074_collective_energy_switch_factsheet_2017.pdf

Table 2 shows that the emergence of collective switching is not the same across the different countries. The first consumer association that decided to develop a collective switching campaign was Consumentenbond (Netherlands) in 2011, followed by Belgium, Denmark, UK, Austria, France, Italy, Portugal, Spain, Slovenia

and Chez Republic. The first campaign is usually the most innovative, with a large number of consumers who sign up for the campaign. After the first auction, the number usually decreases and stabilises. The only exception was in Netherlands, where the number of consumers who signed up for the campaign increased after the first auction, but the percentage of consumers that switched decreased. The Netherlands is also the country with the highest total saving. Portugal is the country with the largest percentage of consumers who signed up for the campaign with respect to its population (at first the 5,61% of the population signed up for the campaign). The switching rate calculated as the number of consumers that switched compared to the number of consumers that signed up for the campaign is around the 26-27% for Austria, Belgium's switching rate is not constant, it is between 20 and 30% the first two years, the third year is almost 50% and decreases drastically during the last campaign where the switching rate was only 17%. Italy is always around 20%, Netherlands shows a decreasing trend: in the first campaign the switching rate is around 40% and in the last 18%. Portugal and Spain show more or less the same trend: in the first year the number of consumers who signed up for the campaign was higher, but the number of consumers that switched was lower; for these reason, the switching rate is around 6-7%. The second year, the number of consumers who signed decreased with a consequent increasing of the switching rate that was around 13-16%. Finally, in UK the switching rate is 13%.

Austria, France and UK decided to not participate to the interview, however it was possible to rebuild the case studies thanks to the data provided by the BEUC.

5. Case studies

5.1 Application of 6C framework

Table 3 provides a summary of the case studies analysed taking into account the six dimensions: context, cooperation, construct, configuration, capability and change. Looking at the context macro area, it is possible to observe that the countries analysed have a highly concentrated energy market: there are few big retailers and the competition is low (with the exception of the Chez Republic). In the first stage of the collective switching campaigns organisation, all countries had the PrizeWise support for the technical platform, some of them availed themselves with external partners also for communication (Austria, Belgium, Chez Republic and Denmark). However, Denmark is the only country that asked the technical and communication support by LM Delivery. The construct macro category is the same for all the countries, in this paper, in fact, it was decided to consider as intermediaries only the consumer associations that are BEUC members. Configuration, capability and change present some differences. The configuration macro area takes under consideration consumers, media and interested by politicians (strong interest in Austria, Slovenia and UK), big suppliers participation (in France, Portugal and Spain the big suppliers decided not to participate), consumer association marketing strategy (Belgium, Chez Republic and Netherland invest in communication) and consumer association relation with the territory (strong in Belgium and Slovenia). The second macro category, capability, tries to figure out if special teams have been assigned for the management of the collective switching campaign, if the consumer association internalised the technical platform and if it is used also for campaign organisation in other sectors. All the consumer association under analysis created a special team, Belgium, Italy and Portugal internalised the technical platform and the Chez Republic and Italy used the platform in other sectors. Finally, the change macro category investigates: if collective switching campaigns are organised by other intermediaries (Belgium, Italy, Netherlands, UK), if there are collective switching campaigns on renewables (Austria, Belgium, France, Italy, Netherlands) and if the market share of the main retailers decreased and the competition increased (common to all countries).

	Context	Cooperation	Construct	Configuration	Capability	Change
Austria	High market concentration; VKI active from more than 50 years.	PrizeWise (home page, CRM/back office, negotiations with suppliers) E-control (communication)	Non-profit organization BEUC member.	Big consumers interest, but structure not ready for more customers. Hired additional HR. No marketing strategy.	Internal special team. Not internalised any process.	Collective switching campaigns on renewables. No other intermediaries. From the second campaign small saving. Market high concentrated.
Belgium	Few retailers with high market share; Test-Achats active from 60 years.	PrizeWise (technical support, communication and negotiations with the suppliers)	Non-profit organization Executive Board of BEUC, CI (Consumers International) and ICRT (International Consumer Research and Testing).	Open relationship with the territory. Big investment in communication.	Internal special team. Internalised the technical platform. Investment to reach low-income households	Renew the Business Ecosystem through the introduction of new intermediaries. Campaign on solar panels. Increased competition, lower energy price.
Chez Republic	High number of retailers, high concentration; high level of competition; dTest active from 25 years.	PrizeWise (Technical support) External PR agency	Non-profit organisation BEUC member.	Is still at the beginning. Investment in communication.	Internal special team. Platform used also for other sector (mobile tariff)	Other intermediaries connect to municipalities. Competition increased, cumulative market share of main retailers decreased. Collective switching also on other sectors.
Denmark	Lower competition and high concentration; consumers usually do not change supplier. Forbrugerrådet Tænk active from 70 years.	LM Delivery (Technical and communication support)	Non-profit organization BEUC member.	Closed business Ecosystem, strong criticism from media and politician. Switching rate low. Partner left them, no capability to internalise the process.	Internal special team.	Business Ecosystem collapse
France	Discrete number of suppliers, high concentration; UFC-Que Choisir active from 66 years.	PrizeWise (Technical support)	Non-profit organization BEUC founding member	Focus on gas market. Scepticism of the market who refuses the competition.	Internal special team.	No big changes, collective switching on renewables, at the moment it does not spread on the territory.
Italy	High number of retailers and cumulative market share of main retailers less than other countries; Altroconsumo active from 44 years.	PrizeWise (Technical support)	Independent, non-profit organisation BEUC founding member.	Business Ecosystem not ready, lack of knowledge and trust of the consumers.	Internal special team. Internalised the technical platform. Platform used for other sectors	Collective switching on renewables. Diocese of Padua organises collective switching campaign, collective switching also on other sectors.
Netherlands	Less number of suppliers, high concentration; Consumentenbond active from 64 years.	PrizeWise (Technical support)	Non-profit organization BEUC founding member	They overcome the consumer concerns. Large investment in communication. Collective switching as "standard activity"	Internal special team.	Collective switching on renewables; other intermediaries, n° of retailers increased, cumulative market share of the main retailers decreased
Portugal	Recent energy market liberalization; high concentration; DECO active from 43 years.	Technical and organizational support	Independent, non-profit association with charity status. BEUC member.	Business Ecosystem closed, low economic benefit, big companies not participated.	Internal special team. Internalised the technical platform	No other intermediaries, no renewables. Collective switching on other sectors.
Slovenia	Few retailers, market concentrated ZPS active from 27 years	PrizeWise (Technical support)	Oldest consumer NGO; Member of BEUC ANEC and ICRT	Marketing investments, attention to the media, trust of the consumers.	Internal special team. Investments to replicate into other sectors. Offline consumers campaign.	No other intermediaries, no renewables.
Spain	High concentration; OCU active from 42 years.	PrizeWise (Technical support)	Oldest consumer organisation. BEUC member.	Business Ecosystem closed, five big companies not participated, problem to obtain a good price.	Internal special team.	No other intermediaries, no renewables, n° of retailers increased, cumulative market share of the main retailers decreased.
United Kingdom	Big 6 dominate gas and electricity market; Which? Active from 60 years.	PrizeWise (Technical support) 38 Degrees campaigning organisation	Non-profit association with charity status. BEUC member.	Business ecosystem open even if at the beginning the Big 6 had less interest. Strongly interest at governmental level.	Internal special team.	Development of the Business Ecosystem: DECC supported the development of collective switching. Market share of largest supplier decreased.

Table 3: summary of case studies

From the analysis of Table 3, it is possible to see common patterns of the energy business ecosystem. These patterns are presented in Table 4. This business ecosystem has been classified into four different categories: closed energy business ecosystem, medium-open energy business ecosystem, open energy business ecosystem and energy business ecosystem under construction.

The Chez Republic and Slovenia have been considered separately for two reasons: they are smaller and more recent compared to other consumer associations and they organise collective switching campaigns from two years ago, so the business ecosystem is still evolving. The case studies analysis shows that even if the Chez Republic and Slovenia consumer associations are smaller and their campaigns are more recent compared to other countries, there are the right conditions for the development of the business ecosystem toward an open configuration.

Denmark, Portugal and Spain are in a closed energy business ecosystem. In Denmark this very closed system has led to the failure of this policy innovation. Portugal and Spain, even if they continue to organise collective switching campaigns, the results are not encouraging. They have the least amount of total savings, the consumer participation is drastically decreased and they have not stimulated market interest, in particular the main retailer interest.

Austria, France, Belgium and Italy have been classified in the "medium-open energy business ecosystem". However, this category could be further subdivided: Austria and France show the same pattern, such as Belgium and Italy. Austria and France, after a declining trend, continued to invest and made the last campaign that recorded the second best result in terms of total saving. Belgium and Italy, instead, have slightly abandoned the organisation of collective switching campaigns, but have activated virtuous circles that allowed the diffusion of this policy innovation through other intermediaries and in other sectors.

The Netherlands and the UK are the only two countries where this policy innovation has evolved and spread. The two cases are different. The Netherlands case could be considered the "case of success" in the consumer association environment. It overcomes consumer concerns and has made possible to spread of the collective switching throughout Netherlands; it organises more than two campaigns every year with very impressive results. Also other intermediaries organise collective switching campaigns and this policy innovation has become a standard and alternative activity to changing energy supplier. The same is true also for the UK, but with a different assumption. The UK consumer association does not play a crucial role as Consumentenbond for Netherlands. The key of its success was the growing government interest, which led the Department of Energy and Climate Change (DECC) to support the development of collective switching in the country. A common denominator is the big change in the energy market. From the years of the introduction of the collective switching, a large number of small retailers has grown; most of them are focused on renewables. The cumulative market share of the main retailers decreased and the competition increased.

		Closed energy business ecosystem (Denmark, Portugal, Spain)	Medium-open energy business ecosystem (Austria, France, Belgium, Italy)	Open energy business ecosystem (Netherlands, UK)	Business Ecosystem under construction (Chez Republic, Slovenia)
Context	Industry Life Cycle	Maturity	Maturity	Maturity	Growth
	Missions	Consumer protection	Consumer protection	Consumer protection	Consumer protection
	Barriers	Lower competition, high market concentration; social barriers, switching rate low.	Few retailers (Case 2), high market concentration, social barriers (Case 6), structure not ready (Case1)	Few retailers, high market concentration	Few retailers (Case 9), high market concentration
Cooperation	External Partner	Technical and communication support (Case 4)	Technical support. Communication and negotiation with the suppliers (Case 1-2)	Technical support. Campaign organization (Case 11)	Technical support. Communication (Case 3)
Construct	Structure	Non-profit organization	Non-profit organization	Non-profit organization	Non-profit organization
	Infrastructure	No technical expertise	No technical expertise	No technical expertise	No technical expertise
Configuration	External relationship	Market closed: no interest from the big retailers. Strong criticism from media and politician. (Case 4)	Strong consumers interest, Scepticism of the market (Case 5).	Strong market and consumer interest, Strongly interested at governmental level (Case 11)	Strong market and consumer interest.
Capability	Platform adaptation	Platform not adapted to other sectors (Case 4 and 10)	Platform used also for other sectors (Case 6).	Platform used also for other sectors	Platform used also for other sectors (Case 3), investments to replicate into other sectors (Case 9).
	Team constitution	Internal special team	Internal special team	Internal special team	Internal special team
	Internal capability	Do not internalise the platform. Outsourced technical support	Structure not ready for more consumers. (Case 1). Case 1, 2 and 6 internalised the platform.	Technical process internalised.	Do not internalise the platform.
	Developments for accessibility of the service	-	Investment to reach low-income households (Case 2)	-	Structure campaign for offline consumers (Case 9)
Change	Renewal	No other intermediaries, no renewables. Business ecosystem collapses (Case 4)	Introduction of new intermediaries. Collective switching on renewables (Case 2 and 5) and in other sectors (Case 6)	Collective switching internalised at the governmental level (Case 11). Collective switching on renewables (Case 7)	New intermediaries connect to municipalities. Collective switching also on other sectors (Case 3).
	Market evolution	N° of retailers increased, cumulative market share of the main retailers decreased (Case 10)	Increased competition, lower energy price.	Increased competition, cumulative market share of the main retailers decreased	Competition increased, cumulative market share of main retailers decreased (Case 3).

Table 4: Energy business ecosystem patterns

Table 4 provides aggregate results in order to understand energy business ecosystem. As asserted by Rong et al. (2015) the 6C framework can be clusterised into three groups.

The first group includes context and cooperation. The context takes into consideration the environmental setting for the business ecosystem development and the cooperation with regard to the partner relations in order to reach the strategic objective. This cluster reflects the industry life cycle of the driver subject, its mission, the barriers, the identification of the external partner useful for the development of this policy innovation. Looking at the table, it is possible to see that with the exception of the last business ecosystem, other consumer associations are in the maturity stage. They have a company reputation and have previous experience that could help for the dissemination of the business ecosystem. As the consumer association, they pursue the same mission: consumer protection. As external partner they collaborated with PrizeWise, which provides the technical support, and 5 of them (Austria, Belgium, Chez Republic, Denmark and UK) required collaborations for the communication part.

Barriers are one of the most important aspects in these business ecosystems. Each country is characterised by a high market concentration. Both market barriers and social barriers affect the closed energy business ecosystem and the medium open business ecosystem. In the closed business ecosystem there are few retailers who have a large part of the market share, the competition is low and for this reason a "big company" has no interest to participate in collective switching campaign. In addition, there are also social barriers: in Denmark, for example, the switching rate is really low because consumers are not inclined to change energy supplier. The medium-open business ecosystem is characterised by a larger number of energy suppliers (with the exception of Belgium). However, even here, large retailers share the market share. In addition, they encounter social and cultural barriers. In Italy, for example, there is a lack of trust: consumers are afraid to lose their surplus by switching supplier and this is only partially overcome by the trust that consumers have in Altroconsumo. Austria highlights also the existence of internal barriers: the consumer association in fact was not ready to handle a large number of consumers. The open energy business ecosystem and the energy business ecosystem under construction at the moment present the same specificity. Nevertheless, the Chez Republic and Slovenia markets are smaller than in the UK and the Netherlands. Except Chez Republic, they have few retailers; the concentration is high and consumers welcome policy innovation.

The second group is made by construct, configuration and capability. This group is more static; the study has considered the structure, the infrastructure, the internal capability and the platform adaptation capability. The driving forces of this policy innovation are consumer associations, non-profit organisations - some of them with charity status. For the first campaign, no one had the technical expertise to develop a collective switching campaign. In the closed business ecosystem, the platform used for the collective switching campaign was not used in other sectors, with the exception of Portugal, which organises other campaigns for tablets, oil, diapers, pets food, health plans, solar panels, bank deposits, air conditioning, baby seat and tires. In the medium-open energy business ecosystem, only Italy used the platform for fuel, mobile telephony, two-wheel drive and, low-impact motorcars campaigns. In the open energy business ecosystem the platform is used also for other sectors and in the energy business ecosystem under construction the Chez Republic organises collective switching campaigns for mobile tariffs. Some consumer associations, after the first auction, decided to internalise the process is the case of Austria, Belgium and Italy (in the medium-open business ecosystem) as well as the Netherlands and the UK (in the open business ecosystem). In order to professionalise the entire process and its strategic development, each consumer association allocated dedicated human resources to each auction. Belgium and Slovenia are the only two countries that organise campaigns for the offline consumer. Regarding the external relationship, in the closed business ecosystem, the media and the politicians look with criticism at this policy innovation; the same is true in France (medium-open energy business ecosystem), where the market looks with criticism at this policy innovation and refuses the competition. The open business ecosystem and the business ecosystem under construction show a growing consumer and market interest. In the UK there was a large interest also at the governmental level.

The third group shows the changes that the business ecosystem made in the market. In the closed business ecosystem, no other intermediaries decided to organise collective switching campaign; they decided also to not organise campaigns for renewable energies. In Denmark, the ecosystem collapsed because the partner left them and they do not have the capability to internalise the process. In the medium-open business ecosystem, other intermediaries start to organise collective switching campaigns, Belgium France and Italy organise campaigns on renewables energy and only Italy also in other sectors. In the energy open business ecosystem, collective switching has become an alternative way to change energy supplier; in the UK it is also internalised at the governmental level. In the Chez Republic there are other intermediaries connected to municipalities and campaigns in other sectors (business ecosystem under construction). Finally, in each country, with different intensity and in different ways, collective switching puts some pressure on the market and its players. In these years, in fact, the number of energy retailers has increased, the competition has increased, and the cumulative market share of the main retailers has decreased. In addition, in some countries small retailers start focusing on renewable energy.

6. Discussion and conclusion

The business ecosystem concept is always related to digital or technology sectors. This contribute is the first that adapts the business ecosystem model to the energy sector. Its adaptable nature, its aptitude to take into consideration different variables and its ability to describe the actors' interaction has led to the decision to use it for the energy sector. In addition, there is a need to carry out an empirical work that merges the literature related to the innovation intermediaries to the one related to the business ecosystem. This paper underlines the crucial role played by consumer associations for the development of a policy innovation, in particular their effort to overcome social and culture barriers and their ability to interact with other actors of the business ecosystem.

From this paper, the intermediaries' key role identified by (Geels and Deuten, 2006) has been confirmed. Intermediaries play an aggregator role in the first phase of collective switching, create structures and infrastructure useful for the development of policy innovation (technological platform, relationship with external partners) and transform a supranational need (consumer protection) in a guide for local projects.

Using a case study approach, the study has analysed the key variables that, in different ways, influence the development and the dissemination of an energy policy innovation in a business ecosystem. To do that, the 6C framework was used, in order to study different levels of the system. Deconstructing the business ecosystem into six different macro areas (context, cooperation, construct, configuration, capability and change), it is possible to understand how a business ecosystem works.
Analysing the case studies, it can be seen that the context and the cooperation are the basis for an energy policy development in a business ecosystem. The life cycle industry, its mission, the internal and external barriers and the external partners create the prerequisites for a policy development. The BEUC statement "a collective switching works well when the electricity and gas prices are high, the competition is high and also if consumer association have the ability to support the campaign. If these factors are not met, less interesting tariffs are the result", has been confirmed through the case study analysis. The second area composed by construct, configuration and capability is more static but crucial to achieve change: the marketing investment (necessary to overcome social and market barriers), the supplier and the demand side interest, the "post switching" management (how the switching process is handled) and the company's ability to replicate the acquired expertise in other sectors are the main drivers of change. Finally, changes achieved taking into account the business ecosystem were explored. A closed business ecosystem has limited the policy innovation dissemination; the opposite is true for the open business ecosystem, where virtuous contamination involves other intermediaries and other sectors appear. Nevertheless, it was interesting to study the market behaviour because, as explained by the BEUC Senior Economic Officer, "also in the closed business ecosystem even if the major supplier decided to not participate, something happened. They, in fact, adjust their offers taking into account the winner tariff. The collective switching campaign has the power to rebalance the companies position in the market; this could happen not only in the energy market but also in the telecommunications or in the financial service sectors".

This policy innovation reflects the European Commission: with the "Clean Energy for all European" package, in fact, the European Commission tries to improve the consumers' condition within the energy market. Collective switching aims to improve the customer experience and the competition within the energy market. As said previously, even if the collective switching campaign has no success in a Country, "something happens": the market share is redistributed. Finally, as it emerges in the case study analysis, intermediaries export this policy innovation into other sectors, activating virtuous contamination aimed to protect consumers.

A limitation of this paper lies in the fact that it considers as intermediaries only BEUC consumer associations' members. For structural reasons, in fact, it was decided not to take into consideration other intermediaries that organise in their countries collective switching campaigns. This decision was taken for a data availability problem; however, it could be interesting to analyse also other intermediaries' behaviours with the aim to investigate analogies and differences regarding the way to reach consumers and manage partners. In future researches, additional information will be collected to better understand the context: interviews with energy suppliers and consumers will be conducted. The analysis will also include the role of

other stakeholders that contribute to the business ecosystem development. Finally, a comparison with other sectors will be structured.

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Appendix A: Country statistical profile

Austria	Unit	2011	2012	2013	2014	2015
GDP per capita	USD current PPPs	44254.36	46253.61	47733.78	48602.59	49440.25
Renewable energy	Ktoe	8692.23	9784.99	9946.89	9789.30	9594.93
Households with access to internet	%	75.44	79.28	80.86	80.99	82.42
Unemployment rate: total labour force	%	4.57	4.86	5.34	5.62	5.72
Gross domestic expenditure on RandD	Mln USD	9662.59	10632.03	10785.68	11181.50	11348.58
Total population	'000 persons	8388.53	8426.31	8468.57		
Belgium						
GDP per capita	USD current PPPs	41510.74	42639.08	43756.73	45003.75	45861.43
Renewable energy	Ktoe	3094.25	3350.11	3475.05	3358.31	3321.58
Households with access to internet	%	76.51	77.71	80.05	82.80	81.83
Unemployment rate: total labour force	%	7.14	7.54	8.43	8.52	8.48
Gross domestic expenditure on RandD	Mln USD	9593.16	10528.28	10853.98	11154.66	11280.11
Total population	'000 persons	11047.74	11128.25	11178.44	11227.28	
Chez Republic						
GDP per capita	USD current PPPs	28795.82	29051.39	30496.02	32359.37	33753.17
Renewable energy	Ktoe	2991.49	3206.65	3573.07	3633.49	3571.81
Households with access to internet	%	66.63	65.44	72.62	77.99	78.98
Unemployment rate: total labour force	%	6.71	6.98	6.95	6.11	5.05
Gross domestic expenditure on RandD	Mln USD	4597.46	5225.00	5542.29	5911.87	6098.01
Total population	'000 persons	10496.67	10509.29	10510.72	10524.78	
Denmark						
GDP per capita	USD current PPPs	44407.95	44808.54	46742.94	47809.60	48993.58
Renewable energy	Ktoe	4000.28	4182.93	4328.82	4434.43	4542.16
Households with access to internet	%	90.08	92.00	92.71	93.12	91.74
Unemployment rate: total labour force	%	7.57	7.52	7.00	6.59	6.17
Research and Development (RandD)						
Total population	'000 persons	5570.57	5591.57	5614.93		
France						
GDP per capita	USD current PPPs	37485.25	37671.03	39515.14	40246.86	41199.22
Renewable energy	Ktoe	17902.49	20616.25	22875.36	21304.55	21533.06
Households with access to internet	%	75.92	80.00	81.72	82.96	82.62
Unemployment rate: total labour force	%	8.81	9.40	9.92	10.30	10.36
Gross domestic expenditure on RandD	Mln USD	52388.22	53404.55	53953.31	54300.71	54772.31
Total population	'000 persons	63223.16	63514.00	63786.14	64062.25	
Italy						
GDP per capita	USD current PPPs	35935.48	35757.02	35885.39	36294.10	37255.14
Renewable energy	Ktoe	21023.37	23872.23	26368.15	26512.54	26331.64
Households with access to internet	%	61.57	62.92	68.91	72.61	75.39
Unemployment rate: total labour force	%	8.35	10.65	12.15	12.68	11.89
Gross domestic expenditure on RandD	Mln USD	25299.92	25827.09	26115.99	27498.93	26838.83

Total population	'000 persons	59659.69	59898.03	60224.73	60447.91	

Netherlands

GDP per capita	USD current PPPs	46066.86	46715.50	48679.16	49017.87	50077.59
Renewable energy	Ktoe	3433.00	3544.52	3440.58	3441.05	3621.64
Households with access to internet	%	93.64	93.55	94.63	95.78	95.97
Unemployment rate: total labour force	%	4.98	5.82	7.24	7.42	6.87
Gross domestic expenditure on RandD	Mln USD	14332.49	14452.16	14523.04	15094.96	15493.60
Total population	'000 persons	16693.07	16754.96	16804.43		

Portugal

GDP per capita	USD current PPPs	26780.13	26454.23	27899.48	28806.18	29687.73
Renewable energy	Ktoe	5138.58	4353.82	5325.74	5536.27	4752.88
Households with access to internet	%	57.97	61.02	62.34	64.87	70.23
Unemployment rate: total labour force	%	12.68	15.53	16.18	13.90	12.44
Gross domestic expenditure on RandD	Mln USD	4137.48	3755.31	3574.47	3506.66	3521.94
Total population	'000 persons	10557.56	10514.84	10457.29		

Slovenia

GDP per capita	USD current PPPs	28804.73	28847.36	29537.75	30997.47	31968.21
Renewable energy	Ktoe	1037.32	1076.44	1182.44	1224.33	1052.92
Households with access to internet	%	72.60	73.94	75.62	76.80	77.64
Unemployment rate: total labour force	%	8.17	8.84	10.11	9.67	8.96
Gross domestic expenditure on RandD	Mln USD	1388.86	1437.87	1435.91	1356.18	1287.00
Total population	'000 persons	2052.50	2056.26	2059.11	2061.62	

Spain

GDP per capita	USD current PPPs	32071.61	31991.05	32620.78	33676.82	34726.64
Renewable energy	Ktoe	14831.98	16135.12	17744.11	17768.31	17138.84
Households with access to internet	%	62.71	66.59	69.73	74.35	78.75
Unemployment rate: total labour force	%	21.39	24.79	26.09	24.44	22.06
Gross domestic expenditure on RandD	Mln USD	19543.25	18438.55	17852.49	17637.06	18029.35
Total population	'000 persons	46736.26	46766.40	46593.23	46464.05	

United Kingdom

GDP per capita	USD current PPPs	36440.98	37475.05	39030.29	40719.39	41779.39
Renewable energy	Ktoe	8081.50	8814.53	10476.87	12107.20	13786.31
Households with access to internet	%	82.70	86.80	88.45	89.93	91.25
Unemployment rate: total labour force	%	8.04	7.89	7.53	6.11	5.30
Gross domestic expenditure on RandD	Mln USD	38290.98	37195.86	39027.01	40688.27	42115.01
Total population	'000 persons	62435.20	62858.80	63237.94	63650.01	

Table 5: Country statistical profile

Source: OECD Data (data.oecd.org)

Appendix B: Countries energy profile

Natural gas prices for household consumers are defined as follows: Average national price in Euro per GJ including taxes and levies applicable for the first semester of each year for medium size household consumers.

Electricity prices for household consumers are defined as follows: Average national price in Euro per kWh including taxes and levies applicable for the first semester of each year for medium size household consumer.

Austria	Unit	2011	2012	2013	2014	2015
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	36	41	45	54	56
Cumulative Market Share, Main Retailers - %	%			58.0	52.0	60.0
Electricity						
Retailers to Final Consumers - No	Nr	155	152	154	149	155
Cumulative Market Share, Main Retailers - %	%	62.0	85.0	79.0	80.0	82.0
Prices						
Electricity retail prices	EUR per kWh	0.1986	0.1975	0.2082	0.2021	0.2009
Gas retail prices	EUR per gigajoule	19.2900	21.0500	21.3200	20.7800	20.2800
Belgium						
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	17	22	29	37	46
Cumulative Market Share, Main Retailers - %	%		88.4	79.8	78.2	76.2
Electricity						
Retailers to Final Consumers - No	Nr	31	33	42	37	52
Cumulative Market Share, Main Retailers - %	%	89.0	81.1	92.3	73.9	71.5
Prices						
Elecricity retail prices	EUR per kWh	0.2136	0.2327	0.2173	0.2097	0.2126
Gas retail prices	EUR per gigajoule	17.6000	19.1300	18.3200	18.2700	16.2300
Chez Republic						
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	47	57	74	80	88
Cumulative Market Share, Main Retailers - %	%		82.0	73.9	80.7	77.4
Electricity						
Retailers to Final Consumers - No	Nr	356	360	382	380	390
Cumulative Market Share, Main Retailers - %	%	84.6	69.2	70.2	67.8	67.5
Prices						
Electricity retail prices	EUR per kWh	0.1659	0.1664	0.1681	0.1388	0.1385
Gas retail prices	EUR per gigajoule	15.1247	18.3111	17.8029	15.2285	15.9493
Denmark						
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	14	14.00	14	20	17
Cumulative Market Share, Main Retailers - %	%			90.0	89.0	92.0
Electricity						
Retailers to Final Consumers - No	Nr	33	55	49	50	49

Cumulative Market Share, Main Retailers - %	%					
Prices						
Electricity retail prices	EUR per kWh	0.2908	0.2997	0.3000	0.3042	0.3068
Gas retail prices	EUR per gigajoule	28.6448	27.2187	27.5854	25.2216	22.2915
France						
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	60	77	61	64	66
Cumulative Market Share, Main Retailers - %	%		75.0	76.7	73.9	66.0
Electricity						
Retailers to Final Consumers - No	Nr	183	183	164	167	171
Cumulative Market Share, Main Retailers - %	%	79.0	79.0	85.6	87.2	86.7
Prices						
Elecricity retail prices	EUR per kWh	0.1383	0.1392	0.1524	0.1585	0.1676
Gas retail prices	EUR per gigajoule	16.1100	17.6300	18.8300	19.4700	19.4600
Italy						
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	308	462	335	339	338
Cumulative Market Share, Main Retailers - %	%		53.3	43.8	38.2	38.1
Electricity						
Retailers to Final Consumers - No	Nr	347	412	472	534	579
Cumulative Market Share, Main Retailers - %	%	46.0	44.0	42.0	42.0	41.0
Prices						
Electricity retail prices	EUR per kWh	0.1987	0.2132	0.2292	0.2446	0.2450
Gas retail prices	EUR per gigajoule	19.2700	21.3600	23.1700	22.1400	21.2700
Netherlands						
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	32	32	45	46	51
Cumulative Market Share, Main Retailers - %	%		73.0	69.0	69.0	68.0
Electricity						
Retailers to Final Consumers - No	Nr	35	35	45	46	51
Cumulative Market Share, Main Retailers - %	%	74.0	74.0	76.0	70.0	72.0
Prices						
Electricity retail prices	EUR per kWh	0.1802	0.1850	0.1898	0.1841	0.1986
Gas retail prices	EUR per gigajoule	19.1500	20.5700	21.9600	21.9100	21.0000
Portugal						
Market Indicators						
Natural Gas						
Retailers to Final Consumers -No	Nr	20	22	23	24	25
Cumulative Market Share, Main Retailers - %	%		88.1	83.4	80.1	67.8
Electricity						
Retailers to Final Consumers - No	Nr	10	10	13	14	19
Cumulative Market Share, Main Retailers - %	%	96.0	93.2	91.0	87.5	89.4
Prices						
Electricity retail prices	EUR per kWh	0.1654	0.1993	0.2081	0.2175	0.2279
Gas retail prices	EUR per gigajoule	16.9500	20.5200	23.2300	25.9600	27.1100
Slovenia						

Market Indicators

Natural Gas

Retailers to Final Consumers -No	Nr	20	21	21	21	20
Cumulative Market Share, Main Retailers - %	%		84.2	85.0	85.9	84.0

Electricity

Retailers to Final Consumers - No	Nr	16	13	14	13	18
Cumulative Market Share, Main Retailers - %	%	97.2	96.4	94.9	98.5	93.9

Prices

Electricity retail prices	EUR per kWh	0.1441	0.1542	0.1610	0.1630	0.1589
Gas retail prices	EUR per gigajoule	18.5600	22.1600	18.5700	18.5400	17.4800

Spain

Market Indicators

Natural Gas

Retailers to Final Consumers -No	Nr	33	36	37	44	52
Cumulative Market Share, Main Retailers - %	%		83.6	78.6	75.8	74.2

Electricity

Retailers to Final Consumers - No	Nr	188	121	225	273	267
Cumulative Market Share, Main Retailers - %	%	88.3	88.8	80.9	78.3	78.5

Prices

Electricity retail prices	EUR per kWh	0.1981	0.2190	0.2228	0.2165	0.2309
Gas retail prices	EUR per gigajoule	14.8900	18.3700	20.3400	20.9000	20.3200

United Kingdom

Market Indicators

Natural Gas

Retailers to Final Consumers -No	Nr	16	16	45	43	61
Cumulative Market Share, Main Retailers - %	%		75.6	68.5	74.2	66.8

Electricity

Retailers to Final Consumers - No	Nr	29	29	33	34	37
Cumulative Market Share, Main Retailers - %	%	87.6	85.8	83.1	80.8	77.8

Prices

Electricity retail prices	EUR per kWh	0.1433	0.1682	0.1741	0.1918	0.2125
Gas retail prices	EUR per gigajoule	11.8047	14.4972	14.7385	16.6567	17.6453

Table 6: Country energy profile

Source: http://ec.europa.eu/energy/en/data-analysis/country;
http://ec.europa.eu/eurostat/tgm/table.do?tab=tableandinit=1andlanguage=enandpcode=ten00117andplugin=1;
http://ec.europa.eu/eurostat/tgm/table.do?tab=tableandinit=1andlanguage=enandpcode=ten00118andplugin=1

Conclusions

This thesis analyses the social issue applied to the energy sector. The two papers are very different: the social issue is declined in different ways and different methodologies are used to reach our goals. In the first paper the social issue is represented by the CSR initiatives, categorized in seven dimensions (environmental, community, human rights, employee relations, diversity, product and governance), that explore the industry CSR peculiarities. In the second paper the social issue is represented by a policy innovation developed with the aim of protecting consumers during their switching decision. Methodologies are very different too: the first is an econometric paper; the second is based on a qualitative analysis. The reason lies in the available data difference: in the first case the amount of data available made possible a panel analysis, in the second case there were not available data and for these reason an exploratory analysis was necessary.

The first paper tests the existence of a dynamic, non-linear, endogenous relationship between CSR and economic performance, taking into account sector specificities, differences in economic performance measures and macro-categories of CSR. In particular for the CSR side, seven different measures of CSR engagement were taken into consideration. Indicators provided by KLD were standardised and normalised, generating a measure of the relative goodness or badness of the performance of each company in every aspect of CSR. For the economic side, six economic performance measures (market-based and accounting-based measures) were considered. Arellano Bond technique was used in the dynamic panel to test the endogeneity and the lagged possible impact of each CSR macro-dimension on the economic performance variables. Results suggest strong positive correlations with the TSR indicator and a significantly positive reduction in Financial Risk due to investments in almost all dimensions of CSR. These results are common to all sectors. On the opposite, the accounting-based measures show less clear results. Looking the Oil and Gas sector, it is possible to see that it is characterized to large CSR investments. A possible explanation might be that companies, in this sector, are far more subject to external controls (both by the government and non-governmental organisations) compared to others.

The second paper explores the crucial role played by consumer associations for the development of a policy innovation, in particular their effort to overcome social and culture barriers and their ability to interact with other actors of the business ecosystem. The intermediaries, in this case the consumer associations, aggregate consumer with the same characteristics, create structures and infrastructure useful for the development of policy innovation (technological platform, relationship with external partners) and transform a supranational need (consumer protection) in a guide for local projects. Through a case study approach, there were identified key variables that, in different ways, influence the development and the dissemination of an energy policy innovation in a business ecosystem. Deconstructing the business ecosystem into six different macro-areas (context, cooperation, construct, configuration, capability and change), it was possible to understand how a business ecosystem works. An important aspect that emerges from this analysis is that this policy innovation generates effects not only in the open business ecosystem, but also in the closed ones. In fact, even if the major suppliers decide to not participate to collective switching, they adjust their offers taking into account the winner tariff. Therefore, collective switching campaign has the power to rebalance companies' position in the market; this could happen not only in the energy market but also in the sectors that present the same specificities.

Both studies present limitations. In the firs paper a unique CSR Dataset (MSCI ESG KLD STATS) was used: some ratings were based on subjective interpretation of public and private data, suffering from different conceptualization of the phenomenon as well as data collection and management issues. Replicating the same work with different sources of information could shed new light on the relationship between performance measures, sectorial activities and CSR measures. In addition, the analysis underlines the importance of considering sectorial specificities when assessing the empirical relationship between CSR and firms' performance. Certainly there will be further theoretical research that focuses on each sector to account for and explain the different and somehow unclear pattern of relationships that was discovered in this thesis. The second paper takes into consideration as intermediaries only BEUC consumer associations' members. This decision was taken for a data availability problem; however, it could be interesting to analyse also other intermediaries' behaviours. In addition, in future researches, additional information will be collected to better understand the context: interviews with energy suppliers and consumers will be conducted. The analysis will

also include the role of other stakeholders that contribute to the business ecosystem development. Finally, a comparison with other sectors will be structured.