André Dorsman · Özgür Arslan-Ayaydin
Mehmet Baha Karan *Editors*

Energy and Finance

Sustainability in the Energy Industry

Springer

Energy and Finance

André Dorsman • Özgür Arslan-Ayaydin •
Mehmet Baha Karan
Editors

Energy and Finance

Sustainability in the Energy Industry

Springer

Editors
André Dorsman
VU University Amsterdam
Amsterdam, The Netherlands

Özgür Arslan-Ayaydin
University of Illinois at Chicago
Chicago, Illinois
USA

Mehmet Baha Karan
Business Administration
Hacettepe University
Ankara, Turkey

ISBN 978-3-319-32266-7 ISBN 978-3-319-32268-1 (eBook)
DOI 10.1007/978-3-319-32268-1

Library of Congress Control Number: 2016943644

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG Switzerland

Foreword

Sustainability is a concept embraced by many and rejected by few. But, below the label, what does this concept mean? Sustainable in what sense? Environmental? Economic? Social? How do we move from these lofty goals to the desired outcomes? What are the indirect impacts of pursuing sustainability? Questions abound. Answers are in short supply.

The impressive volume helps to supply some of the needed answers. *Energy, Sustainability and Finance* is a collection of essays connected to the issue of sustainability, especially as it relates to the energy industry. The essays provide solid frameworks for thinking about sustainability issues and generate many tantalizing results. Apart from collecting a particularly knowledgeable group of authors, the editors have made two additional excellent choices: they have taken a multidisciplinary approach—going well outside traditional economic and financial analyses—and have focused on the energy industry—clearly the "ground zero" for many of the issues under discussion.

As a financial economist, I am, by dint of inclination and training, attracted to using financial markets to solve problems. The chapter on "Carbon rights and emissions in the Energy Industry" (Chap. 2) gives pause, as it discusses order imbalance in the European Union carbon trading market and the sensitivity of this market to sparse information from only a few regulators and major economies. The good news is that, while markets suffer imbalances, they are short-lived and quickly corrected. More sobering news is presented in two country studies. "International Arrangements, the Kyoto Protocol and the Turkish Carbon Market" (Chap. 4) documents that the devil is in the details. Without the proper legal and tax infrastructure in place, international environmental agreements will be ineffective. "Governing Energy Transitions: Transition Goals in the Swiss Energy Sector" (Chap. 7) introduces the novel concept of a "price scissors"—the subsidization of renewable energy resources provides large electric utilities, cantons, and cities with favorable economic advantages at the expense of smaller utilities, cantons, and cities. Thus, environmental policy will lead to major shifts in Switzerland in terms of political and economic influences that may have subsequent effects on environmental policy. The law of unintended consequences emerges yet again.

Considerations of terrorism usually evoke feelings of... terror. The interesting essay on "The financial impact of terrorist attacks on the value of the oil and gas industry: An international review" (Chap. 5) examines terror as a business risk and finds that it is largely discounted by stock market investors.

While this result highlights the power of the standard economic paradigm, several chapters disrupt the notion that sustainability can largely be viewed through the prism of economic models. Two insightful essays highlight the interactions between economics and politics. "Red Versus Blue And Going Green In The Energy Industry" (Chap. 3) shows that political preferences of CEOs matter and influence firm behavior. However, "The Economic Drivers of the Political Will for Social Responsibility in Energy Policy for Fossil Fuel Exporting Countries" (Chap. 9) shows that causation flows in the other direction, as economic factors influence the political will to implement environmentally responsible policies.

Environmentally sustainable policies can have additional effects. On the positive side of the ledger, countries that follow environmentally sustainable policies are relatively insulated from oil price shocks, as documented in "The Effect of the Relationship between Oil Price and Stock Markets in Energy Sustainable Countries" (Chap. 8). Alternatively, on the negative side of the ledger, the adoption of such policies may lead to added levels of distorting noise. "When Corporate Social Responsibility Causes Tone Inflation in Earnings Press Releases: Evidence from the Oil and Gas Industry" (Chap. 6) documents that managers of more socially responsible firms unduly inflate earnings releases in order to signal to their shareholders that sustainable investing is not hurting stockholder returns.

Good research takes us outside our traditional paradigms and allows us to see new possibilities for solving problems. A unique element in this book is the examination in two chapters of the role of Islamic finance in addressing sustainability issues—"Green Sukuk: An Innovation in Islamic Capital Markets" (Chap. 10) and "Islamic Finance Compared to Conventional Finance: The Debt Section" (Chap. 11). Islamic finance is built on the principles of justice, equity, and fairness, and there is a need for understanding how these principles impact financial relations in general and those in the energy industry in particular. The chapters do a nice job of introducing the basic concepts of Islamic finance, discussing the ways in which Islamic financial products meet the requirements of Sharia'a Law, and relating the ethical dimensions of Sharia'a Law to the protection of the environment. The latter paper focuses on the returns to sukuk in general and the former paper on one aspect of Islamic finance, green sukuk—Sharia'a-compliant bonds that support environment-friendly investments. An interesting case study of the issuance of a green sukuk by a French energy company in 2012 is also provided. Green sukuk finance has increased from virtually no bonds outstanding in 2007 to over $50 billion in 2014. Given this substantial growth and, more generally, the exponential growth in Islamic financial products in recent years, Islamic financial products and sustainability policies will interact increasingly more frequently in the years ahead.

The authors have made important inroads into the jungle of issues that surrounds sustainability. This volume contains many thought-provoking results and insights that moves thinking forward in important ways. It helps us begin to progress from platitudes to action, from a fragile world to one that is sustainable.

University of Illinois at Chicago and CESifo Robert S. Chirinko
Chicago, IL, USA
March 2016

Contents

Introduction: Energy and Finance

1

André Dorsman, Özgür Arslan-Ayaydin, and Mehmet Baha Karan

Abstract

Sustainability has become a central issue for firms in the energy industry. These firms have been under increasing pressure to uplift not only their environmental consciousness but also social impact of their actions. One constraint of these firms is prevention of trading off shareholder value maximization with increasing their corporate social responsibility activities geared to the long term benefits of stakeholders. Based on the principles of fairness and equity, Islamic Banking and Finance also provides a vehicle for the firms in the energy industry by incentivizing their corporate social responsibility activities.

Keywords

Sustainability • Corporate social responsibility • Islamic banking and finance • Finance and energy

1.1 Introduction

Extraction, transportation and transformation of resources are the stages in the energy industry that are managed by people and subject to human error. Therefore energy industry imposes significant costs on society, including air pollution, oil

A. Dorsman (✉)
VU University Amsterdam, Amsterdam, The Netherlands
e-mail: a.b.dorsman@vu.nl

Ö. Arslan-Ayaydin
University of Illinois at Chicago, Chicago, IL 60607, USA
e-mail: orslan@uic.edu

M.B. Karan
Hacettepe University, Ankara, Turkey
e-mail: mbkaran@hacettepe.edu.tr

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_1

spills, injuries, and even deaths. Perhaps more so than in any other industry, people demand sustainability from energy companies. Nowadays societies require energy companies to do more to guard against risks to society than merely comply with the law. This book intersects the sustainability aspects of the energy industry with finance, namely; trading, pricing, markets and project management. Specifically, this book also reflects the Islamic finance from the perspective of sustainability in the energy industry.

This chapter begins with a discussion of the importance of sustainability for the energy industry. The chapter then provides insight on the environmental and social impacts of the energy firms and the concept of Corporate Social Responsibility (CSR). The next section explains how energy economies, financial market research issues and sustainability are integrated with Islamic Banking and Finance. This section provides some examples of the recent Islamic financing activities geared at improving the environmental impacts of the firms in the energy industry. The next chapter provides the discussion of the chapters of the book showing the relevance of academic research in the area of financing and sustainability in the energy sector for the academics and policy makers. The chapter ends with the last section presenting the conclusions.

1.2 Importance of Sustainability for Energy Industry

Many use the terms sustainability and CSR synonymously. Sustainability amalgamates environmental and social consciousness with economic growth. Moreover, CSR is currently more popular than ever in the business world. CSR goes beyond charity and requires the company to act beyond legal obligations and integrate social, environmental and ethical concerns into company's business process. In other words, in CSR, responsibility of businesses is towards their stakeholders and society at large and thus it extends beyond its legal and enforceable obligations. However, one should note that sustainability and CSR only overlaps when the socially responsible actions acknowledge the long run impact on communities. Put differently, overlapping of sustainability and CSR is ensured when CSR activities do not trade off short-term benefits to stakeholders with some long-term costs.

Demonstrating an authentic and visible commitment to sustainability is a key in building and regaining trust from the stakeholders. Currently almost all Fortune 500 companies publish some form of annual CSR report about their investments in environmental sustainability, and social progress.

Perhaps more so than in any other industry, people demand CSR from energy companies. Energy is one of the industries that are exposed to environmental issues at most. Particularly, oil and gas companies face environmental risks, health and safety risks and liability risks. Extraction, transportation and transformation of resources are the stages in the energy industry that are managed by people and subject to human error. The industry may impose significant costs on society, such as; air pollution, ozone depletion, acid precipitation, forest destruction, emission of

radioactive substances, injuries, and even deaths. The trust of societies has somewhat been shaken by recent environmental and social issues affecting the energy industry.

Currently, managers of the energy industry have been more committed to ensuring sustainability through their CSR activities. In their latest report, Hanna and Lacy (2015) survey 53 CEOs in the energy industry from 30 countries. They report that 94 % of the CEOs in the industry believe that sustainability issues will be critical to the future success. The extension of this outcome is reflected on some activities of the firms targeting at environmental and social issues. For example, in 2002 BP, has developed an initiative that offers micro-credits to the local community in Trinidad and Tobago to start their own businesses. Shell also initiated *LiveWire Smarter Future Programme*, which aims to help young entrepreneurs. In 2014 alone, the programme trained almost 8000 participants.[1]

Growing environmental awareness also has shaped the development of new strands in the energy industry, such as the wind energy. Energy companies have taken environmentally conscious actions such as reducing corporate gas emissions, comprehensively recycling and composting, avoiding harmful extraction of fossil fuels,[2] and policies specifically targeting at minimizing the impact of production on water quality in terms of nutrient, thermal and chemical pollution.

Sustainability is built on three pillars; social, environment and economic concepts. Energy companies have been actively engaging in social and environmental strands in differing terms. This book aims to bring together all these three pillars by providing results from studies investigating the financing activities of the energy firms by incorporating the social and environmental CSR actions.

1.3 Sustainability and Energy Industry: Islamic Banking and Finance

This book also discusses the sustainability concept from the perspective of the Islamic Banking and Finance. Since its inception in the early 1970s the Islamic Banking is one of the world's fastest growing financial markets, with an estimated annual average growth rate of 20 %. This growth is further enhanced during the latest financial crisis.

The attractiveness of the Islamic Banking and Finance lies on its adherence to equitable, fair and socially responsible principles, which were not necessarily prioritized by the conventional banks. The principles of Islamic Banks are based on the notion that they are not only responsible to their shareholders but also to the society. Regardless of religious consideration, Islamic finance has a potential to

[1] http://www.shell.com/sustainability/communities/local-employment-and-enterprise.html

[2] For example, Green Mountain Energy avoids mountaintop removal for coal mining to prevent the destruction of the landscape (https://www.greenmountainenergy.com/wp-content/uploads/2014/04/Ceres-2009.pdf).

provide a model for sustainable changes in the financial system for firms in energy industry (For further details, see, Myers and Hassanzadeh 2013).

Nowadays we see more juxtaposition of CSR and Islamic finance leading the energy industry to be "more green". Through acquiring a part of its external funding requirements from Islamic Financial sources, energy industry can be motivated to be more environmentally conscious. In this vein, Malaysia announced guidelines for issuance of socially responsible sukuk, aimed at helping firms raise money for projects ranging from renewable energy to affordable housing. In April 2014, the Dubai Supreme Council of Energy, a government planning body, and the World Bank signed an agreement to develop funding for the Emirate's green investment programme, including "green" Islamic bonds. Dubai aims to derive 5 % of its energy from sustainable sources and retrofit buildings to reduce energy consumption. Nevertheless, in their study, Ghoddusi and Khoshroo (2015) explains how Islamic Energy Bonds can be used for financing socially responsible projects, such as financing on-grid and off-grid solutions in low-income communities.

1.4 Energy, Sustainability and Finance: Issues Covered in This Book

The chapters selected for this book are genuine academic pieces of writing. All the chapters have undergone blind double peer-review process. The first group of chapters concentrates on the environmental actions of firms in the energy industry. The second group of chapters discusses social impact of energy firms. Lastly the last two chapters introduce the Islamic Banking and Finance and explain its potential role in promoting CSR actions of firms in the energy industry.

1.4.1 Green Energy

Our book starts with chapters discussing the different arrays of green energy from the sustainability perspective.

The second chapter by Jiayuan Chen, Cal Muckley, Don Bredin and Liming Wang is the first to conduct a systematic study of information assimilation in net order flow in the time vicinity of the major policy and macroeconomic announcements in the complete Kyoto Phase of European Union Emissions Trading System (EU ETS). The authors contribute to the information assimilation literature in the European carbon market. Specifically, the authors find that the prevalence of the information assimilation via the indirect channel of net order flow in carbon emissions within the 5 minutes of major relevant announcements.

The next chapter focuses on manager specific characteristics and their potential impact on energy firms' CSR activities, and particularly corporate environmental performance. The authors, Özgür Arslan-Ayaydin and James Thewissen, study whether the political orientation of the managers of the energy firms influence the development of corporate environmental actions. This chapter shows that managers

that contribute to the Democratic party have lower environmental concerns than the managers contributing to Republican party. Their chapter does not show a significant difference between the two types of managers in terms of endorsing environmental strength. Their overall results suggest that political party orientation of a manager in the energy industry has an influence on poor social performance, rather than on promoting and enhancing good environmental performance.

Environmental impact of energy firms came into heightened awareness, particularly their role in global warming, after the ratifications of United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The forth chapter by Doğu Sever and Necmiddin Bağdadioğlu assesses Turkey's obligations deriving principally from the Kyoto Protocol. The authors argue that unless the necessary legal adjustments are established, the carbon trade in Turkey has a potential to be exposed to the carbon trade fraud, which is one of the principle problems in the EU ETS. This chapter provides estimation of Turley's volume of voluntary emissions trade and potential income of emission trade. The chapter concludes with applicable policy suggestions.

The fifth chapter, written by David Holwerda and Bert Scholtens, touches on the strategic risk management. The authors study the impact of terrorist attacks on the stock market returns of firms in the oil and gas industry. Specifically the research question asked by the authors is "Are the companies that are the target of terrorist attack experience a significant abnormal return at or shortly after the event date?" The authors do not find that oil and gas companies that are attacked more frequently react significantly different from those that are attacked less frequently. The chapter concludes that financial markets are found to be efficient in absorbing the impact of the terrorist attacks.

1.4.2 Socially Responsible Investments

Starting with the sixth chapter, the book has more emphasis on the social impact of energy firms.

The writers of the sixth chapter are Özgür Arslan-Ayaydin and James Thewissen. The authors argue that managers of good CSR firms in the oil and gas industry resort to impression management techniques by manipulating the tone of earnings press releases (EPR). The authors investigate 1700 EPR issued by US oil and gas firms between 2005 and 2014. Their results show that, to signal to shareholders that their wealth is not threatened by their CSR involvement, managers of more socially responsible firms opportunistically use more optimistic tone in their EPRs. The authors also find that the tone of the EPR by socially responsible oil and gas firms contains less incremental information value to predict future firm performance.

The next chapter addresses how the Swiss energy transition is governed under changing social and technical system dimensions. The chapter is written by Reinier Verhoog and Matthias Finger. The theoretical contribution of the chapter is extending multi level perspective (MLP) with the concepts of politics, power and

agency by applying in the Swiss energy market. The authors conclude that the promotion of renewable energy through subsidization causes a price scissor effect, which is disadvantageous for small Swiss utilities.

The eighth chapter integrates energy sustainability, economic performance and energy prices. Şahnaz Koçoğlu, Mehmet Baha Karan and Ayhan Kapusuzoğlu are the authors of this chapter. The authors group countries by using the Energy Sustainability Index of World Energy Council (WEC). Then they look at the relationship between stock market performances of the each group and oil prices. They use Johansen Co-integration Test and Granger Causality Test for period between 2004 and 2014. Their results show that the relationship varies in accordance to how the county ranks in the Energy Sustainability Index.

The next chapter is written by John Simpson, Abdulfatah Alsameen and John Evans. The chapter centers on the equilibrium relationships between political risk, domestic stock market prices, global benchmark stock market prices and global oil and gas prices, particularly in the period following the global financial crisis. The chapter provides evidence on ascertaining the relative importance of domestic and global economic factors while explaining that country's political will to implement policies of social responsibility in fossil fuel exports.

1.4.3 Islamic Finance

The last two chapters discuss the sustainability and finance in the energy industry from the perspective of Islamic Banking and Finance.

Green *sukuk* represent a new asset class that lies at the intersection of three investment trends: Islamic mutual funds, socially responsible investments (SRI), and *sukuk* (Islamic bonds). Chapter 10 written by Nafis Alam, Meryem Duygun and Rima Turk Ariss, looks into the potential for Green *sukuk* in major Islamic finance markets. The chapter introduces a means by which environmentally conscious investors can bring the Islamic values into their investing practices.

Finally the last chapter by, Özgür Arslan-Ayaydin, Mohamed Bejaoui, André Dorsman and Khurram Shahzad, provides insight on the external financing by Islamic principles. The research question of the chapter is whether the financial risk-return window is influenced when one invests in bonds that follow the Islamic financing principles. The authors find that, after correcting for risk, the returns on the Islamic bonds (sukuk) are significantly higher than those on conventional bonds.

1.5 Conclusions

Aftermath the recent environmental scandals and social unrests, the sustainability of the activities carried out by firms in the energy industry has attracted tremendous attention. Therefore, energy industry has not only been under higher scrutiny of the public but it is also heavily regulated. Specifically the one of the main questions

centering on this book is how can the firms in the energy industry maximize the shareholder value by also optimizing their CSR activities.

The chapters of these book shed light on timely and innovative concepts by intersecting the energy economics, law and financing with environmental and social activities of energy firms. Furthermore, the last two chapters aim at introducing the Islamic Banking and Finance as a new concept and showing how it can be a vehicle for incentivizing CSR activities of energy firms. The chapters in the book provide important results for not only the academic research in the area of energy economics, social responsibility, law and financial markets, but also practitioners and policy makers. We hope that the readers both enjoy and benefit the book.

References

Ghoddusi H, Khoshroo S (2015) Islamic finance and the energy sector. Howe School of Technology & Management, Islamic Finance and the Energy Sector, 16 Feb 2015

Hanna A, Lacy P (2015) Towards a new era of sustainability in the energy industry. Un Global Compact-Accenture CEO Study.

Myers TA, Hassanzadeh E (2013) The interconnections between Islamic finance and sustainable finance. International Institute for Sustainable Development, Winnipeg

Part I

Green Energy

Carbon Rights and Emissions in the Energy Industry

2

Jiayuan Chen, Cal Muckley, Don Bredin, and Liming Wang

Abstract

In this chapter, we examine high frequency order imbalance in the European Union emissions trading system carbon market at announcements of current and prospective economic activity and verified emissions. We verify that analysts do strive to forecast announcements accurately but that our scheduled public announcements nevertheless indeed do contain important surprise components. Our findings suggest that the preponderance of the order imbalance related information assimilation in carbon emission rights occurs within 5 min of the German (DE NO) and European Union new order (EU NO), European Union industrial production (EU IP) and United States non-farm payroll (US NFP) scheduled announcements. This is new evidence of information assimilation in the carbon emissions market. The extent of information assimilation is documented for 15 min both before and after each announcement in contiguous 5-min windows, and relative to same time interval observations on non-announcement days. The findings are of especial importance to firms in the energy sector as, above certain capacity thresholds, power stations and other combustion plants, oil refineries and coke ovens are regulated in the European Union emissions trading system.

Keywords

Carbon rights • Emissions • Information assimilation • Net order flow

J. Chen, PhD (✉) • C. Muckley • D. Bredin
University College Dublin, School of Business Graduate School of Business, Carysfort Avenue, Blackrock, Co., Dublin, Ireland
e-mail: jiayuan.chen@ucdconnect.ie; cal.muckley@ucd.ie; don.bredin@ucd.ie

L. Wang
University College Dublin Confucius Institute for Ireland, Belfield, Dublin, Ireland
e-mail: liming.wang@ucd.ie

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_2

2.1 Introduction

Does net order flow vary substantively at scheduled macro-economic and verified emission announcements? In this chapter, we address this question to better account for an important candidate channel for the assimilation of information in the European carbon rights market. Regulated European Union carbon emissions stem to a large extent from the European energy industry. The functioning of the European carbon rights market, in respect to the assimilation of new information, is, thus, of paramount importance to the energy industry in Europe.

Traditional ideas of market efficiency suggest that asset prices should completely and instantaneously reflect news in market related fundamentals. However, Biais et al. (2005) conduct a survey and show that market microstructure matters. Due to order handling and inventory costs, adverse selection and market power, trades do have an impact on prices and perfectly efficient allocations are not in general achieved. In particular, with respect to the focus of this chapter, Evans and Lyons (2008) show the importance of net order flow variations to determine currency price dynamics, especially following the arrival of public macro news. The net order flow measurement is calculated as the averaged over the time interval product of best bid price and size minus the product of best ask price and size. It thus reflects the level of order imbalance in the market at a given time. Evans and Lyons (2008) therefore identify an indirect channel of price discovery, which reveals dispersed information to dealers who can revise their spot rate quotes accordingly.

A centrally important concern of scholars, regulators and market practitioners is the capacity of markets to form prices and provide liquidity in response to new information. Indeed, a key question should be how is this market performing from a market microstructure perspective? An extensive microstructure literature has contributed to addressing these issues on mature markets, such as the US equity and government bond markets and the major international foreign exchange markets. An absence of information assimilation at macroeconomic and policy announcements would suggest that the European Carbon market is disconnected from market fundamentals. This should raise important concerns about this markets prospects and feasibility.

In the context of the carbon markets, Conrad et al. (2012) study the direct channel of information assimilation. They show that announcement releases concerning the European Commission National Allocation Plans and unexpected news on the future and current economic development in Germany and the US can have an impact on EUA price dynamics. Bredin et al. (2016) provide evidence in the same vein with respect to prices, trading activity and illiquidity. In this chapter, we contribute to the carbon rights and emissions literature as we provide a novel study of the impact on net order flow of scheduled current and prospective economic announcements and at verified emission announcements. Net order flow can constitute a heretofore overlooked channel for the assimilation of new information in the European carbon market. We outline and we test for stylized regularities in net order flow imbalance which can be related to the information assimilation process, about market fundamentals, around scheduled public announcements.

Our main findings are twofold. First, we verify that analysts do strive to successfully forecast announcements—their forecasts are unbiased estimates of actual announcements, during the sample period 2008–2012 inclusive. However, our scheduled public announcements nevertheless indeed do contain important new information i.e. surprise components. Second, our findings suggest that the preponderance of the information assimilation in carbon emission rights occurs within 5 min of the German (DE NO) and Eurozone new order (EU NO), Eurozone industrial production (EU IP) and the United States non-farm payroll (US NFP) scheduled announcements. Taking these two main findings together, they comprise some evidence consistent with a well-functioning emissions market. This evidence is despite a collapse in carbon prices in the latter 2 years of the Emissions Trading System.

Studies of the functioning of the European Union emissions trading system include that of the Environmental Energy Agency (October, 2012), which has indicated that the European Union as a whole has over-delivered on its Kyoto phase target. Under the Kyoto agreement, the EU was committed to reduce greenhouse gas (GHG) emissions by 8 % (relative to 1990 levels) by 2012. Furthermore, Ellerman et al. (2014) show that the rate of carbon dioxide emissions to GDP has declined markedly since the inception of the European carbon market, and this is unlikely to be entirely due to the long-term secular trend to increasing energy efficiency.

The most significant implemented policy change was the introduction of a single EU wide cap which declines linearly each year by 1.74 % (from 2013). There has also been a variety of other market interventions introduced with a view to curtailing supply. Besides the policy to reduce emissions by 20 % relative to 1990 levels, there is also a policy of improved energy efficiency of 20 % by 2020 and to attain 20 % of energy consumption from renewables, also by 2020. As well as the headline 20–20–20 policy, other policies that are likely to have an influence on allowance prices are the Large Combustion Plant Directive, the Mercury Convention and a range of Community projects under the Article 24a of the EU ETS Directive. Notwithstanding, the EU Commission has postponed auctions to address an evident surplus of carbon allowances. Specifically, the proposed solution involves "back-loading" of these auctions until circa 2018–2019, as a short-term measure. As a long-term measure, a market stability reserve is under discussion within the European Commission and with other stakeholders.

This chapter is the first to conduct a systematic study of information assimilation in net order flow in the time vicinity of the major macroeconomic and policy announcements in the complete Kyoto Phase of the EU ETS market. Our microstructure information variable is observed at the 5-min frequency, both before and after announcements. It therefore offers a new insight into the information assimilation process in net order flow in the Kyoto phase of the EUA futures market relative to prior work (Conrad et al. 2012; Mizrach and Otsubo 2014).

The rest of the chapter is organized as follows. In Sect. 2.2 we present certain stylized regularities in information assimilation in long standing markets and the extant information assimilation literature in the European carbon market. Our methodology to measure information assimilation is detailed in Sect. 2.3. In Sect. 2.4, we provide our main empirical findings in respect to the information content of

announcements and the information assimilation in net order flow in the European carbon market. In Sect. 2.5 we give an overall assessment of our findings, and Sect. 2.6 concludes.

2.2 Information Assimilation Literature

In traditional finance, there are three types of market efficiency with respect to different information sets: the weak form, where prices only reflect historical prices. Second, the semi-strong form where prices reflect all publicly available information. Finally, the strong form of market efficiency is where all information, including public and private information, is fully reflected in the prices. Under the weak form efficiency hypothesis, investors cannot consistently beat the market solely conditional on historical prices. Under the semi-strong form hypothesis, prices jump to new equilibria on arrival of public information, as news affects the fundamental value of assets via market consensus (French and Roll 1986). Under the strong form hypothesis, no higher than normal return, volatility or volume (or other evidence of information assimilation) should be observed prior to public announcements. Otherwise, these findings may indicate unpriced private information present in the markets prior to announcements. In this section, we present a brief assortment of major findings in respect to information assimilation in the longstanding capital markets such as the equity and bond markets. We also provide a synopsis of information assimilation related findings in the European carbon rights market.

2.2.1 Information Assimilation in Longstanding Capital Markets

In regard to information assimilation in the equity market, there is a well-documented set of seminal findings. Morse (1981) found greater trading volume than normal a day before public announcement. Keown and Pinkerton (1981) observe high abnormal return and trading volume prior to merger announcement. Abdel-Khalik and Ajinkya (1982) discover high return a week before analyst earning announcement. Patell and Wolfson (1984) study Broad Tape news announcements of earnings and dividends and show their effects on intra-day United States stock price behavior. They show that stock returns react to news within several minutes and that the observed effects are no longer evident once this time period has elapsed. In contrast, they document an effect on variances and serial correlations which persists for several hours, even extending to the following trading day after announcements. Bomfim (2003) examines pre-announcement effects on the stock market, suggesting that the conditional volatility is abnormally low on days preceding regularly scheduled policy announcements, and increases significantly in the short run after the announcement release. In the same vein, Kalev et al. (2004) document a comparable positive and significant public news announcement impact on the conditional variance of Australian stock returns. Finally, Scholtus et al. (2014) report significant positive returns of high-frequency

trading strategies based on US macroeconomic news releases, which significantly reduces after 300 million-seconds has elapsed post-announcement.

The process of information assimilation in the Treasury bond market has been studied inter alia by Fleming and Remolona (1999), Balduzzi et al. (2001) and Green (2004). Green (2004) shows that trading intensity is lower than normal and bid-ask spreads are wider than normal in the half-hour period prior to announcements and his findings also show the information role of trading subsequent to macroeconomic announcements. In respect to foreign exchange markets, Ederington and Lee (1993) report that foreign exchange rates adjust to news in a large number of small price changes within 10 s of the announcement and that the response is completed within 40 s of the announcement, albeit the change in volatility persists for an additional fifteen minutes. Almeida et al. (1998) find that impacts of announcements on the exchange rate are exclusively present in the 15 min post announcement period. Studying limit orders in the U.S. Treasury market around macroeconomics news announcements, Jiang et al. (2014) show that high-frequency trading activities widen spreads during the pre-announcement period and reduce depth on the order book during the post-announcement period.

With the availability of limit orderbooks and the development of market microstructure theory, the academic literature has put more focus on signed transactions, i.e., net order flow—our measure of trading activity. As the averaged over the interval product of best bid price and size minus the product of best ask price and size, it is calibrated to reflect the level of order imbalance at a given time. In a market microstructure framework, net order flow is indicative of private information, and it is found to play a core role in price discovery. Evans and Lyons (2008) show the importance of net order flow variations to determine currency price dynamics, especially following the arrival of public macro news. Using a similar measure, net signed volumes, Hendershott et al. (2015) find that institutional order flow predicts news announcements, which suggests significant price discovery in the U.S. stock market.

2.2.2 Information Assimilation in the European Carbon Market

The preponderance of the EU ETS literature has focused on market operating and pricing mechanisms (Bredin and Muckley 2011), and the economic impact of the EU ETS market (Zhang and Wei 2010), whereas only a small number of the published articles have studied transaction level information assimilation in this market. Indeed, previous related work, largely focuses on the announcement effects on returns (e.g. Conrad et al. 2012), with only indirectly related studies of the volatility, spread and trading volume issues (e.g., Mizrach and Otsubo 2014), evident in the literature.

The exceptions include Chevallier (2009), Rittler (2012), Conrad et al. (2012), Bredin et al. (2014) and Bredin et al. (2016). Conrad et al. (2012) studied high frequency data with a view to examining the impact of the European Commission's second National Allocation Plan (NAP) as well as a set of scheduled

macroeconomic news on the EUA Futures returns from 2006 to 2010. An especially important exception to the dearth of contributions to the literature on information assimilation at high frequency around publicly scheduled announcements, in the European carbon market, is the study by Conrad et al. (2012). Conrad et al. (2012) report that several of their scheduled announcements influence EUA futures returns immediately or within several minutes subsequent to the announcements. They show, accounting for intra-day periodicity, volatility clustering and volatility persistence, that EUA prices do respond to good news in regard to current and expected economic activity in Germany and the United States. They also find that European Commission decisions on second National Allocation Plans have a strong and immediate impact on EUA prices. In a similar vein, Mizrach and Otsubo (2014) show that realized volatility, bid ask spreads and adverse selection costs decline with verified emission releases in April, which is indicative of information assimilation at these announcements.

Turning to the types of agents evident in the market, Kalaitzoglou and Ibrahim (2013) study transaction-by-transaction December 2008 expiration futures data. They find that informed, fundamental and uninformed traders prevail in the EU ETS, with faster reactions from fundamental traders in Phase II. Bredin et al. (2014) show that accounting for duration between trades there is a negative contemporaneous volume volatility relation in the EU ETS futures market on December 2005 to December 2012 expiration contracts. This finding suggests a predominance of liquidity (uninformed) traders in the market. Nevertheless, Mizrach and Otsubo (2014) provide evidence of strategic trading by informed institutional traders (positively autocorrelated trade direction, short time intervals between trades and a large adverse selection component of the bid-ask spreads). This result indicates, as in well traded capital markets (Fleming and Remolona 1999; Balduzzi et al. 2001; Green 2004; Riordan et al. 2013), a potential for a period of information asymmetry across agent types after informative announcements. Informed and fundamental traders may thus communicate their insight by their trading decisions and thus influence the information assimilation process related to publicly scheduled announcements.

We contribute to the information assimilation literature in the European carbon market. Our study accounts for observations on the net order flow variable (Green 2004) in time intervals both before and after regulatory and macroeconomic announcements. Hence, we follow studies in long-standing capital, bond and currency markets. Our study can thus give an indication of changes in the liquidity, and thus of relative market efficiency (see Chordia et al. 2005, 2008), about informative announcements in the European carbon market. Net order flow has been associated with return prediction and liquidity, and is pertinent to the price discovery process (Evans and Lyons 2005, 2008; Mizrach and Otsubo 2014). As a result, in this chapter, we test, in the European carbon market, for stylized regularities or behavioral patterns which have been established with respect to information assimilation in net order flow in long-standing capital, bond and currency markets (Table 2.1).

Table 2.1 Description of variables

Panel A Net order flow information					
Definition	The product of best ask-price and ask-size subtracted from the product of best bid-price and bid-size, averaged within each equidistant time interval				
Frequency (min)	1	5	10	30	60
Maximum	45,134.95	70,437.38	75,134.00	75,651.66	75,408.82
Minimum	−41,400.00	−43,470.00	−41,787.50	−39,202.85	−43,523.49
Mean	0.83	4.14	8.27	24.82	49.63
Interpolation (%)	62	22	10	3	2

Panel B Scheduled announcement			
a. Future economic outlooks			
Symbol	Announcement	Source	Release Date
DE Ifo	German Ifo business climate	IIER	3 weeks into the month
DE ZEW	German ZEW sentiment	ZEW	2nd/3rd Tue of the month
DE NO	German factory new orders	Destatis	35 days after month end
EU NO	Eurozone industrial new orders	Eurostat	[a]
EU CCI	Eurozone consumer confidence	Eurostat	20 days after month end
US CS	US consumer sentiment	U. Michigan	Middle of the month
US PMI	US ISM manufacturing PMI	ISM	1st day after month end
b. Current economic activity			
Symbol	Announcement	Source	Date
EU IP	Eurozone industrial production	Eurostat	45 days after month end
DE IP	German industrial production	Destatis	40 days after month end
FR IP	French industrial production	INESEE	40 days after month end
UK IP	UK industrial production	ONS	40 days after month end
US NFP	US non-farm employment change	BLS	1st Friday after month end
c. Verified emission announcements			
Symbol	Announcement	Date	Release time
VE	Access to installation-level 2008 verified emissions	1/4/2009	12:00 CET
VE	Access to installation-level 2009 verified emissions	1/4/2010	12:00 CET
VE	Access to installation-level 2010 verified emissions	1/4/2011	12:00 CET
VE	Access to installation-level 2011 verified emissions	2/4/2012	12:00 CET

This table presents a brief description of the data sample. Panel A gives the definition of *net order flow* as well as the summary statistics; Panel B provides descriptive information on the set of public announcements examined. The announcement times are shown in London local time

[a]The Eurozone Industrial New Orders (EU NO) was discontinued by the European Statistical System Committee in May 2012

2.3 Methodology: The Measurement of Information Assimilation

In this section, we present our methodology to identify different information assimilation, if any, in market micro-structure behavior in net order flow on announcement days compared to non-announcement days.

2.3.1 Modeling the Surprise

Following standard event studies, we estimate surprises, by subtracting the forecasts from the actual announcements, which exhibit an unbiasedness property in respect to related announcements. An empirical diagnostic test of the unbiasedness of expectations is available in Table 2.2. Consistent with Balduzzi et al. (2001) and Conrad et al. (2012), we measure the standardized surprise S_t^k of announcement type k at time t as

$$S_t^k = \frac{\left(A_t^k - F_t^k\right)}{\sigma^k}, \tag{2.1}$$

where A_t^k and F_t^k denote the actual and forecast values of public announcement k released at time t. The standard deviation of surprises of announcement k across our entire sample period is denoted as σ^k. As we thus normalize our surprises, the

Table 2.2 Unbiasedness test

	No. of obs.	$\widehat{\beta}_1$	$\widehat{\beta}_2$	R^2	Wald test
DE Ifo	50	−0.075	1.004	0.982	0.039
DE ZEW	51	−1.427	0.928	0.936	4.255**
DE NO	51	−0.005	2.086***	0.466	11.579***
EU NO	41	0.001	1.011	0.597	0.007
EU CCI	50	−0.524	0.989	0.936	0.089
US CS	51	8.735*	0.860	0.708	3.140*
US PMI	51	1.139	0.982	0.917	0.192
EU IP	51	−0.001	0.882	0.670	1.779
DE IP	51	−0.003	1.423**	0.511	4.516***
FR IP	51	−0.001	1.188	0.280	0.477
UK IP	51	−0.002	0.875	0.416	0.710
US NFP	51	−120.127	0.725	0.080	0.615

This table presents an unbiasedness test with respect to our analyst expectations, estimates, and actual announcements. $\widehat{\beta}_1$, $\widehat{\beta}_2$ and R^2 correspond to the OLS estimates and R-square from the regression $A_t = \beta_1 + \beta_2 F_t + \varepsilon_t$, where A_t and F_t denote the actual and forecast announcement at time t, respectively. $\widehat{\beta}_1$ and $\widehat{\beta}_2$ are tested against the null hypotheses $\beta_1 = 0$ and $\beta_2 = 1$; the last column *Wald test* reports the F statistic of the joint hypothesis $\beta_1 = 0$ and $\beta_2 = 1$. *, ** and *** denote significant level at 10 %, 5 % and 1 %, respectively

information assimilation parameters of interest are directly comparable in magnitude across different announcements.

2.3.2 Announcement Versus Non-announcement Days

We study information assimilation by looking at the market behavior of our response variables on announcement days compared to non-announcement days. The adopted methodology is consistent with the approach of Balduzzi et al. (2001). We categorize our EUA Futures data into different groups such that G_k contains all observations on announcement days of announcement type k, whereas G_0 contains all other observations on non-announcement days (days without any announcement event of our interest). We calculate the absolute mean net order flow in the time vicinity of announcement k from group G_k, and that of the same time period from group G_0. We thus effectively investigate the information assimilation on announcement days by a straightforward time interval specific test of the equality of the means from the study group G_k and from the control group G_0. The associated ratio of means is calculated as

$$ratio_i^k = \left(\frac{1}{N_k} \sum_{\{Y_{n,i} \in G_k : i \in I_k\}} |Y_{n,i}|\right) / \left(\frac{1}{N_0} \sum_{\{Y_{n,i} \in G_0 : i \in I_k\}} |Y_{n,i}|\right) \tag{2.2}$$

where $Y_{n,i}$ denote the observation at the ith 5-min time interval on day n, and N_k and N_0 denote the number of days within group G_k and G_0 respectively. I_k is a set of time intervals in the time vicinity of announcement k (Fig. 2.1).

To enable comparison with the received literature,[1] for each announcement, we select to focus on three time intervals in the lead period, before the announcement, one at the announcement, and two in the lag period, after the announcement. In other words, we cover the period from 15 min before to 15 min after each announcement. Let i_k denote the time interval at the beginning of which announcement k is released, on a scheduled announcement day, and hence $I_k = \{i_k - 3, i_k - 2, i_k - 1, i_k, i_k + 1, i_k + 2\}$. Finally, the significance of the difference between the numerator and denominator of the ratio, $ratio_i^k$, is tested using a two-sample t-test.

[1] For example, Balduzzi et al. (2001) examine the window from 30 min before to 45 min after an announcement.

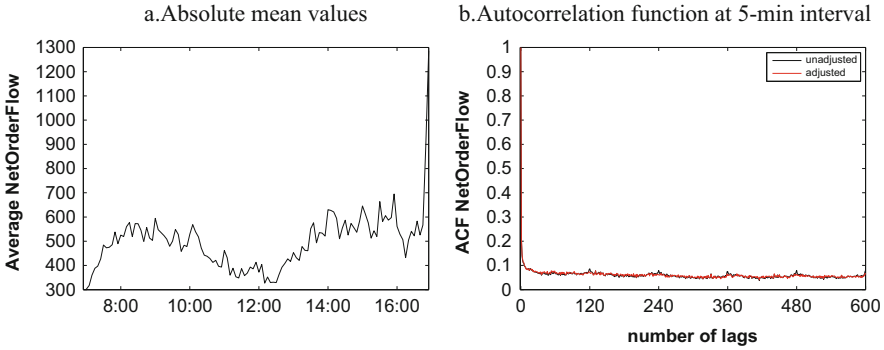


Fig. 2.1 Net order flow intraday seasonality. This figure shows the intraday seasonality of net order flow. Subfigure (**a**) illustrates the absolute average net order flow of every 5-min interval across all sampling days; and subfigure (**b**) presents the auto-correlation function up to 5 consecutive days. The adjusted ACF marked in *red* from subfigure (**b**) is calculated from the filtered data, where each observation is scaled by the absolute mean value of the corresponding time interval across all sampling days

2.3.3 Announcements

Our set of scheduled public macro-economic and regulatory announcements is consistent with that examined by Conrad et al. (2012) (namely, Germany Ifo index, German ZEW index, German new orders, EU new orders, EU consumer confidence index, US consumers sentiment, US manufacturing PMI, EU/German/French/UK industrial production, and US nonfarm payrolls), and we add to this set of news announcements, the EU ETS verified emissions announcements.[2] We also avail of a broad set of synchronized survey data on market analysts' expectations, which allow us to infer the prevalence of new information across our set of scheduled public announcements. Our announcement forecasts are collected at the Forex Factory. The Forex Factory (http://www.forexfactory.com) collates forecasts of macroeconomic indices which are constructed at Thomas Reuters or Bloomberg. The consensus analyst estimates are used to identify the information content of announcements.

Macroeconomic announcements are generally categorized into either leading or coincident indicators. We adopt two measures for our coincident (or current economic activity) indicator; EU and country specific industrial production and nonfarm payrolls. Our leading indicators are used to indicate where the EU and particular economies are headed in the future.[3] Our selected leading indicators represent a range of country specific and EU statistical and survey data.

[2] We leave to future work other macroeconomic announcements e.g. in Latin America, Asia and the Middle East, which can have a bearing on European economic performance and carbon emissions.

[3] Besides the EU, we focus on industrial production for the three largest EU economies: Germany, France and the UK.

This set of leading indicators comprises several indices. First, the German Ifo index which is based on ca. 7000 monthly survey responses of firms in manufacturing, construction, wholesaling and retailing and widely cited as an early indicator of economic activity. Second, the German ZEW index which reflects the views of up to 350 financial experts regarding expected economic conditions in Germany over the coming 6 months. Third, the German/EU New Orders which is compiled by Destatis/Eurostat has received considerable empirical support (Alexander and Stekler 1959; Döpke et al. 1994)[4]. Fourth, the EU (consumer sentiment) consumer confidence index covers 23,000 households in the Euro Area, in respect to current economic and financial conditions, savings intention, as well as on expected developments regarding: consumer price indexes, general economic situation and major purchases of durable goods.

Fifth, the US consumer sentiment - The University of Michigan consumer sentiment index represents (500) consumer's attitudes for both the present economic situation as well as expectations of future economic conditions. Finally, the set of announcements also includes the US Institute for Supply Management (ISM) Purchasing Managers Index (PMI) which is published on the first business day of every month and is derived from surveys of private sector firms. The PMI (or sometimes referred to as the ISM) is an indicator of the economic state of the manufacturing sector. The PMI index is based on five major indicators: new orders, inventory levels, production, supplier deliveries and the employment environment.

2.4 Empirical Findings

In this section, we report our main empirical findings with respect to the significant variation in time interval specific net order flow measurement in announcement vis-à-vis non-announcement days. To begin, we report our findings with respect to the unbiasedness of the mean analyst expectations. This is our assessment of the quality of our surprise—new information—estimates. The imperfect extent to which these analysts' mean forecasts account for our scheduled announcements implies new information content in our scheduled public announcements.

2.4.1 Do Publicly Scheduled Announcements Contain New Information?

We extend the work of Conrad et al. (2012) to show that while mean analyst forecasts show strong evidence of unbiasedness in respect to announcements during the entirety of phase II of the European emissions trading system, there is frequently a substantive unexplained surprise component in the scheduled announcements. It

[4] See, De Bondt et al. (2013) Introducing the ECB Indicator on Euro Area Industrial New Orders, Occasional Paper Series, No. 149 for an up to date overview.

is this new information that we expect can be assimilated into EUA prices via the indirect channel of net order flow as a conduit to reflect dispersed information.

In Table 2.2, we report Wald tests with respect to the joint null hypothesis that our analyst estimates are of a good quality. Our joint null hypothesis contains two components. First, unbiasedness—the analyst forecasts are, on average, in expectation, equal to the actual observed announcements. Second, that there is no systematic component of announcements that is not accounted for in the variation in analyst forecasts. It is evident that there is no instance where this joint null hypothesis is rejected at the 5 % level of statistical significance. As a result, at the 5 % significance level, our mean analyst forecasts are unbiased estimates of the announcements. Given that we thus verify that our analyst mean forecasts are on average correct we have thus identified an unbiased estimate of the surprise element of the announcement information. It is this surprise element that we assume can potentially result in substantive variation in the net order flow measurements on announcement days, during specific time intervals about the announcements, not observed on non announcement days.

Finally, it is also noteworthy in Table 2.2, that mean analyst forecasts generally account for about 60 % of the variation in announcements over time. Exceptions include the German business climate index (DE Ifo), the Eurozone consumer sentiment index (EU CCI) and the United States purchasing managers index (US PMI) where almost all of the variation in the announcements is accounted for by variation in the mean analyst forecasts; but also United States nonfarm payroll (US NFP) where less than 10 % of the variation in announcements is accounted for in variation in mean analyst forecasts. Notwithstanding, the mean analyst forecasts of United States nonfarm payroll (US NFP) announcements are unbiased. These latter findings suggest the centrally important news aspect of the detailed scheduled public macro-economic and verified emissions announcements. It is this news aspect of announcements which we expect can be revealed to market dealers via announcement related variation in net order flow.

2.4.2 Announcement Day Versus Non-announcement Day Net Order Flow Measurements

First, from Table 2.3, the time interval with the greatest evident information assimilation is the immediate 5-min time interval after the announcement. This is indicative of a relatively rapid trading response to new information on the part of traders in the European Union Emissions Trading System, who interpret the new information contained in the announcement. In particular, net order flow is more than twofold higher after German (DE NO) and Eurozone new order (EU NO) announcements and announcements concerning European Union industrial production (EU IP). The greatest change in net order flow, in this contemporaneous time interval, occurs in respect to United States non-farm payroll (US NFP) announcements. The smallest significant change in net order flow, in this

Table 2.3 Announcement effects on net order flow

	−15 to −10	−10 to −5	−5 to 0	0 to 5	5 to 10	10 to 15
DE Ifo	0.760	1.073	1.121	1.269	0.952	1.167
DE ZEW	1.463	0.988	1.359	1.154	0.931	3.067***
DE NO	0.858	1.024	0.912	2.096**	0.915	0.769
EU NO	0.907	0.827	1.425	2.431***	0.921	1.319
EU CCI	0.792	0.727	0.683	0.832	1.062	1.036
US CS	0.939	1.142	1.088	1.403	0.748	0.728
US PMI	0.885	0.798	0.622	1.576*	0.564	0.602
EU IP	1.410	1.317	2.465***	2.132***	1.820*	0.942
DE IP	1.015	1.189	0.819	1.296	1.495	0.865
FR IP	1.006	1.142	1.238	0.973	0.784	0.536
UK IP	0.989	0.857	0.814	0.703	0.764	1.138
US NFP	0.931	1.008	0.843	2.832***	0.925	0.898
VE	4.262***	2.944	0.890	0.537	0.320	0.546

This table reports the average announcement effects on net order flow at 5-min frequency. The absolute mean ratios of net order flow on announcement days relative to non-announcement days are calculated for each announcement, up to three intervals in the pre-announcement period and six intervals in the post-announcement period. *, ** and *** denote significant level at 10 %, 5 % and 1 % respectively, under the null hypothesis of the ratio equal to one

contemporaneous time interval, occurs in respect to United States PMI (US PMI) announcement.

Second, while the greatest incidence of information assimilation is evident in the 5-min time interval after the announcement there is also significant evidence of lead and lag information assimilation within the 15 min time interval before the announcement. In particular, there is substantive lead heightened (2.465) net order flow in the 5 min before the European Union industrial production (EU IP) announcement. Furthermore, in the 15–10 min time interval before the verified emissions (VE) announcement there is a greater than fourfold increase (4.262) in the net order flow measurement. This lead variation in net order flow, before the European Union industrial production (EU IP) and verified emissions (VE) announcements suggests unusual announcement day trading activity which is consistent with traders taking positions in the European Union carbon market with respect to anticipated new information which is about to be released.

Finally, turning to the extent of significant net order flow imbalances, on announcement relative to non-announcement days, in the 5–15 min time intervals after announcement, there is also evidence of substantive variation in these measurements after announcements. For instance, the net order flow imbalance evident in the 5-min windows immediately before and after a European Union industrial production (EU IP) announcement persists in the 5–10 min window after this announcement. Albeit, the net order flow imbalance, in the 5–10 min window after this latter announcement, is weaker both in magnitude and in statistical significance than indicated by preceding net order flow imbalance measurements. In addition, in the 10–15 min window after the German ZEW (DE ZEW)

announcement net order flow spikes and is more than 3 (3.067) fold higher than it is on non-announcement days. This post announcement delayed substantive heightening of net order flow is consistent with delayed information assimilation on the part of traders in the European Union emissions trading system.

2.5 Overall Assessment of Results

Measured as the product of best bid price and size minus the product of best ask price and size, net order flow (order flow imbalance) reflects the dispersed information available to traders/dealers. It is reportedly a key measurement of the price discovery process in the financial market (see e.g., Brandt and Kavajecz 2004). Further, O'Hara (2003) argues that asset pricing models need to incorporate liquidity and the cost of price discovery. Most important, with respect to this chapter, Evans and Lyons (2008) show that net order flow variations determine currency price dynamics, especially following public macro-economic news. In this chapter, we discuss the impact of the major EU and US macroeconomic and policy announcements on the net order flow of EU carbon emissions. Our study therefore sheds light on the efficiency and market microstructure of the EU ETS.

We begin our empirical analyses by addressing the question "*Do publicly scheduled announcements contain new information?*". We conduct Wald tests on the joint null hypothesis that the analyst forecasts are equal to the actual announcements in expectation, and that there is no systematic unaccounted variation in actual announcements. We find that except for German New Orders (DE NO) and German Industrial Production (DE IP), that our mean analyst forecasts are unbiased estimates of the announcements at the 1 % significance level. Moreover, we find that the mean analyst forecasts account for about 60 % of the variation in announcements over time. We thus identify the surprise component in the scheduled announcements, which is the variation that is unaccounted for by the mean analyst forecasts. It is this *new information* which can potentially result in substantive movement in the net order flow in the proximate time period of the announcements, on announcement days compared to non-announcement days.

Next, we test specifically for the significance of the difference in net order flow on *announcement days* versus *non-announcement days*. Our method includes (i) calculating the *ratio* of average order flow imbalance at time intervals shortly before and after an announcement on announcement days versus that of the same time intervals on non-announcement days. And we conduct (ii) a two-sample t test for whether this *ratio* significantly differs from *one*. The empirical results show three key features. First, the greatest evident information assimilation occurs in the immediate 5-min time interval after an announcement. For example, net order flow is more than twofold higher after German (DE NO) and European new order (EU NO), European industrial production (EU IP) and the United States non-farm payroll (US NFP) announcements, than it is in the same time periods on non-announcement days. This finding is indicative of swift information assimilation in the European Union Emissions Trading System. Second, there is also significant evidence of lead information assimilation within the

15-min time interval before the announcement. In particular, substantive lead heightened net order flow is observed up to 15 min before the European Union industrial production (EU IP) and the verified emissions (VE) announcements. This lead variation in net order flow suggests unusual announcement day trading activity which is consistent with traders taking positions in the European Union carbon market with respect to anticipated new information which is about to be released. Finally, we observe significant order flow imbalances, on announcement days relative to non-announcement days, in the 5–15-min time intervals after announcements. For instance, this is a relatively pronounced finding in respect to European industrial production (EU IP) and German ZEW index (DE ZEW) announcements. This latter post announcement substantive heightening of net order flow is consistent with delayed information assimilation on the part of traders in the European Union emissions trading system.

The overall results support the notion that the European Union and United States scheduled macroeconomic and policy announcements are reflected in informational assimilation in the European Carbon market. The implication is that price discovery does reflect new information in the European Carbon market, which is indicative of a level of (at least) imperfect market efficiency in this new market.

2.6 Summary and Conclusions

In this chapter, we assert the information content, in respect to the European Carbon market, of scheduled public European and United States macroeconomic and verified emissions announcements. To do this, we test net order flow variation in the European Union emissions trading system in the proximate time period of these announcements. In light of the regulation of the energy sector in the European carbon market, evidence of a well-functioning market, or otherwise, is especially important for agents within this sector.

The quality of EU ETS price signals has been a focus of controversy in respect to the light shed by these signals on the functioning of the European carbon market. In the Kyoto Phase of the EU ETS the price signals tumbled quite dramatically, however, European economies had been on a low or negative economic growth path during this time and the costs associated with emissions reductions should reflect the economic conditions. Indeed, Article 1 of the EU ETS Directive states that the objective of the scheme is to "promote reductions of greenhouse gas in a cost-effective and economically efficient manner" (Page 6). As a result, price signals are not necessarily a reflection of the quality of functioning of the emissions trading system. Instead, we propose that tests concerning how well the market assimilates new information should be of paramount importance.

Does net order flow vary substantively at scheduled current and prospective economic announcements and at scheduled verified emission announcements? In this chapter, we have addressed this question with a view to better accounting for this candidate channel in the assimilation of information in the European carbon market. We find that that the preponderance of the information assimilation via the indirect channel of net order flow in carbon emission rights occurs within 5 min of

the German (DE NO) and European new order (EU NO), European Union industrial production (EU IP) and United States non-farm payroll (US NFP) scheduled announcements. Whether or not EUA price variation is indeed better accounted for by this documented variation in net order flow, at macro-economic and emissions related scheduled announcements, is an open question which we leave to future research.

References

Abdel-Khalik AR, Ajinkya BB (1982) Returns to informational advantages: the case of analysts' forecast revisions. Account Rev 57(4):661–680

Alexander SS, Stekler HO (1959) Forecasting industrial production – leading series versus autoregression. J Polit Econ 67(4):402–409

Almeida A, Goodhart C, Payne R (1998) The effects of macroeconomic news on high frequency exchange rate behavior. J Financ Quant Anal 33(3):383–408

Balduzzi P, Elton E, Green C (2001) Economic news and bond prices: evidence from the U.S. treasury market. J Financ Quant Anal 36:523–543

Biais B, Glosten L, Spatt C (2005) Market microstructure: a survey of microfoundations, empirical results, and policy implications. J Financ Mark 8:217–264

Bomfim A (2003) Pre-announcement effects, news effects, and volatility: monetary policy and the stock market. J Bank Financ 27:133–151

Brandt M, Kavajecz K (2004) Price discovery in the U.S. treasury market: the impact of orderflow and liquidity on the yield curve. J Financ 59:2623–2654

Bredin D, Muckley C (2011) An emerging equilibrium in the EU emissions trading scheme. Energy Econ 33:353–362

Bredin D, Hyde S, Muckley C (2014) A microstructure analysis of the carbon finance market. Int Rev Financ Anal 34:222–234

Bredin D, Chen J, Muckley C (2016) Is information assimilated at announcements in the European carbon market? Working paper series, Centre for Financial Markets, University College Dublin

Chevallier J (2009) Carbon futures and macroeconomic risk factors: a view from the EU ETS. Energy Econ 31:614–625

Chordia T, Sarkar A, Subrahmanyam A (2005) An empirical analysis of stock and bond market liquidity. Rev Financ Stud 18(1):85–129

Chordia T, Roll R, Subrahmanyam A (2008) Liquidity and market efficiency. J Financ Econ 87 (2):249–268

Conrad C, Rittler D, Rotfuß W (2012) Modeling and explaining the dynamics of European Union allowance prices at high-frequency. Energy Econ 34:316–326

De Bondt G, Dieden HC, Muzikarova S, Vincze I (2013) Introducing the ECB indicator on euro area industrial new orders. ECB Occasional Paper, 149

Döpke J, Krämer JW, Langfeldt E (1994) Konjunkturelle Frühindikatoren in Deutschland. [Leading indicators for the business cycle in Germany, with english summary]. Konjunkturpolitik 40 (2):135–153

Ederington L, Lee J (1993) How markets process information: news releases and volatility. J Financ 48(4):1161–1191

Ellerman A, Marcantonini D, Zaklan A (2014) The EU ETS: eight years and counting. Working paper, EUI RSCAS

Evans M, Lyons R (2005) Do currency markets absorb news quickly? J Int Money Financ 24:197–217

Evans M, Lyons R (2008) How is macro news transmitted to exchange rates? J Financ Econ 88:26–50

Fleming J, Remolona E (1999) Price formation and liquidity in the U.S. treasury market: the response to public information. J Financ 54(5):1901–1915
French K, Roll R (1986) Stock return variances: the arrival of information and the reaction of traders. J Financ Econ 17:5–26
Green T (2004) Economic news and the impact of trading on bond prices. J Financ 59 (3):1201–1234
Hendershott T, Livdan D, Schürhoff N (2015) Are institutions informed about news? J Financ Econ 117:249–287
Jiang G, Lo I, Valente G (2014) High-frequency trading around macroeconomic news announcements: evidence from the US treasury market. Bank of Canada Working Paper, 2014-56
Kalaitzoglou I, Ibrahim B (2013) Does order flow in the European carbon futures market reveal information? J Financ Mark 16:604–635
Kalev P, Liu W, Pham P, Jarnecic E (2004) Public information arrival and volatility of intraday stock returns. J Bank Financ 28:1441–1467
Keown A, Pinkerton J (1981) Merger announcements and insider trading activity: an empirical investigation. J Financ 36:855–869
Mizrach B, Otsubo Y (2014) The market microstructure of the European climate exchange. J Bank Financ 39:107–116
Morse D (1981) Price and trading volume reaction surrounding earnings announcements: a closer examination. J Account Res 19:374–383
O'Hara M (2003) Presidential address: liquidity and price discovery. J Financ 58:1335–1354
Patell J, Wolfson M (1984) The intraday speed of adjustment of stock prices to earnings and dividend announcements. J Financ Econ 13:223–252
Riordan R, Storkenmaier A, Wagener M, Zhang S (2013) Public information arrival: price discovery and liquidity in electronic limit order markets. J Bank Financ 37:1148–1159
Rittler D (2012) Price discovery and volatility spillovers in the European Union emissions trading scheme: a high-frequency analysis. J Bank Financ 36(3):774–785
Scholtus M, van Dijk D, Frijns B (2014) Speed, algorithmic trading, and market quality around macroeconomic news announcements. J Bank Financ 38:89–105
Zhang Y, Wei Y (2010) An overview of current research on EU ETS: evidence from its operating mechanism and economic effect. Appl Energy 87:1804–1814

The Green Thumb in the Energy Industry: The Impact of Managerial Political Affiliation on Corporate Environmental Performance

3

Özgür Arslan-Ayaydin and James Thewissen

Abstract

This chapter tests the upper echelons theory of Hambrick and Mason (Acad Manage Rev 9:193–206, 1984) by investigating whether managers' political party affiliation (liberal or republican) explains the environmental performance of firms in the energy industry. Based on the environmental scores compiled by Kinder, Lyndenberg and Domini Research and Analytics, Inc., we show that the political affiliation of managers in the US between 1996 and 2013 is a key factor in explaining differences in corporate environmental performance. Specifically, firms with Democratic managers have a stronger environmental performance than those with Republican managers. Additionally, while firms with Republican CEOs have lower environmental concerns than those with Democratic CEOs, there is no significant difference in their environmental strengths. These results suggest that the political ideology of the CEO has more impact on abating poor environmental performance than in promoting and enhancing good environmental performance. We conclude that political orientation of managers is a key determinant in the development of corporate environmental strategies in the energy industry.

This research was carried out thanks to financial support in the form of a grant from the Flemish IWT and the Hercules Foundation (Project No. AKUL/11/02). We thank Malika Sareshwala for her work as a research assistant.

Ö. Arslan-Ayaydin
University of Illinois at Chicago, Chicago, IL 60607, USA
e-mail: Orslan@uic.edu

J. Thewissen (✉)
Accounting, Finance and Insurance, Katholieke Universiteit Leuven, Korte Nieuwstraat 33, 2000 Antwerp, Belgium
e-mail: James.Thewissen@kuleuven.be

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_3

Keywords
Energy firms • Environmental performance • Upper Echelons theory • Political orientation

3.1 Introduction

Firms in the energy industry have increasingly been pressured to protect the rights of environmental stakeholders by creating higher value with less environmental impact, such as pollution, health and safety threats (Spence 2010). According to the Fleishman-Hillard (2007) report, 53 % of U.S. consumers believe that firms in the energy sector need more government oversight than firms in other industries, to ensure that they are operating in a socially responsible way. Yet, understanding the environmental performance of firms in the energy industry requires the identification of the antecedents that explain why some of the firms in the energy industry perform environmentally better than the others.

The variety in corporate social responsibility (CSR) performance has been attributed to various causes, ranging from differences in performance (see, e.g., Arslan-Ayaydin and Thewissen 2015a, b), earnings quality (Prior et al. 2008; Kim et al. 2012) or financial incentives (Waddock and Graves 1997). There is, however, an obvious lack of focus on relevant manager-specific characteristics and the potential effect that they may have on a firm's CSR (Angus-Leppan et al. 2010; Manner 2010; Waldman 2006), and in particular corporate environmental performance. Managers are obviously in a position to influence the development of CSR initiatives, and thus the firm's environmental practices (Agle et al. 1999; Waldman 2006). As primary decision makers (Hosmer 1982; Mintzberg 1978), managers should play a critical role not only in core business strategies, but also in social strategies and resource allocation to such pursuits (Agle et al. 1999; Wood 1991).

This study fills this gap by investigating whether managers' political party orientation—Republican (conservative) versus Democrat (liberal)—explains the environmental performance of firms in the energy industry. We address this issue by using the upper echelons theory of Hambrick and Mason (1984) to show that observable CEO-specific characteristics predict differences in environmental performance. Based on bounded rationality, the upper echelons theory argues that executives are not able to gather and interpret all available information, instead, situations are perceived within executives' limited cognitive resources. The limited information is filtered through an interpretation process influenced by the executive's experiences, values, and personality, which in turn, affect their choices and, as a result, firm outcomes. Because the manager is unable to make a completely rational decision based on all available information, their choices ultimately reflect their individual differences.

Extensive empirical evidence supports the upper echelons theory. The evidence is not confined to executives' influence over purely strategic results, but also includes social outcomes. In fact, several studies find that CEO characteristics, such as tenure, functional background, education and international experience,

influence a firm's corporate social performance (Simerly 2003; Slater and Dixon-Fowler 2009, 2010). Their main conclusion is that, if we want to understand why organizations do the things they do, or why they perform in the way that they do, we must consider the biases and dispositions of their most powerful actor; their top executives.

Our empirical analysis is based on the fundamental premise that political orientation of managers in the energy industry is correlated with their environmental performance. Democratic and Republican parties have been growing increasingly polarized and this ongoing trend is reflecting on the expanding gap between their views on social issues (Layman et al. 2010; Pew Research Report 2014). In fact, Democrats, in contrast to Republicans, are more apt to support causes such as environmental and labor protection, while opposing smoking, guns, and defense. Hong and Kostovetsky (2012), for instance, show that managers who make campaign donations to Democrats hold less of their portfolios in companies that are deemed socially irresponsible (relative to non-donors or Republican donors). More importantly, Giuli and Kostovetsky (2014) find that firms with Democratic political affiliations choose more socially responsible policies. Political orientation of top managers therefore becomes a natural measure of preferences for CSR.

The environmental performance of energy firms depends on how efficiently managers take mitigation measures, such as ensuring the rigorous control of the emissions into the atmosphere, effective treatment of discharges to rivers and providing the preventive maintenance of equipment and storage facilities to hedge against leak and accident risks. Nevertheless, the environmental performance of energy firms also depends on the extent to which top managers adopt the environmental consciousness as a key component of corporate culture. Following the upper echelons theory, we argue that political preferences of top executives are reasonable predictors of management style and that managers' political ideology is expected to have an explanatory value in predicting environmental consciousness of energy firms. We hypothesize that firms with managers who donate to Republican candidates are less likely to be environmentally responsible compared to firms with managers donating to Democrats. The results of this Chapter first show that, between 1996 and 2006, the average environmental performance of firms in energy industry, defined as the spread between the Kinder, Lydenberg and Domini Research and Analytics (henceforth; KLD) environmental strengths and concerns, has constantly remained negative. Although environmental performance has substantially improved since the mid-2000s, the negative average environmental performance not only explains why American consumers believe U.S. firms are not performing well environmentally (Fleishman-Hillard 2007), but also plays a role in enhancing the awareness of regulatory bodies concerning these firms' CSR policies.

We next show that managers in the energy industry that contribute to the Democratic party adopt a more friendly environmental policy. Overall, this result is in line with our expectations and the upper echelons theory. It is also robust after we control for size, risk, agency issues, year and state characteristics that explain corporate environmental performance. We further find that it is the political

affiliation of the CEO that is the impetus behind the environmental performance, as the political affiliation of the team of executives seems to have little explanatory power for environmental performance.

Aggregating environmental strengths and concerns can be problematic since firms with high ratings in strengths and concerns would give similar results than firms that are neutral in environmental performance. In addition, while strengths reflect pro-active policies to be more environmentally responsible, concerns reflect actual outcomes, such as oil spill or an accidental leak. We therefore distinguish the impact of managers' political affiliation on a firm's environmental strengths from its impact on the firm's concerns. Our results show that the main driving force behind the political orientation of managers and environmental performance is the firm's environmental concerns. Specifically, firms with Democratic managers are found to have lower environmental concerns than those with Republican managers, but we find no significant difference between both groups in terms of environmental strengths. This result suggests that CEOs have more discretion in influencing poor social performance than in promoting and enhancing good environmental performance.

This paper contributes to the literature by providing novel support to the upper echelon theory. In particular, this paper is the first to specifically focus on the energy industry in this matter. Given the substantial environmental risks entailed in the energy industry (Smolarski and Vega 2013), there is a need for more research on the manager-specific factors that explain environmental performance. Practitioners concerned with the negative impact of environmental activities of firms in the energy industry need to understand the factors that drive a firm's environmental performance. For instance, understanding that the CEO's political values play a role in CSR outcomes of firms in the energy sector, makes it easier to assess whether his/her values are in line with the firm's corporate social policies before the appointment of that CEO.

This chapter proceeds as follows: Sect. 3.2 explains Data and Methodology. Section 3.3 describes the results and Sect. 3.4 concludes.

3.2 Measures of Environmental Performance and Political Orientation

This paper uses data from various sources to identify managers and their political orientations. In this chapter, we focus on the firms in the oil and gas industry, for which environmental issues are of key interest. Following Patari et al. (2012) and Arslan-Ayaydin and Thewissen (2015a), we select firms from Compustat based on their primary Standard Industrial Classification (SIC) Code. Their primary SIC code starts with 13—oil and gas extraction-, 29—petroleum refining end related industries—or 49—electric, gas, and sanitary services.

From the selected firms, we then limit the sample to firms that are part of the KLD database to measure environmental performance. For these firms, we then select those for which an executive's political orientation is observable and listed

Table 3.1 Variable definitions

Variable	Variable description
Political Orientation and corporate social responsibility variables	
$PolOr_{i,j,t}$	Political orientation of manager i of firm j in year t
$PolOr_{j,t}$	Average political orientation of the managers of firm j in year t
$EnvtP_{j,t}$	Corporate social responsibility for firm j in year t
$EnvtP^{Str}_{j,t}$	Number of corporate social responsibility strengths for firm j in year t, standardized by the total number of possible strengths ($S_{j,t}$)
$EnvtP^{Con}_{j,t}$	Number of corporate social responsibility concerns for firm j in year t, standardized by the total number of possible concerns ($C_{j,t}$)
Control variables	
$ROA_{j,t}$ (in %)	Return on assets of firm j for year t
$\sigma_{ROA,j,t}$	Standard deviation of $ROA_{j,t}$ Over the last preceding four years
$BTM_{j,t}$	Book-to-market ratio of firm j of year t
$AT_{j,t}$ (in $ million)	Total assets at the end of year t (in $ million)
$Lev_{j,t}$	Total debt divided by total assets of year t
$Year^{y}_{t}$	Dummy indicator, which is zero, except when the year t corresponds to the fiscal year y
$State^{St}_{j,h}$	Dummy indicator, which is zero, except when the state h of firm j corresponds to the state St
CEO-specific variables	
$Fern_{j}$	Indicator variabe if the CEO of firm j is female
$Own_{j,t}$	CEO share ownership standardized by the total number of shares outstanding
$LessOnePerc_{j,t}$	Indicator variable if the CEO owns less than than 1 % of the board's voting power
$Age_{j,t}$	Age of the CEO of firm j in year t
$Dual_{j,t}$	Indicator variable if the manager is both the Chairman and the CEO of firm j in year t
$Tenure_{j,t}$	The number of years the executive has been CEO of firm j in year t
$\Delta_{j,t}$ (Delta) (in $ million)	Sensitivity of the stock-based compensation of the CEO of firm j's to the stock (in $ million)

on the RiskMetrics database for the years 1996–2013. Following Hutton et al. (2014), we use executives' personal political contributions from the Federal Election Commission (FEC) to identify their political orientations. We also exclude firms missing the required firms-years data to measure the control variables. Each variable used in our regression models are is defined in Table 3.1.

3.2.1 Dependent Variable: Environmental Performance

To measure a firm's environmental performance, we follow Arslan-Ayaydin and Thewissen (2015a) and use the objective measure from the Kinder, Lydenberg and Domini Research and Analytics database between 1996 and 2013. KLD is a Boston-based investment research firm, which specializes in following firms'

CSR activities. The main benefit of the KLD data is that it is an independent investment research center that specializes in firm ratings of environmental, social and governance performance for use in investment decisions. KLD uses both internal (e.g. annual reports) and external (e.g., articles in the business press) sources to conduct year-by-year assessments of the corporate social performance. Since the assessment is based on objective information (Waddock and Graves 1997), KLD safeguards against inflated assessments about a firm's social performance (Liston-Heyes and Ceton 2008; Waddock and Graves 1997). For instance, in the case of regulatory violations, the criteria are rated as dollars paid for fines (Waddock and Graves 1997). Given that the criteria are applied similarly for each firm in each year, the dataset gives consistent ratings (Harrison and Freeman 1999; Waddock and Graves 1997) over time and across industries. As KLD provides a quantifiable and enhanced corporate social performance measure and is an independent rating system (Hillman and Keim 2001), it has been used in a growing body of research on corporate social performance issues (see e.g. Hillman and Keim 2001; Johnson and Greening 1999; Waddock and Graves 1997). The rating agency assesses publicly-traded firms. Only larger US firms will thus be included in the sample of this study. The KLD agency initially started in 1990 by examining the social performances of all companies in the S&P 500 Index and Domini 400 Social SM Index, totaling 650 firms. Over time, KLD's coverage has substantially increased. Since 2001, KLD has expanded its coverage universe to incorporate the largest 1000 US companies in terms of market value, an expansion which advanced further in 2003 with the inclusion of the 3000 largest US firms.

Each category is rated following a binary scheme. If the assessment indicated that a company fulfills certain criteria for a category (either a strength or a concern), it is indicated by the value of one, and zero denotes neutrality. For example, a company that develops clean energy systems to limit their impact on climate change has a 'one' in the category of "Clean Energy". If it had to pay fines for environmental issues, this will be shown in the category of "Regulatory Problems" as a 'one'. A firm earns a zero for that category if it pays no fines at all. If a firm shows the same activity or impact every year, they are also rated each year in the same way. KLD further aggregates data for environmental performance, where all items for strengths and of concerns are equally-weighted.[1]

The number of strengths and concerns in each category has evolved over time, as KLD refined the database. For example, in 2007, there are six possible strengths in the environment category and seven possible concerns for SAFECO Corporation. In 1995, there were only five possible environmental strengths as well as seven concerns. As a result, it is not possible to directly compare strengths or concerns within a category across years. However, such a comparison is essential for our

[1] A weighted measure of environmental performance that would regroup each category in function of their importance with respect to environmental matters would be more appropriate. However such a weighting scheme would require detailed understanding and theoretical background of these measures (Hillman and Keim 2001), which is out of the scope of this paper.

work because we are interested in both the time-series and the cross-sectional dimensions of CSR activities. We therefore scale the strengths and concerns for each firm-year to obtain two indices that range from zero to one. To achieve this, we follow Servaes and Tamayo (2013) and divide the sum of environmental strengths (concerns) for each firm year by the number of strengths (concerns) in each category year, formally defined as

$$EnvtP_{j,t}^{Str} = \frac{\sum_{s=1}^{S} Strength_{j,t,s}}{S_{j,t}}, \tag{3.1}$$

and

$$EnvtP_{j,t}^{Con} = \frac{\sum_{s=1}^{S} Concern_{j,t,c}}{C_{j,t}}, \tag{3.2}$$

where $Strength_{j,t,s}$ ($Concern_{j,t,c}$) is the KLD strength (concern) s (c) for firm j in year t and $EnvtP_{j,t}^{Str}$ ($EnvtP_{j,t}^{Con}$) is the weighted environmental strength (concern) of firm j in year t. The total number of strengths (concerns) for firm j in year t is denoted as $S_{j,t}$ ($C_{j,t}$). We then define a firm's environmental performance ($EnvtP_{j,t}$) as the spread between its environmental strengths and concerns.

$$EnvtP_{j,t} = EnvtP_{j,t}^{Str} - EnvtP_{j,t}^{Con} \tag{3.3}$$

Strengths and concerns are thus combined to give an overall measure of environmental performance $EnvtP_{j,t}$. In Sect. 3.3, we distinguish between environmental strengths and concerns and how they relate to managers' political affiliations. The list of KLD strengths and concerns are reported in Table 3.2.

3.2.2 Independent Variables: Political Orientation

Following Hong and Kostovetsky (2012), Christensen et al. (2015) and Hutton et al. (2014), we identify managers' personal political orientation through their personal political contributions. We collect political contributions made to senate, house, or presidential candidates. These contributions are recorded by the Federal Election Commission (FEC), as required by the Federal Election Campaign Act, and any contribution of $200 or above is available on the FEC website (http://www.fec.gov).[2]

[2] Individual contributions are also subject to limits, which generally increase over time. For example, individual contribution limits for the 2011–2012 election cycle were $2500 to a candidate, $30,800 to a national party, and $5000 to a PACs with an overall (biennial) contribution limit of $117,000 (www.fec.gov).

Table 3.2 KLD rating categories for environmental performance

Stengths	Concerns
Clean energy	Regulatory problems
Beneficial products and services	Substantial emissions
	Climate change
Pollution prevention	Negative impact of products and services
Recycling	Land use and Biodiversity
Management system	Non-carbon emissions
Other strengths	Other concerns

We collect managers' individual political contributions from the FEC's "detailed files". These files list the contributor's name, address and occupation, the amount of the contribution, and the date of the contribution. Occupation usually includes the employer name and often the position and title of the individual, which together with the contributor's name and contribution date serve as the key identifiers for linking the FEC data to Risk Metrics. We merge Risk Metrics managers in fiscal year to t the most recent election cycle. We use an algorithm based on distance matching to identify possible matches and visually inspect those with an imperfect matching score to validate their accuracy.

Following Christensen et al. (2015), we proxy a manager's political orientation by taking the dollar value of his/her contributions to the Republican Party minus the dollar value of his/her contributions to the Democratic Party, standardized by the dollar value of his/her total contributions. We then obtain a continuous measure of political affiliation bounded between −1 and +1, where a value of +1 indicates that all contributions were made to the Republican Party, while a value of −1 indicates that all contributions were made to the Democratic Party. This leaves values between −1 and +1 to assess which direction the executive's political orientation points to. Formally, we measure an executive's political affiliation ($PolOr_{i,j,t}$) as the following:

$$PolOr_{i,j,t} = \frac{\sum_{k=1}^{K} Contr_{i,k,j,t}^{Rep} - \sum_{q=1}^{Q} Contr_{i,q,j,t}^{Dem}}{\sum_{k=1}^{K} Contr_{i,k,j,t}^{Rep} + \sum_{q=1}^{Q} Contr_{i,q,j,t}^{Dem}}, \tag{3.4}$$

where $Contr_{i,k,j,t}^{Rep}$ is the contribution k of manager i of firm j to the Republican party in year t and $Contr_{i,k,j,t}^{Rep}$ is the contribution q of manager i of firm j to the Democrat party in year t.[3] In robustness checks, we also consider $PolOr_{i,j,t}$ constructed only for the political orientation of the firm's CEO (i.e. $PolOr_{CEO,j,t}$).

We take the average of the political orientation measure ($PolOr_{i,j,t}$) for each manager across all election cycles where the manager made contributions to create

[3] Our results are robust to the usage of a dummy variable that takes a value of one when executives are net contributors to the Republican Party.

our final measure of a manager's political orientation. This approach of averaging across election cycles reduces measurement errors that may be introduced if a manager were to make political contributions for opportunistic reasons that might obscure a manager's personal political orientation (Christensen et al. 2015). In addition, prior research suggests that an individual's political party identification is generally established in adolescence or early adulthood and remains constant over the individual's entire adult life (Green et al. 2002). The average across election cycles should therefore give us a measure that more accurately reflects the manager's true political orientation.

We compute the firm-level political orientation by aggregating $PolOr_{i,j,t}$ for a given firm j for each year t. Although each executive's measure of political orientation remains constant during the sample period, the firm-level political orientation measure ($PolOr_{j,t}$) varies over time as managerial composition at the firm changes. Formally, this gives us the following average political affiliation for firm j in fiscal year t

$$PolOr_{j,t} = \frac{1}{I} \sum_{i=1}^{I} PolOr_{i,j,t} \tag{3.5}$$

In the interest of brevity, we loosely refer to firms with a $PolOr_{j,t}$ score higher (lower or equal) than zero as Republicans (Democrats).

3.2.3 Political Orientation Measures and CSR in the Energy Industry: Summary Statistics

Table 3.3 reports the summary statistics for the annual managerial political contributions. During the full sample period, 386 unique managers of firms in the energy industry made a contribution, for a total of 2970 contributions. The mean $PolOr_{j,t}$ is 0.319, which shows that, on average, managers in the energy industry are tilted towards the Republican Party.[4] Between 1996 and 2014, the average percentage of firms with more Republican managers equals 67.462 %.

Table 3.3 also reports the average environmental performance of firms by year and political parties. We define a firm as Democratic (Republican) if the average political orientation of its managers ($PolOr_{j,t}$) is lower (higher) than zero. For both groups, the environmental performance is negative for each year of the sample. Starting with an average −0.082 (−0.145) in 1996, the environmental performance ($EnvtP_{j,t}$) of Republican (Democratic) firms decreases to a low −0.222 (−0.212) in 2001 (2008), to substantially improve in recent years with an average of −0.051 (−0.054) in 2013. This result lends empirical support to the Fleishman-Hillard (2007) report, which shows that the consumers of U.S. firms believe that generally

[4] Examining the CEO level measure, we find that $PolOr_{CEO,j,t}$ is slightly more skewed towards the Republican Party. The mean value of $PolOr_{CEO,j,t}$ is 0.333.

Table 3.3 Descriptive statistics—political orientation and environmental performance

			Corporate social responsibility					
	$PolOr_{j,t}$		Republicans			Democrates		
Year	% Rep	Average	$EnvtP_{j,t}$	$EnvtP^{Str}_{j,t}$	$EnvtP^{Con}_{j,t}$	$EnvtP_{j,t}$	$EnvtP^{Str}_{j,t}$	$EnvtP^{Con}_{j,t}$
1996	58.824	0.332	−0.082	0.047	0.129	−0.145	0.059	0.204
1997	66.667	0.442	−0.104	0.059	0.163	−0.145	0.059	0.204
1998	65.385	0.375	−0.083	0.052	0.134	−0.135	0.039	0.175
1999	64.706	0.394	−0.148	0.040	0.188	−0.159	0.020	0.179
2000	68.571	0.434	−0.179	0.042	0.220	−0.100	0.043	0.143
2001	70.213	0.377	−0.222	0.037	0.260	−0.117	0.046	0.163
2002	66.667	0.271	−0.216	0.038	0.254	−0.104	0.039	0.143
2003	69.136	0.337	−0.155	0.028	0.184	−0.117	0.026	0.143
2004	80.645	0.361	−0.168	0.016	0.185	−0.139	0.020	0.159
2005	68.675	0.354	−0.187	0.013	0.201	−0.174	0.018	0.192
2006	66.304	0.312	−0.181	0.014	0.194	−0.165	0.019	0.184
2007	68.056	0.329	−0.156	0.016	0.172	−0.197	0.020	0.217
2008	65.657	0.320	−0.181	0.021	0.202	−0.212	0.040	0.252
2009	64.000	0.285	−0.184	0.021	0.205	−0.185	0.038	0.222
2010	67.327	0.296	−0.121	0.078	0.1999	−0.106	0.075	0.180
2011	67.000	0.302	−0.094	0.072	0.166	−0.053	0.080	0.133
2012	66.667	0.276	−0.049	0.020	0.069	−0.044	0.038	0.082
2013	62.000	0.245	−0.051	0.033	0.084	−0.054	0.051	0.105
1996–2013	67.462	0.319	−0.143	0.033	0.176	−0.127	0.041	0.168

This table reports the average political affiliation of managers by year and the proportion of Republican managers in the US energy industry between 1996 and 2006. This table also reports average environmental performance by year and distinguishes between the environmental strengths and concerns of Republicans versus Democratic managers

managers are not performing at their best in the CSR arena. In fact, the report shows that consumers are not impressed with the CSR records of U.S. firms, as less than one fifth of the consumers give a poor score to U.S. firms for their social responsibility. Although we find that environmental performance has substantially improved since the mid-2000s, a look at the evolution of the average environmental performance of our sample shows that it remains substantially negative.

3.3 Results

In this section, we examine whether firms with Democratic managers perform environmentally better than Republicans. We provide evidence by using our main measure of political affiliation ($PolOr_{j,t}$) that Democratic firms effectively have a better environmental performance than their Republican counterparts and this result is robust to the control of alternative explanations, such as risk, past performance, CEO-specific characteristics and year- or state-fixed effects. We also find that CEO is the main driving force behind this relationship and the CEO's political orientation is mainly associated with lower environmental concerns, but not with better strengths.

3.3.1 A Firm's Environmental Performance and Its Manager's Political Affiliation

We hypothesize that, all else being equal, Democratic managers in the energy industry are more environmentally responsible than Republican managers. In Table 3.5, we examine this relationship and use a pooled OLS regression to estimate the following regression:

$$EnvtP_{j,t} = \beta \cdot PolOr_{j,t} + \rho \cdot \Gamma_{j,t} + Year_t^y + State_{j,h}^{St} + \varepsilon_{j,t}. \tag{3.6}$$

In all tests, we control for year ($Year_t^y$) fixed effects. Since managers and stakeholders are more likely to live in the state where the firm is headquartered, there is likely to be a significant geographic clustering in political views (see; Porter 1998, 2000). We also define a dummy variable ($State_{j,h}^{St}$) for the state where the firm is headquartered.

We include a number of firm-specific control variables ($\Gamma_{j,t}$) in all tests, including firm size ($AT_{j,t}$), return on assets ($ROA_{j,t}$), leverage ($Lev_{j,t}$), past return-on-asset volatility ($\sigma_{ROA,j,t}$) and book-to-market ($BTM_{j,t}$). Size is a proxy for monitoring. Because larger firms tend to be under more monitoring by investors, media and some other social and environmental groups, there is a higher chance that KLD would define them as environmentally responsible. We measure firm size by using the natural logarithm of the book value of total assets. Return on assets is used as a proxy for firm profitability. Profitable firms are the ones that are more

likely to undertake environmentally friendly policies. We proxy a firm's profitability by its return on assets. We also use control variables that relate CSR to agency problems. Barnea and Rubin (2010) argue that insiders (such as, e.g., managers, blockholders and directors) reap the benefits of CSR but share only part of the cost, as they hold less than 100 % of the firm. To control for the agency issues, we include leverage, which is defined as the long-term debt divided by the total book value of assets. Firm's risk is measured by using the standard deviation of return on assets over the last 5 years. Book-to-market is often used as a measure of the firm's financial distress and is calculated as the book value of assets divided by the market value of assets. Each variable is defined in Table 3.1 and the summary statistics are presented in Table 3.4.

In Model (1) of Panel A of Table 3.5, we see that the estimated coefficient β on $PolOr_{j,t}$ is negative and highly significant at a 99 % confidence level. This result is consistent with our hypothesis by showing that managers in the energy industry that contribute to the Democratic party adopt a more friendly environmental policy. Overall, this conclusion is in line with the upper echelons theory of Hambrick and Mason (1984). Differences in environmental performance arise because the differences in executives' political orientation greatly influence their interpretations of the situations they face and, in turn, affect their choices concerning their environmental performance. This conclusion is robust after we control for size, risk, agency issues, year and state characteristics that may explain corporate environmental performance.

3.3.2 Environmental Strengths and Concerns

Most studies aggregate the data by taking the difference between the number of concerns from the strengths to have one estimate for each firm (see e.g. Hillman and Keim 2001; Waddock and Graves 1997). This is problematic since strengths and concerns reflect different aspects of environmental performance. While strengths reflect proactive policies to be more environmentally responsible, concerns reflect actual outcomes, such as oil spill or an accidental leak. In addition, both strengths and concerns are significantly and positively correlated.[5] Consolidating the two values would give similar results for firms that are rather neutral and companies that have high ratings in both strengths and concerns. This would not only decrease the variation of the data (Sharfman and Fernando 2008), but also reduce the amount of information provided by KLD scores. We therefore distinguish between the impact of managers' political affiliation on corporate environmental strengths ($EnvtP^{Str}_{j,t}$) from its impact on corporate environmental concerns ($EnvtP^{Con}_{j,t}$).

Models (2) and (3) of Panel A of Table 3.5 confirm that that a manager's political affiliation effectively explains the environmental performance, but shows that this relation is in fact driven by the firm's environmental concerns. In Model (3), we see

[5] The Spearman correlation factor is 24 % and significant at a 99 % confidence level.

Table 3.4 Summary statistics by political affiliation

	Sample 1257			Democrats 409			Republicans 848		
No.	Mean	Sd.	Median	Mean	Sd.	Median	Mean	Sd.	Median
Control variables									
$ROA_{j,t}$	0.045	0.036	0.052	0.042	0.034	0.042	0.046	0.037	0.056
$\sigma_{ROA,j,t}$	0.032	0.015	0.046	0.024	0.012	0.038	0.036	0.019	0.049
$BTM_{j,t}$	0.592	0.562	0.334	0.611	0.573	0.278	0.584	0.557	0.357
$AT_{j,t}$	17.567	7.355	29.570	16.966	8.818	18.542	17.857	7.168	33.626
$Lev_{j,t}$	0.274	0.283	0.108	0.278	0.282	0.100	0.271	0.284	0.112
CEO-specific variables									
$Fern_{j,t}$	0.038	0.000	0.138	0.068	0.000	0.203	0.023	0.000	0.087
$Own_{j,t}$	0.008	0.002	0.023	0.006	0.002	0.014	0.008	0.002	0.026
$LessOnePerc_{j,t}$	0.390	0.000	0.472	0.441	0.000	0.483	0.365	0.000	0.464
$Age_{j,t}$	59.217	59.000	5.889	59.448	59.000	5.552	59.106	59.000	6.045
$Dual_{j,t}$	0.368	0.333	0.380	0.366	0.333	0.367	0.369	0.333	0.386
$Tenure_{j,t}$	8.675	7.500	6.484	8.971	7.800	6.408	8.531	7.333	6.520
$\Delta_{j,t}$	0.967	0.417	2.060	0.968	0.367	2.362	0.967	0.433	1.899

This table reports the summary statistics of the firms- and manager-specific control variables. Each variable is defined in Table 3.1

Table 3.5 Manager's political affiliation and corporate environmental performance

	Panel A—Team of executives			Panel B—CEO vs. Team of executives		
	$EnvtP_{j,t}$	$EnvtP^{Str}_{j,t}$	$EnvtP^{Con}_{j,t}$	$EnvtP_{j,t}$	$EnvtP^{Str}_{j,t}$	$EnvtP^{Con}_{j,t}$
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Managers' political affiliation						
$PolOr_{j,t}$	**−0.029*****	0.000	**0.030*****			
	(0.009)	(0.002)	(0.008)			
$PolOr_{CEO,j,t}$				**−0.035*****	−0.001	**0.034*****
				(0.008)	(0.002)	(0.008)
$PolOr_{Team,j,t}$				−0.001	0.000	0.001
				(0.008)	(0.002)	(0.008)
Control variables						
$ROA_{j,t}$	0.023	−0.038	−0.062	0.041	−0.038	−0.079
	(0.102)	(0.028)	(0.097)	(0.102)	(0.028)	(0.096)
$\sigma_{ROA,j,t}$	**−0.469*****	**−0.061****	**0.408*****	**−0.457*****	**−0.060****	**0.396*****
	(0.105)	(0.029)	(0.099)	(0.105)	(0.029)	(0.099)
$\log BTM_{j,t}$	−0.003	−0.001	0.001	−0.010	−0.002	0.008
	(0.030)	(0.008)	(0.029)	(0.030)	(0.008)	(0.029)
$\log AT_{j,t}$	**−0.096*****	**0.019*****	**0.115*****	**−0.096*****	**0.019*****	**0.115*****
	(0.005)	(0.001)	(0.004)	(0.005)	(0.001)	(0.004)
$Lev_{j,t}$	**0.156*****	**−0.029****	**−0.186*****	**0.156*****	**−0.030****	**−0.186*****
	(0.047)	(0.013)	(0.045)	(0.047)	(0.013)	(0.045)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.639	0.610	0.739	0.641	0.610	0.740
Adj. R^2	0.621	0.590	0.725	0.622	0.589	0.726
Num. obs.	1255	1255	1255	1255	1255	1255

Panel A of this table reports the results of Eq. (3.1) about the effect of managers' political affiliation on corporate environmental performance. Panel B reports the results of Eq. (3.2), which further distinguishes between the political orientation of the CEO and the team of executives. Standard errors are reported in parentheses. The p-values are bold where they are less than or equal to the significance level cut-off of 0.1

*, **, and *** denote statistical significance at the 10 %, 5 %, and 1 % levels, respectively

that a manager's political affiliation ($PolOr_{j,t}$) is significantly associated with more concerns, which indicates that firms run by Republican managers have significantly more environmental issues than firms run by Democratic managers. On the other hand, Model (2) shows that $PolOr_{j,t}$ is not significantly related to the firm's environmental strengths, which suggests that managers have more discretion in influencing poor environmental performance than promoting and enhancing good environmental performance.

3.3.3 The CEO and Team of Executives

So far, we aggregated the political affiliation of the CEO and other named top executive officers, as reported in Risk Metrics, into a political orientation metric. In practice, it is likely, however, that the CEO has more influence on the environmental policy than the other top managers. As primary decision maker (Hosmer 1982; Mintzberg 1978), the influence of the CEO is particularly vital. The CEO plays a key role in not only core business strategies, but also social and environmental strategies and resource allocation to such pursuits (Agle et al. 1999; Wood 1991). In Panel B of Table 3.5, we disentangle the political orientation into the affiliation of the CEO ($PolOr_{CEO,j,t}$) and the team of executives ($PolOr_{Team,j,t}$) and test how they individually relate to the firm's environmental performance. Specifically, we test the following model

$$EnvtP_{j,t} = \beta \cdot PolOr_{CEO,j,t} + \xi \cdot PolOr_{Team,j,t} + \rho \cdot \Gamma_{j,t} + Year_t^y + State_{j,h}^{St} + \varepsilon_{j,t} \tag{3.7}$$

where $\Gamma_{j,t}$ is the set of firm-specific control variables defined in Table 3.1. In all tests, we control for year ($Year_t^y$), as well as for state ($State_{j,h}^{St}$) fixed effects. We find that it is the political affiliation of the CEO that is the primary driving force behind corporate environmental performance. Results in Model (4) and (6) suggest that only the estimated coefficient for $PolOr_{CEO,j,t}$ is significant. The political affiliation of the team of executives seems to have little explanatory power for environmental performance, as the coefficient for $PolOr_{Team,j,t}$ is insignificant for all models.

In Table 3.6, we explore the association between environmental performance and the political affiliation of the CEO. In Model (1), the coefficient for $PolOr_{CEO,j,t}$ remains negative, showing a negative correlation between environmental performance and the political orientation of the CEO. The *Adj.* R^2 of Model (1) also shows that the political orientation of the CEO ($PolOr_{CEO,j,t}$) is a better variable to explain environmental performance than the overall ($PolOr_{j,t}$) measure, as the *Adj.* R^2 of Model (1) is larger than its corresponding Model (1) in Table 3.5.

In Model (2), we add CEO characteristics. Risk Metrics is our source for data on firm managers. Risk Metrics provides detailed information on each individual, including age ($Age_{j,t}$), gender ($Fem_{j,t}$), tenure ($Tenure_{j,t}$), voting power ($LessOnePerc_{j,t}$), the percentage of shares owned by the manager ($Own_{j,t}$) and whether the CEO is also the president of the firm ($Dual_{j,t}$). To control for managers' salary incentives, we include managers' compensation sensitivity to a 1 % change in the firm's stock price, commonly referred to as the delta of the managers' portfolio ($\Delta_{j,t}$). $\Delta_{j,t}$ is measured by following the procedure suggested by Core and Guay (2002). Each variable is defined in Table 3.1 and the summary statistics presented in Table 3.4. Overall, after correcting for CEO and firm-specific characteristics, Models (2) and (4) respectively present a negative association between a CEO's political affiliation and environmental performance and concerns.

Table 3.6 CEO political affiliation, CEO-specific characteristics and corporate environmental performance

	$EnvtP_{j,t}$	$EnvtP_{j,t}$	$EnvtP^{Str}_{j,t}$	$EnvtP^{Con}_{j,t}$
	Model 1	Model 2	Model 3	Model 4
CEO-specfic variables				
$PolOr_{CEO,j,t}$	**−0.035*****	**−0.037*****	−0.001	**0.036*****
	(0.008)	(0.009)	(0.002)	(0.008)
Firm-specific variables				
$ROA_{j,t}$	0.042	0.089	−0.033	−0.122
	(0.102)	(0.101)	(0.028)	(0.096)
$\sigma_{ROA,j,t}$	**−0.456*****	**−0.458*****	**−0.064****	**0.394*****
	(0.105)	(0.105)	(0.029)	(0.099)
$\log BTM_{j,t}$	−0.010	−0.004	0.001	0.005
	(0.030)	(0.031)	(0.009)	(0.029)
$\log AT_{j,t}$	**−0.096*****	**−0.100*****	**0.018*****	**0.117*****
	(0.005)	(0.006)	(0.002)	(0.006)
$Lev_{j,t}$	**0.156*****	**0.146*****	**−0.030*****	**−0.177*****
	(0.047)	(0.049)	(0.014)	(0.046)
CEO-specific variables				
$\log Contr_{j,t}$		0.005	0.001	−0.005
		(0.005)	(0.001)	(0.005)
$Fern_j$		−0.011	0.010	0.021
		(0.064)	(0.018)	(0.060)
$Own_{j,t}$		0.267	0.099	−0.167
		(0.226)	(0.064)	(0.215)
$LessOnePerc_{j,t}$		**0.065*****	**0.014*****	**−0.051*****
		(0.017)	(0.005)	(0.016)
$\log Age_{j,t}$		0.000	0.000	0.000
		(0.011)	(0.003)	(0.010)
$Dual_{j,t}$		**0.027****	0.003	**−0.024****
		(0.011)	(0.003)	(0.011)
$\log Tenure_{j,t}$		**−0.024*****	−0.003	**0.021*****
		(0.007)	(0.002)	(0.007)
$\log \Delta_{j,t}$		**−0.026***	−0.001	**0.025***
		(0.014)	(0.004)	(0.013)
Year fixed effect	Yes	Yes	Yes	Yes
State fixed effect	Yes	Yes	Yes	Yes
R^2	0.641	0.656	0.615	0.749
Adj. R^2	0.623	0.636	0.592	0.734
Num. obs.	1255	1255	1255	1255

This table reports robustness checks on the impact of CEOs' political affiliation on the corporate environmental performance and controls for CEO characteristics. Standard errors are reported in parentheses. The p-values are bold where they are less than or equal to the significance level cut-off of 0.1

*, **, and *** denote statistical significance at the 10 %, 5 %, and 1 % levels, respectively

3.4 Conclusion

After decades of academic research and business practice, the attention on firms' CSR policies has been continuously increasing. However, there is a lack of focus on relevant manager-specific characteristics and the potential effect that they may have on a firm's CSR (Angus-Leppan et al. 2010; Manner 2010; Waldman 2006), and in particular corporate environmental performance. In this paper, we test the upper echelons theory of Hambrick and Mason (1984) and investigate whether the political orientation of the managers of the firms in the energy industry is a factor that influences the development of corporate environmental initiatives.

We find that, in the energy industry, managers that contribute to the Democratic party adopt relatively more friendly environmental policies. Our results show that the main impact of the political orientation of managers and environmental performance is on the firm's environmental concerns. Specifically, while firms with Democratic managers have lower environmental concerns than those with Republican managers, we find no significant difference between both groups in terms of environmental strengths. We further show that it is the political affiliation of the CEO that is the main driver behind environmental performance. This result suggests that CEOs have more discretion in influencing poor social performance than in promoting and enhancing good environmental performance. Overall, we conclude that managers are primary decision makers and that their political orientations not only play a key role in core business strategies, but also environmental strategies.

Future research may focus on the impact of other CEO-specific characteristics, such as religion, education history and insider ownership, on corporate environmental performance of firms in the energy industry, and their combined impact on the firms' financial performance.

References

Agle B, Mitchell R, Sonnenfeld J (1999) Who matters to CEOs? An investigation of stakeholder attributes and salience, corporate performance, and CEO values. Acad Manage J 42:507–525

Angus-Leppan T, Metcalf L, Benn S (2010) Leadership styles and CSR practice: an examination of sensemaking, institutional drivers and CSR leadership. J Bus Ethics 93:189–213

Arslan-Ayaydin O, Thewissen J (2015a) The impact of environmental strengths and concerns on the accounting performance of firms in the energy sector. In: Dorsman A, Simpson J, Westerman W (eds) Energy technology and valuation issues. Springer, New York

Arslan-Ayaydin O, Thewissen J (2015b) The financial reward for environmental performance in the energy sector. Working Paper. http://ssrn.com/abstract=2287302

Barnea A, Rubin A (2010) Corporate social responsibility as a conflict between shareholders. J Bus Ethics 97:71–86

Christensen D, Dhaliwal D, Boivie S, Graffin S (2015) Top management conservatism and corporate risk strategies: evidence from managers' personal political orientation and corporate tax avoidance. Strateg Manage J 36:1918–1938

Core J, Guay W (2002) Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. J Account Res 40:613–630

Fleishman-Hillard (2007) Rethinking corporate social responsibility—a Fleishman-Hillard/National consumers league study. http://www.zumord.net/mazeedi/media/pdf/mosoh5.pdf
Giuli AD, Kostovetsky L (2014) Are red or blue companies more likely to go green?: politics and corporate social responsibility. J Financ Econ 111:158–180
Green D, Palmquist B, Schickler E (2002) Partisan hearts and minds: political parties and the social identities of voters. Yale University Press, New Haven, CT
Hambrick DC, Mason PA (1984) Upper echelons: the organization as a reflection of its top managers. Acad Manage Rev 9:193–206
Harrison JS, Freeman RE (1999) Stakeholders, social responsibility, and performance: empirical evidence and theoretical perspective. Acad Manage J 42:479–485
Hillman A, Keim G (2001) Shareholder value, stakeholder management, and social issues: what's the bottom line? Strateg Manage J 22:125–139
Hong H, Kostovetsky L (2012) Red and blue investing: values and finance. J Financ Econ 103:1–19
Hosmer L (1982) The importance of strategic leadership. J Bus Strategy 3:47–58
Hutton I, Jiang D, Kumar A (2014) Corporate policies of republican managers. J Financ Quant Anal 49:1279–1310
Johnson R, Greening D (1999) The effects of corporate governance and institutional ownership types on corporate social performance. Acad Manage J 42:564–576
Kim Y, Park M, Wier B (2012) Is earnings quality associated with corporate social responsibility? Account Rev 87:761–796
Layman G, Carsey T, Green J, Herrera R, Cooperman R (2010) Activists and conflict extension in american party politics. Am Polit Sci Rev 104:324–346
Liston-Heyes C, Ceton G (2008) An investigation of real versus perceived CSP in S&P-500 firms. J Bus Ethics 89:283–296
Manner M (2010) The impact of CEO characteristics on corporate social performance. J Bus Ethics 93:53–72
Mintzberg H (1978) Patterns in strategy formation. Manage Sci 24:934–949
Patari S, Jantunen A, Kylaheiko K, Sandstrom J (2012) Does sustainable development foster value creation? Empirical evidence from the global energy industry. Corp Soc Responsib Environ Manage 19:317–326
Pew Research Report (2014) Political polarization in the American public. http://www.people-press.org/2014/06/12/political-polarization-in-the-american-public/
Porter M (1998) Location, clusters and the new 'micro' economics of competition. Bus Econ 33:7–13
Porter M (2000) Location, competition and economic development: local clusters in the global economy. Econ Dev Q 14:15–34
Prior D, Surroca J, Triba J (2008) Are socially responsible managers really ethical? Exploring the relationship between earnings management and corporate social responsibility. Corp Gov Int Rev 16:160–177
Servaes H, Tamayo A (2013) The impact of corporate social responsibility on firm value: the role of customer awareness. Manage Sci 59:1045–1061
Sharfman MP, Fernando CS (2008) Environmental risk management and the cost of capital 29. Strateg Manage J 29:569–592
Simerly R (2003) An empirical examination of the relationship between management and corporate social performance. Int J Manage 20:353–359
Slater D, Dixon-Fowler H (2009) CEO international assignment experience and corporate social performance. J Bus Ethics 89:473–489
Slater D, Dixon-Fowler H (2010) The future of the planet in the hands of MBAs: an examination of CEO MBA education and corporate environmental performance. Acad Manage Learn Educ 9:429–441
Smolarski J, Vega J (2013) Extreme events: a study of small oil and gas firms. Account Financ 53:809–836

Spence D (2010) Corporate social responsibility in the oil and gas industry: the importance of reputational risk. In: Symposium on energy law
Waddock S, Graves S (1997) The corporate social performance-financial performance link. Strateg Manage J 18:303–319
Waldman D (2006) Cultural and leadership predictors of corporate social responsibility values of top management: a GLOBE study of 15 countries. J Int Bus Stud 37:823–837
Wood D (1991) Corporate social performance revisited. Acad Manage Rev 16:691–718

International Arrangements, the Kyoto Protocol and the Turkish Carbon Market

4

Doğu Sever and Necmiddin Bağdadioğlu

Abstract

Using a combination of desk research and quantitative approach, this chapter assesses Turkey's obligations deriving from the Kyoto Protocol, and other international arrangements with a specific focus on carbon trade. The desk research involves reviewing Turkey's greenhouse gas emission and her responsibilities with regard to the aforementioned protocol and arrangements. Whereas the quantitative approach includes an estimation of Turkey's emission reduction potential. The assessment shows that while not having any binding commitment to reduce greenhouse emissions deriving from the protocol, Turkey recognizes her responsibilities originating from the arrangements. Accordingly, Turkey implements various policies including voluntary emission trade initiated in 2005. Yet, the progress has been rather slow, among other reasons, due to inadequate legal infrastructure and high level of emission in the Turkish energy sector. This chapter cautions that unless the necessary legal adjustments, particularly in the Turkish tax law, are made, the carbon trade in Turkey is likely to be exposed to the carbon trade fraud once experienced within the EU Emission Trading System. Nevertheless, Turkey has accumulated significant experience through the voluntary emission trade so far. Based upon 2013 data, Turkey has a potential of reducing 20 million tons greenhouse gas emission with market value of $80 million yearly by revitalizing 308 small and large scale renewable energy projects.

A slightly different version of this chapter titled as "Turkey's obligations deriving from Kyoto protocol and assessments related to the Turkish carbon market" is presented at *the 5th Multinational Energy and Value Conference*, 7–9 May 2015, Istanbul, Turkey.

D. Sever (✉) • N. Bağdadioğlu
Hacettepe University, Ankara, Turkey
e-mail: dogu.sever@dgstax.com

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_4

4.1 Introduction

Considering the energy sustainability issue alongside environmental concerns, this chapter assesses Turkey's obligations deriving principally from the Kyoto Protocol and its implications with a specific focus on carbon trade. Although a signatory to the Kyoto Protocol in 2009, Turkey is one of the G20 and OECD countries with no emission reduction commitment. However, Turkey is amongst the first 15 OECD countries with the worst emission records (70 % of her greenhouse gas (GHG) emissions coming from energy sector). While not showing any commitment to reduce GHG emissions from the Kyoto Protocol, Turkey recognizes her responsibilities originating from international treaties as well as *the Acquis Communautaire*. Accordingly, Turkey implements various policies, including voluntary emission trade initiated in 2005. Nonetheless, the progress has been rather slow, among other reasons, due to inadequate legal infrastructure and high level of emission in the Turkish energy sector.

This chapter argues that unless the necessary legal adjustments, particularly in the Turkish tax law, are made, the carbon trade in Turkey is likely to be exposed to the carbon trade fraud which was one of the major problems in the EU Emission Trading System (EU ETS). Turkey has gained significant experience through the voluntary emission trade so far. Based upon 2013 data, Turkey has a potential of reducing 20 million tons GHG emission with market value of $80 million yearly by revitalizing 308 small and large scale renewable energy projects which are listed for different types of voluntary emission reduction projects.

To show how these might serve well Turkey's quest for realizing the goal of environmentally friendly energy sustainability, this chapter is developed under two main sections using a combination of desk research and quantitative approach. The desk research involves a review of Turkey's GHG emission and her responsibilities principally within the framework of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, which is accounted for in the following section. The quantitative approach is employed to estimate Turkey's volume of voluntary emissions trade and potential income of emissions trade which is the focus of the third section where the regulations related to carbon (emission) trade in Turkey are presented as well. After possibly related tax problems are indicated, the chapter concludes with applicable policy suggestions.

4.2 The General Situation in Turkey

The Mediterranean countries including Turkey are anticipated to be seriously affected by the climate change which has economic, environmental as well as social consequences. In the studies carried out on the effects of climate change, it is determined that droughts were increasing in the Mediterranean region between 1900 and 2005 (IPCC 2007). This determination is also repeated in the Fifth Evaluation Report of Intergovernmental Panel on Climate Change (IPCC), where the seriousness of the subject is emphasized once again (IPCC 2013). It is also

observed that the spread of warm water species into the Mediterranean Region has effected beyond the normal migration movements and human impacts (IPCC 2014, p. 30).

Aligning with the findings of the IPCC's global scale determinations, an increase of average surface temperatures in Turkey is observed; so are the irregularities in rainfall in Turkey. The average temperature, which was around 13.2 °C during the 1971–2000 period, has been increasing since 1990, with 2010 being recorded as the warmest year (Akçakaya et al. 2013, p. 12). The World Foundation for Protection of Wild Life (WWF) reports that the temperature surge in Turkey will be limited until the end of 2030s, but a heavy increase will be observed after this period. In the same report, it is estimated that the temperature increase will reach up to about 4 °C in winter and 6 °C in summer compared to the 1960–1990 period (WWF 2014). It is estimated that the yearly mean temperatures in Turkey will increase between 2.5 °C and 4 °C in the following years, and this increase will reach up to 4 °C in the Aegean and Northern Anatolian Regions and 5 °C in the inner regions (The Ministry of Environment and Urbanization 2012, p. 4). Moreover, Akçakaya et al. (2013, p. 39) estimate, using the scenario RCP8.5 referred in IPPC AR-5, that the summer temperatures in Turkey will likely rise 3 °C in the 2013–2040 period and 5 °C in the 2041–2070 period.

The Ministry of Environment and Urbanization (2013) indicates that the effects of climate change is expected to be seen throughout water resources, agriculture and food, ecosystem, coastal areas, health, settlement and tourism areas in Turkey. In addition, a serious decrease and irregularities will be seen in the surface water. Moreover, water shortages can arise especially in the Middle, Western and Southern Regions. It is stated in the same report that Turkey has 8.333 km long coastal zone and due to the climate change, the rise of sea level might cause coastal erosion, increase likelihood of floods and salt content of soil (The Ministry of Environment and Urbanization 2013). Türkeş (2002) highlights similar concerns and states that the climate change might have negative effects in Turkey, especially in terms of decreasing water resources, increasing forest fires, drought, erosion, and desertification. In Table 4.1, a selection of effects related to climate events are summarized by intensity, region and sector (The Ministry of Environment and Urbanization 2012, p. 29).

All regions in Turkey are at the risk of facing increasingly destructive effects of the climate change unless necessary measures are taken. To be able to deal with these negative effects, Turkey has declared that it will play an active role in solution of the climate change problem and environmental protection. Accordingly, Turkey began implementing legal arrangements considering her historical responsibility for the climate change problem. Although the GHG emissions in Turkey has increased since 1990 due to the fossil fuel dependence in industrial production, Turkey has stated that her participation in the global struggle and cooperation with the international parties to stop the climate change and sustain development are her main objectives within the framework of the principle of common but differentiated responsibility (The Ministry of Environment and Urbanization 2012, p. 14).

Table 4.1 The effects of climate change on regions and sectors in Turkey

Effect	Intensity	Region	Sector
Changes in course of rivers/ watershed	Low	All regions	Ecosystem services, biological diversity
Loss of surface water	Medium	West Anatolia Region	Agriculture, infrastructure of water-treatment plants
	High	İstanbul, Ankara, Aydin, Nevşehir, Bursa	Urban areas
Increase in water scarcity	Medium	Afyonkarahisar, İzmir, Kayseri, Muğla, Manisa	Agriculture, industry, energy
Flooding	Medium	Black Sea and Southeastern Anatolia Regions	Survival of farmers, human health
Soil loss/ brackishness	Low	Mediterranean Region, Black Sea Region, Aegean Region and Southeastern Anatolia Region	Tourism, ecosystem services, biological diversity, sea food
Landlessness/ fertile soil loss	Medium	Southwestern Anatolia Region	Survival of farmers, food security, shallow lakes, wetland area
Shore erosion	Low	Black Sea Region	Fishery, unemployment
Deterioration of nautical ecosystem	Low	Mediterranean Region, Black Sea Region and Aegean Region	Ecosystem services, biological diversity
Forest fires	Medium	West Anatolia	Tourism, agriculture
Migration to survive	Low	Mediterranean Region	Tourism, agriculture, food security
Reduction in agricultural productivity	Medium	Coast of Mediterranean and Aegean	Agriculture (employment), food security
Reduction in hydroelectrical productivity	Low	Mediterranean Region	Energy, industry
Reduction in production of seafood	Low	Mediterranean Region	Agriculture, food security, water-treatment plants

Source: The Ministry of Environment and Urbanization (2012, p. 29)

4.2.1 The Greenhouse Gas Emissions of Turkey

The total GHG in Turkey has increased from 188.5 million tons (mt) to 439.9 mtCO_2e from 1990 to 2012 (Turkish Statistical Institute 2014). The total GHG trend can be followed in Fig. 4.1 for the period between 1990 and 2012.[1]

[1] Carbon Dioxide Equivalent: A metric measure used to compare the emissions from various greenhouse gases based upon their Global Warming Potential (GWP: A measure of the total

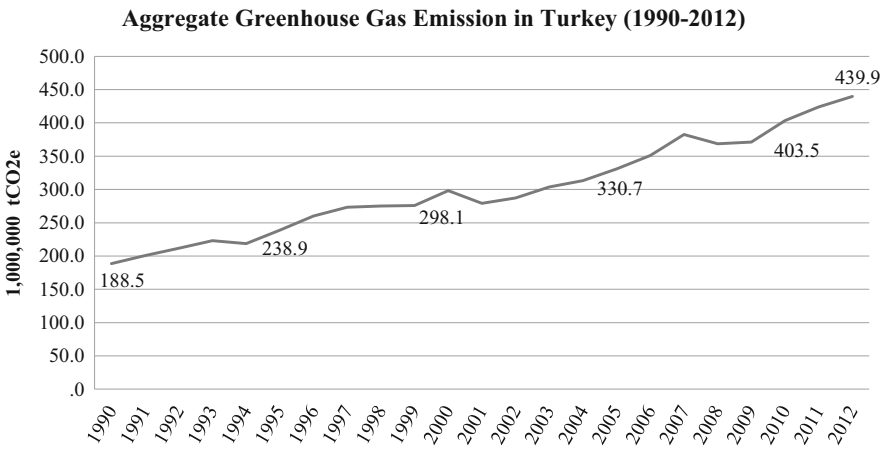


Fig. 4.1 The stock of GHG emissions in (1990–2012). *Source*: Turkish Statistical Institute (2014)

Figure 4.1 reveals that the increase in GHG is around 133 % between 1990 and 2012. The breakdown of GHG emission in Turkey since 1990 can be seen in Fig. 4.2.

Figure 4.2 shows that energy sector has the biggest share in Turkey's total GHG emissions. 70.2 % of total emissions is created by the energy sector, 14.3 % by the industrial treatments, 8.2 % by the waste, and 7.3 % by the agricultural activities. This situation is one of the consequences of Turkey's dependence on the fossil fuels in addressing her energy needs. When the increase of the GHG emission in Turkey is compared with the Annex 1 of UNFCCC countries, it is seen that Turkey is at the top of the list. Figure 4.3 shows the change in the GHG emissions between 1990 and 2012 (Fig. 4.4).

Although the GHG change between 1990 and 2012 is high in Turkey, when the total GHG is compared with the OECD countries, it can easily be said that Turkey has less GHG emission than many developed countries. This situation is clearly seen in the study performed by OECD for 2011 (OECD 2014). [2]

While the amount of total GHG emission by countries is an important indicator, it is not sufficient to convey the scale of the problem. It is also necessary to consider the emission per capita. The GHG emissions in Turkey increased from 3.39 to 5.13 tCO_2e in 2009 per capita, but this value is far less than the OECD average of 9.83 tCO_2e per capita and closer to the World average value of 4.29 tCO_2e per capita (The Ministry of Environment and Urbanization 2013). The average OECD GHG emissions per capita for the years of 2011 and 2012 are 12.68 tCO_2e and 12.47 tCO_2e while the corresponding values for Turkey are 5.7 tCO_2e and 5.85 tCO_2e for

energy that a gas absorbs over a particular period of time (usually 100 years), compared to carbon dioxide) (EPA 2015).

[2] Although Russia is not an OECD member, due to its importance in terms of GHG emissions it is included in the OECD tables throughout. Due to lack of data Mexico and Chili are not included.

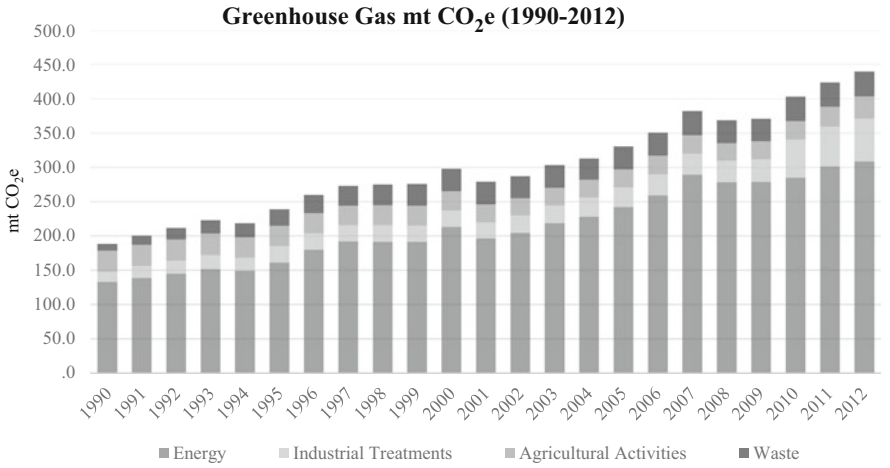


Fig. 4.2 The GHG emissions in Turkey by sectors (1990–2012). *Source*: Turkish Statistical Institute (2014)

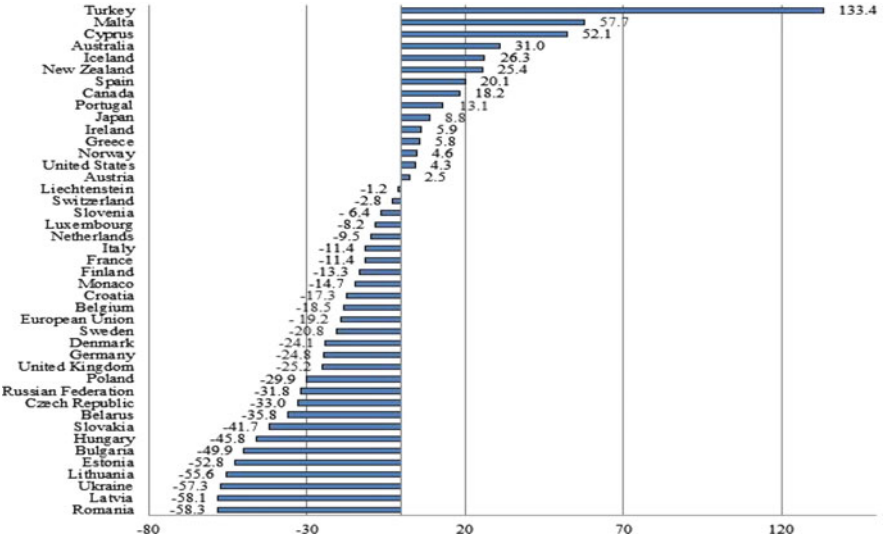


Fig. 4.3 The total aggregate GHG emissions of individual Annex I parties, 1990–2012—excluding LULUCF [A GHG inventory sector that covers emissions and removals of greenhouse gases resulting from direct human-induced "Land Use, Land-Use Change and Forestry" activities (UNFCCC 2015b)]. *Source*: UNFCCC (2015a)

2011 and 2012, respectively (OECD Stat 2015). The GHG emissions per capita of OECD countries can be seen in Fig. 4.5.

Due to Turkey's special position against the UNFCCC and the Kyoto Protocol, making a binding GHG emission reduction commitment by taking a specific

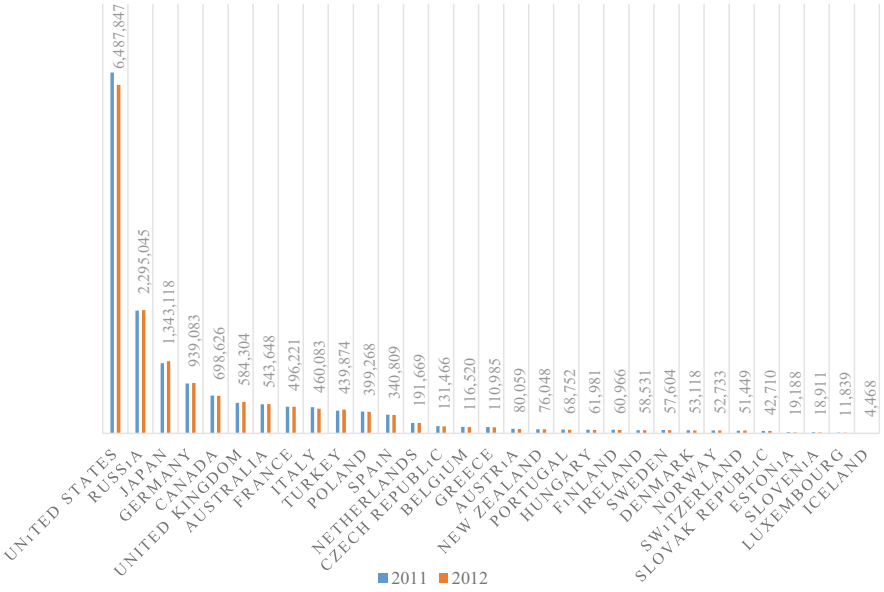


Fig. 4.4 The amount of GHG in OECD countries (1000 tCO_2e) 2011 and 2012. *Source*: OECD Stat (2015)

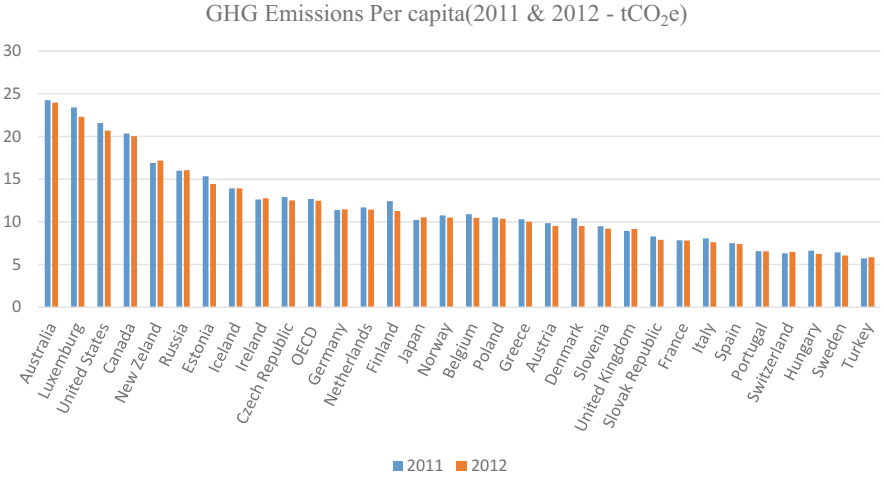


Fig. 4.5 The GHG per capita in the OECD Countries. *Source*: OECD Stat (2015)

baseline year is not seem to be possible in the near future because of Turkey's economic and demographic development status (The Ministry of Environment and Urbanization 2010, p. 16). Although Turkey does not have any binding commitment for emission reduction, Turkey intends up to 21 % reduction in GHG emissions from the BAU level by 2030 (The Ministry of Environment and

Urbanization 2015) by vitalizing different kind of mechanisms, such as supporting renewable energy, using command and control mechanisms (i.e. air and water quality measures) or carbon trade. By using these measures, the projected share of renewable energy share in energy production will be increased from 20 % in 2014 (TEİAŞ 2014) to 30 % by 2023 and the GHG emissions from electricity generation expected as 7 % less compared to the reference scenario by 2020 (The Ministry of Environment and Urbanization 2010, p. 20).

4.2.2 Turkey's Position Against the UNFCCC, the Kyoto Protocol and Relations with the EU

Turkey underlines her sensitivity and responsibility to the environment and climate change issues at the international arena stating her readiness to take necessary steps. Accordingly, two of the vital regulations, the UNFCCC and the Kyoto Protocol are recognized by Turkey.

As a member country of OECD, Turkey is listed both in the Annex I countries and in the Annex II countries which take different financial responsibilities compared to the Annex I countries of the UNFCCC in 1992. At first, Turkey rejected to be listed both as an Annex I and Annex II country, but later Turkey declared a new proposal in the 6th Conference of Parties (CoP) held at Hague in 2000. Turkey proposed that "*the name of Turkey would be deleted from Annex II to the Convention; and the name of Turkey would remain in Annex I, but with an accompanying footnote indicating that Turkey should enjoy favourable conditions within the "common but differentiated responsibilities", taking into consideration Turkey's difficulties stemming from the fact that it is at an early stage of industrialization. That special status should be indicated in the same manner as had been done with the "countries that are undergoing the process of transition to a market economy" in Annex I of the Convention*" (UNFCCC 2000, p. 23). After the parties recognized Turkey's special status and difficulties resulting from Turkey's industrialisation process in the 7th CoP in Marrakech in 2001, Turkey's name is deleted from the Annex II and placed among the Annex I countries, taking into account her special circumstances, differentiating it from other Annex I countries by the decision 26/CP.7 (UNFCCC 2001, p. 5). Eventually, Turkey became a party to the UNFCCC on 24th May 2004 (The Ministry of Environment and Urbanization 2011b, p. 31).

After that Turkey became a party to the Kyoto Protocol on 26th August 2009. Turkey's special conditions are recognised both in the 16th CoP held in Cancun, and in the 17th CoP held in Durban in 2011 (The Ministry of Foreign Affairs 2014). Although Turkey is a party of the Kyoto Protocol, Turkey is not listed in the Annex B of the protocol which states the emission reduction commitments of parties (Kyoto Protocol 1998). Therefore, Turkey does not have any emission reduction commitment based on the Kyoto Protocol.

In accordance with both the 3rd article of UNFCCC and the 10th article of the Kyoto Protocol, Turkey undertakes tasks to fulfill the obligations specified in the articles such as; preparation and periodic updating of national inventories of

anthropogenic emissions (GHG emissions resulting from human activities), cooperation on science and technology etc., and performing sustainable development by considering its common but differentiated responsibility. Nevertheless, the obligation of emissions reduction which is proposed for the Annex I countries of UNFCCC in the Kyoto Protocol is not valid for Turkey because of the special conditions granted.

Turkey is aware of its special status against both the UNFCCC and the Kyoto Protocol as a G20 and OECD country and as a candidate country to the EU. However, this special status should not be perceived as avoidance of responsibilities in environmental subjects. Turkey recognizes her share of historical responsibility regarding the environmental issues like all other countries, and performs the required studies within this scope. Due to it's ongoing industrialisation process and fossil fuel dependency, Turkey is not expected to have an official emission reduction commitment within the context of the Kyoto Protocol in the near future. However Turkey has presented her determination several times by announcements of different regulations like "the Turkish Climate Change Action Plan," which is an important regulation about environment and reduction in emissions. For instance, the short, medium and long term targets have been determined in this plan on eight different subjects covering energy, industry, forestry, agriculture, buildings, transportation, waste, and adaptation to climate change (The Ministry of Environment and Urbanization 2011a). Then, the "Regulation of Greenhouse Gas Emissions" was announced and published in the Official Gazette on 17th May 2014. Furthermore, Turkey has showed her determination not only by the announcements of domestic regulations but also by being a party of international agreements. Three different agreements can be given as examples for Turkey's commitment to the environmental protection: (i) The Convention on Biological Diversity signed in 1992 and to which Turkey has been a party since 1996 (The Ministry of Foreign Affairs 2015a), (ii) the United Nations Convention to Combat Desertification (The Ministry of Foreign Affairs 2015b), which is published in the Official Gazette and effectuated in 1998, and finally (iii) the Convention on the Protection of the Black Sea Against Pollution, which was signed in 1992 (The Ministry of Foreign Affairs 2015c).

Another international obligation that Turkey should fulfill is the "Environment Act" which has to be completed for the full membership to the European Union (EU). As a result of Turkey-EU membership negotiations, an informative screening meeting on environmental act was held on 3–11th April 2006. Also a comprehensive screening meeting was held between 29th May and 2nd June 2006 (The Ministry of EU 2014). Within the scope of Screening End Report prepared by the Commission and certified by the Council, it was emphasized to grant Turkey two opening criteria[3] to be able to discuss the Act. After fulfillment of these criteria, the

[3] Opening Criteria (1) Turkey presents to the Commision its comprehensive strategy for thegradua, well coordinated transportation, implementation and enforcement of the acquis in this chapter, including plans for building up the necessary administrative capacity at national, regional and local level and required financial resources, with an indication of milestones and timetables.

negotiations are started on 21st December 2009 during the Presidency of Sweden (The Ministry of EU 2015).

One of these closing criteria of negotiations on environment is the approval of horizontal and frame environmental *acquis* of the EU. Therefore, Turkey is required to harmonize her regulations with the EU-ETS Directive (13th October 2003 dated and 2003/87/EC numbered). Moreover, since the Directive numbered 2007/589/EC is related to the Directive numbered 2003/87/EC (Seçgel 2013), harmonising the Turkish monitoring and reporting system with the EU is another necessity on the way to membership.

4.3 The Carbon Trade in Turkey

One of the referenced economic tools for the solution of GHG emissions reduction problem is the emission allowance trade which aims at reducing GHG emission levels by lowest cost. This policy tool can be summarised as granting limited permits to the polluters at the beginning of the period and allowing the polluters to trade the permits. The polluters who have a gap in allowances may buy additional allowances from the polluters who have surplus to either offset or to meet their official liability for emissions reduction.

The Kyoto Protocol and the European Union Emission Trading Scheme (EU ETS)[4] have been two important engines for the development of emissions allowance trade which is more complex than other trade systems. The Kyoto Protocol has not only determined the GHG constraints and liabilities of countries but also proposed flexibility mechanisms which can help countries struggling with decreasing their emissions levels. Three different flexibility mechanisms suggested in the Kyoto Protocol are (i) the Clean Development Mechanism (CDM article 12), (ii) the Joint Implementation (JI article 6), and, (iii) the Emission Trading Scheme (ETS article 17) (Kyoto Protocol 1998). The Joint Implementation and the Clean Development Mechanism can be classified as project based mechanisms. In other words, the ETS is main mechanism to limit the emission levels and the Joint Implementation and the Clean Development Mechanism are subsidiary mechanisms which are in some cases used for balancing the systems.

Turkey cannot benefit from the flexibility mechanisms explained above. This is because as mentioned before, although Turkey is an OECD country and a member of G20, it is not one of the countries in the Annex B list of the Kyoto Protocol.

Opening Criteria (2) Turkey fullfils its obligations regarding the implementation of applicable environment acquis in line with the relevant EC-Turkey Association Council Decisions (The Ministry of EU 2015).

[4] More than 11.000 entities including aviation sector (Mooney et al. 2014) included by the system and around 75 % of total emission trade takes place in the EU ETS and six billion allowance transaction (77 billion euros) occured in 2011 (European Comission 2013).

Therefore, Turkey does not have any obligation defined by the Kyoto Protocol. Consequently, she cannot use the flexibility mechanisms of the protocol.

Even though Turkey is not one of the countries having obligation to lower the GHG emissions, Turkey presented her commitment on the GHG emission abatement by applicable plans, such as, the 'Climate Change Action Plan' and other policy tools, such as, the voluntary carbon trade which is used for emission abatement. Accordingly, Turkey has been taking part in the voluntary markets through the renewable energy projects since 2005 (EİE 2014). In other words, the emission trading in Turkey occurs not in the scope of compliance markets but completely on a voluntary basis and in the scope of voluntary markets.

The voluntary carbon trading carried out in Turkey occurs in unorganized markets which can be described as over-the-counter markets. However, there are official efforts for establishing an organized market in Turkey. In this context, by reference to the 'İstanbul International Financial Strategy' prepared by the State Planning Organization, by virtue of action number 33 of the 'İstanbul International Financial Center Strategy and Action Plan' approved by the Higher Planning Council (DPT 2009, p. 34), the carbon and GHG emission trading market would be established, and derivative products would be developed in Turkey between 2012 and 2015. Pursuant to these efforts, the 'Notification of Register Transactions Concerning the Projects Providing Greenhouse Gas Emission Decrease' issued in the Official Gazette numbered 27,665 and dated 07.08.2010 came into force. It aimed at recording the voluntarily developed environmentally focused projects which will assist the reduction in emissions. The objective of the notification has been stated in the First Article of the notification as 'Arranging the methods and principles referring to decrease the greenhouse gas emissions in the scope of combating climate change, limiting emissions and increasing the sink areas to record the projects getting conducted.' Later the 2010 dated notification is abolished by the issuance of 'Project Record Notification of Voluntary Carbon Market' on 9th October 2013, and then, the procedures performed within the context of 2013 dated new notification. Although it was intended to establish a carbon market within 2015, the completion of the process is likely to take place in the following years.

Establishing an official carbon market process continues in a slow manner which looks as if an intentional strategy of the Turkish authorities. Instead of a strictly regulated market at the beginning of the mechanism, the authorities allow companies to get involved in the carbon trade mechanism by using learning by doing approach. Hence the companies find opportunity to prepare their businesses to the compliance market without facing with high implementation cost. At this stage the authorities are monitoring the transactions and trade volume and continuing building required legal infrastructure which are briefly explained above for a compliance market. Other reason for the authorities to act in that way is the low volume of the transactions. The volume of trade is estimated as 4 $mtCO_2e$ and $16 million in 2013 which is around 5 % of the total voluntary carbon trade volume (Ecosystem Marketplace 2013, p. 28). Due to this low volume of trade, the

need for a strictly regulated official carbon market does not seem vital at this stage in Turkey.

4.3.1 The Emissions Reduction Expected from the Eligible Energy Projects Registered in Turkey

According to data supplied by the Ministry of Environment and Urbanization (2014), the project based carbon credits on the emission trading in Turkey are considered under five categories, namely, hydroelectric power plants, wind power plants, energy production from waste/biogas, energy productivity, and geothermal projects. It is expected that about 20 million tCO_2e reduction in emissions per year will be achieved from 308 projects. The total amount of reduction in emissions due to the 159 hydroelectric power plants projects would be 8.7 million tCO_2e/year which makes up the major part of total emission reduction potential.

According to the evaluation of emission reduction efficiencies of the projects (the total amount of emission reduction divided by the projects), it is found that the most efficient projects are energy from waste/biogas projects. The emission reduction amount of each waste/biogas project is estimated as 113.577 tCO_2e/year which is more than double that of the hydroelectric power plant projects (Sever and Bağdadioğlu 2014). The emission reductions based on the aforementioned projects in Turkey are indicated in the Appendix in Table 4.3.[5]

4.3.2 The Estimation of Voluntary Carbon Trade Volume in Turkey

The amount of reduction in emissions expected from different projects in Turkey is determined based on the data used in the previous section of the Ministry of Environment and Urbanization (2014). The objective in this section is to estimate the volume of Turkish voluntary carbon market, assuming that all emission reductions determined in the previous section are converted to emissions allowances (permits) with no cost.

Although the emission permits obtained from the projects indicates 1 tCO_2 reduction, different market prices are observed for different project based permits. According to the Ecosystem Marketplace (2014), the emission permissions obtained from different projects are priced differently in 2013. These different average prices are presented in the Appendix Fig. 4.6.

The average prices of different emission credits are used for the assessment of potential income of the Turkish voluntary carbon market. It can be seen from Table 4.3 and Fig. 4.6 of the Appendix that the projects classified as the 'Energy from Waste/Biogas' in Turkey are separately classified in the Ecosystem

[5] Projects which are not revealed by the Ministry of Environment and Urbanization as of 18.04.2014 are not taken into account.

Marketplace (2014) report. As a consequence of this different classifications, different emission permissions and different prices have been obtained for each type of emissions permit. Since a separate classification for the mentioned projects is not used in Turkey, the average price of emission permits of landfill methane and biomass given in Ecosystem Marketplace (2014) is used for the 'Energy from Waste/Biogas' projects in Turkey. Table 4.2 summarises and combines the data of projects in Turkey and the emission credit prices which are presented in the Appendix.

It is possible to conclude that in the case of emissions reduction for projects revealed by the Ministry of Environment and Urbanization (2014) as of 18.04.2014, and assuming reduction in emissions is completely transformed to emission permits, the estimated potential volume of the voluntary emission trade in Turkey is about $80 million.

Ecosystem Marketplace's (2014, p. 9) estimates of the volume of the world voluntary carbon trade is 76 $mtCO_2e$ with a market value of $379 million in 2013. According to the Ecosystem Marketplace report (2013, p. 28), the share of Turkey in the voluntary carbon market is about 4 $mtCO_2e$ and $16 million in 2013. As can be seen in Table 4.3, the estimated emissions trade potential of Turkey is around 20 $mtCO_2e$ with market value of $80 million. Comparing Turkey's performance and potential for the voluntary emissions trade in 2013, it can be concluded that only about fifth of the current potential is used.

4.3.3 The Taxation Problems of Carbon Trade

Different tax structures across nations and different definitions for emissions permits within tax systems create golden opportunities for those who want to use

Table 4.2 The potential volume of Turkey's emission market

Project						
Type	Number (a)	Emission Reduction tCO_2e/year (b)	Reduction Per project tCO_2e/ year c(=b/a)	$/$tCO_2e$ d	Emission income per project ($) e(=c × d)	Total income ($) f(=a × e)
Hydroelectric power plant	159	8,747,634	55,017	4.3	236,571	37,614,826
Wind power plant	106	7,951,391	75,013	2.1	157,528	16,697,921
Energy from waste/biogas	27	3,069,273	113,577	4.5/8.9 (a. 6.7)	761,634	20,564,129
Energy Efficiency	10	432,081	43,208	10.3	445,043	4,450,434
Geothermal	6	405,309	67,552	2.7	182,389	1,094,334
Total	308	20,605,688				80,421,645

the emission trade as a mean of tax planning. Problems that might arise from these differences are analyzed for the US system and some important points for tax purposes are stressed in the Joint Committee on Taxation Report (Joint Committee on Taxation 2009, p. 31). According to this report, while one of the countries could treat emissions permits as intangible, another country could define them differently as commodities. This kind of differential treatment might causes a new type of tax planning tool which has to be carefully monitored and inspected by tax authorities.

It has been determined during the investigations for carbon trade that the tax planning and tax fraud problems associated with the carbon trade have reached to a very serious point. Besides, after investigating high volumes of carbon trade carried out in the EU ETS, it is determined that the part of transactions could be classified as organized crime (Europol 2009). In the same Report the amount of fraud is estimated to be at about 5 billion euros in the 18 month period. Moreover, it has been determined that 90 % of the total trade in some countries was not real. To stop such fraudulent activity, hundreds of firms across the EU are monitored and more than hundred people are arrested as of 2010 (Europol 2010).

It is observed that the tax evasion and planning via emissions trade are carried out in two ways: (i) Value Added Tax (VAT) and (ii) Price Manipulations (transfer pricing).

Different VAT implementations for emission trade might create a tax fraud environment through carbon trade. According to the information reported in Europol (2010), the organized VAT evasion carried out via the emission trade is one of the most serious criminal activities in the EU. The same Report indicates that this is a serious threat to competitiveness in the EU before transition to the green economy and causes significant loss of income for the central government.

The VAT evasion via carbon trade is the type of fraud that often occurs in cross border trade. The mechanism for the VAT fraud can be summarized as follows (Europol 2010): In the first stage; carbon credits taken from any foreign country without paying VAT are sold to a third party including VAT. In the second stage, any VAT collected from the third parties is not transferred to the tax office. At the last stage, those who import carbon credit are vanished. To stop this type of fraud, audits are increased all over the world to combat this kind of fraud, but the preferred solution is harmonisation of tax systems across countries especially for carbon trade.

The second type of tax evasion through the use of emission trading system is price manipulations. Although it can be claimed that the price manipulations can be observed for every kind of asset used for transactions, the emissions trading is much more open to financial manipulations due to uncertain legal characteristic of both international structure and emissions permits. Moreover, the complex structure of ETS and the market players' ambiguous positions are other factors that exasperate the problem. The issues are also stressed by Interpol (2013, p. 17) and it is underlined that even current market regulation methods failed against manipulations during the last global financial crisis complex structure of carbon markets made regulating these markets especially difficult.

Furthermore, the carbon credits do not depend on physical assets; therefore it is easier to manipulate market if there are poor legal regulations (Interpol 2013). On the other hand, the price manipulations can occur not only for the carbon credits but also for the derivative products of carbon credits. If market prices are incorrect, the emission prices provide both wrong information for the future value of emissions prices and negatively affect the investment decisions. Moreover, if necessary corrections are not implemented the price fluctuations might disrupt the whole market.

The emissions trade's open nature to the price manipulations might create another serious problem which is profit shifting through the transfer pricing and it is also a concern for tax authorities. The profit distribution through the transfer pricing is defined as the transfer of profit from one person to the other by transactions without taking into account the comparable price rules (Sever 2010, p. 55). Tax authorities pay special attention to the carbon trade regarding the transfer pricing rules due to the carbon trade's availability for international trade. Multinational firms have opportunities to buy emission permits by means of their subsidiaries located in any country and can transfer them to other countries. They can then sell these permits to another country or use for their own emission obligations. All these transactions should be done in accordance with the provisions of transfer pricing rules. In other words, the emission permits should not be transferred amongst the related parties without obeying comparable price rules.

Accurate determination of the comparable price is the main problem for the transfer pricing issues. Having an active carbon market for emissions permits simplifies determination process of comparable price. Prices that are obtained from the market can be used as comparable price for the transactions which are under control (Ernst & Young 2010, p. 22). On the other hand, if a well-established market does not exist, prices might not be taken as comparable or prices can be taken as comparable only after necessary arrangements are made. As Copenhagen Economics (2010, p. 13) states, there is not an estimation method especially designed for the project based emission credits in the OECD transfer pricing guidelines.[6] However, in our opinion it is possible to apply the general estimation principles stated in the OECD transfer pricing guidelines to determine the (transfer) price of carbon credits.

Since the carbon trade is still in development phase, sufficient tax regulations for the carbon trade have not been introduced in Turkey yet. However given the increase in trade volume, the introduction of required tax regulations has to be a priority. Harmonisation of the Turkish tax regulations with other trade partners even for the carbon credits can be a solid solution to the VAT evasion problem. Otherwise the carbon trade can be used as a tax fraud mechanism using methods

[6] Breddin and Muckley (2011) analize the price formation of energy products and effects of emission allowances on the price formation. This study finds that contract price of allowances are also an important determinant of prices of energy products in the energy market.

such as VAT evasion or price manipulations as is previously observed across Europe where carbon trade mechanisms were applied.[7]

4.4 Conclusion

Important steps for the global warming issue have been taken after the ratifications of UNFCCC and the Kyoto Protocol. Turkey has been participating in the world-wide efforts and has been a party to the Protocol since 2009. Although Turkey is not obliged to reduce her GHG emissions due to her special conditions, quick steps for satisfying necessary legal obligations are taken to deal with the climate change and global warming problems. Regulations have been implemented without harming Turkey's sustainable development process but by taking into account her common but differentiated responsibilities to the climate change problems. New policy tools such as the carbon trade have been introduced in the voluntary market and establishing a compliance market are opened to debate in Turkey. Although the establishment of a compliance market has not been finalised yet, Turkey presents her awareness and commitment for the global warming by allowing the voluntary carbon trade transactions.

The carbon trade system in Turkey has been developing day by day and both public and private sectors have shown noteworthy efforts to increase the volume of carbon trade. Much needed legal infrastructure which is necessary for a well monitored compliance market is being constructed. According to the Ministry of Environment and Urbanization data, a reduction of 20 $mtCO_2e$ emissions is expected by the registered 308 small and large scale renewable energy projects in Turkey by 18.04.2014. In this chapter, the potential income of emissions trade using that data is estimated as $80 million, under the assumption that all emissions reduction amount can be converted to carbon credits at no cost. As stated previously, compared to the volume of 76 $mtCO_2e$ of World voluntary carbon trade with a market value of $379 million, and bearing in mind $16 million income realised from the sale of 4 $mtCO_2e$ emissions permit in 2013, Turkey's carbon transaction volume is noticeably below its potential.

Thus, Turkey ought to take necessary steps to capitalize on the aforementioned carbon trade emissions reductions and fulfill her potential. These steps should include increasing both the public awareness for the climate change issue and the potential usage of carbon credits for the emissions reductions policies. Moreover, subsidies or incentives for the renewable energy investments, which are green alternative for fossil fuels, should be provided to the investors.

[7] About 150 companies investigeted related with carbon credit transactions in Italy in 2010 and potential VAT loss is estimated to be around 500 million euros. France, Germany, Spain, United Kingdom, Norway, Switzerland, Belgium, Czech Republic, Denmark, Latvia, the Netherlands, Slovak Republic and Portugal are all among the countries trying to identify the network of carbon credit fraud (Europol 2010).

Last but not least, due to not having a binding emission reduction commitment and relatively low volume of carbon trade, the establishment of a carbon market in Turkey is not expected in the near future. However even with the low volume of trade, the establishment of a well operated system which requires strict screening, reporting of GHG and monitoring of the emissions permissions has to be implemented to prevent any unintended transaction which can create price manipulations or tax evasions.

Consequently, to meet all these requirements not only local authorities but also foreign tax and environment authorities have to be in full cooperation to deal with the climate change problem and to prevent any international carbon trade fraud.

Appendix

Table 4.3 The emission reduction in Turkey

Project		Emission reduction	Reduction per project
Type	Number	tCO_2e/year	tCO_2e/year
Hydroelectric power plant	159	8,747,634	55,017
Wind power plant	106	7,951,,391	75,013
Energy from waste/ biogas	27	3,069,273	113,577
Energy efficiency	10	432,081	43,208
Geothermal	6	405,309	67,552
Total	308	20,605,688	

Source: The Ministry of Environment and Urbanization (2014)

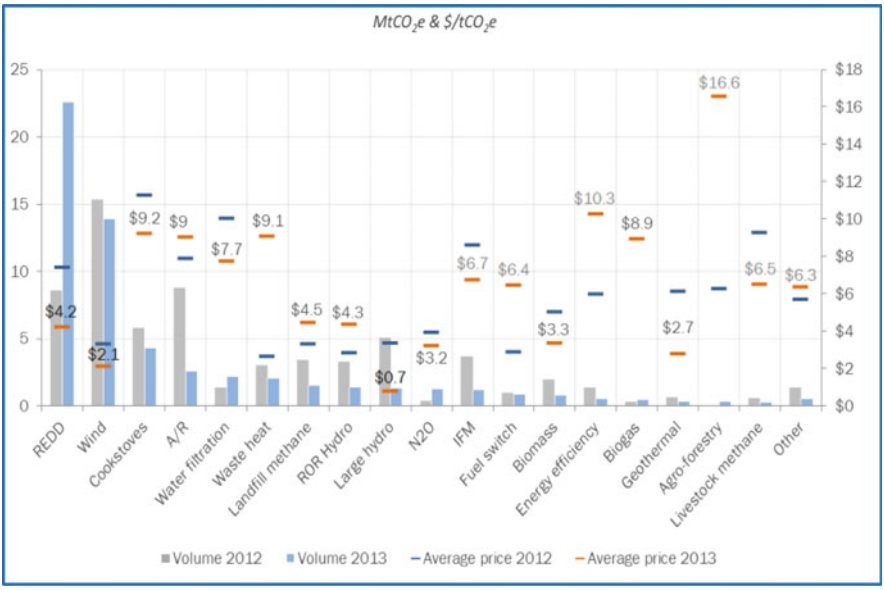


Fig. 4.6 The average prices of carbon credits. *Source*: Ecosystem Marketplace (2014, p. 20)

References

Akçakaya A, Eskioğlu O, Atay H, Demir Ö (2013) Yeni Senaryolarla Türkiye İçin İklim Değişikliği Projeksiyonlari. MGM, Ankara

Breddin D, Muckley C (2011) The price forming process in energy markets. In: Dorsman A, Westerman W, Karan M, Arslan Ö (eds) Financial aspects in energy. Springer, New York, pp 85–107

Copenhagen Economics (2010) Tax treatment of ETS allowances. Copenhagen Economics, Copenhagen

DPT (2009) İstanbul Uluslararasi Finans Merkezi Stratejisi ve Eylem Plani. DPT, Ankara

Ecosystem Marketplace (2013) State of the voluntary carbon markets 2013. Ecosystem Marketplace & Bloomberg New Energy Finance, Washington

Ecosystem Marketplace (2014) Sharing the stage: state of the voluntary carbon markets 2014. Forest Trends' Ecosystem Marketplace, Washington

EİE (2014) Emisyon Ticareti. http://www.eie.gov.tr/iklim_deg/emisyon_ticareti.aspx. Retrieved 6 йил 2014-3

EPA (2015) Glossary of climate change terms. http://www3.epa.gov/climatechange/glossary.html#C. Retrieved 2015 йил 20-9

Ernst & Young (2010) Carbon market readiness. E&Y, USA

European Comission (2013) The EU emission trading system (EU ETS). European Union

Europol (2009) Carbon credit fraud. https://www.europol.europa.eu/content/press/carbon-credit-fraud-causes-more-5-billion-euros-damage-european-taxpayer-1265. Retrieved 2014 йил 13-7

Europol (2010) Further investigations. https://www.europol.europa.eu/content/press/further-investigations-vat-fraud-linked-carbon-emissions-trading-system-641. Retrieved 2014 йил 13–7

Interpol (2013) Guide to carbon trading crime. Interpol General Secretariat Environmental Crime Programme, Lyon

IPCC (2007) 2007: Summary for policymakers. In: Climate change 2007: the physical science basis. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge

IPCC (2013) 2013: Technical summary. In: Climate change 2013: the physical science basis. Contribution of working group I to the fifth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge

IPCC (2014) 2014: Summary for policymakers. In: Climate change 2014: impacts, adaptation, and vulnerability. Part A: global and sectoral aspects. Contribution of working group II to the fifth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge

Joint Committee on Taxation (2009) Climate change legislation: tax considerations. US Senate Committee on Finance, Washington

Kyoto Protocol (1998) http://unfccc.int/resource/docs/convkp/kpeng.pdf. Retrieved 2014 йил 14-7

Mooney G, Muckley C, Bredin D (2014) Prospective costs for the aviation sector of the emissions trading scheme. In: Dorsman A, Gök T, Karan M (eds) Perspectives on energy risk. Springer, New York, pp 203–220

OECD (2014) Greenhouse gas emissions. Retrieved 2014 йил 10-4 from OECD.StatExtracts: http://stats.oecd.org/

OECD Stat (2015) Greenhouse gas emissions per capita. https://stats.oecd.org/Index.aspx?DataSetCode=AIR_GHG. Retrieved 23 Apr 2015

Seçgel G (2013) İklim Değişikliği Politikalari ve Türkiye. Anahtar (294)

Sever D (2010) Transfer fiyatlandirmasi ve Türkiye'de transfer fiyatlandirmasi yoluyla örtülü kazanç dağitimi. Hacettepe Üniversitesi/Sosyal Bilimler Enstitüsü, Ankara

Sever D, Bağdadioğlu N (2014) Evaluation of carbon emission trade as one of the methods of combating. İzmir: Second international congress on energy security in Eastern Europe
TEİAŞ (2014) 2014 Yili İşletme Faaliyetleri Raporu/g (2014 Energy Supply and Demand Report/g)
The Ministry of Environment and Urbanization (2010) Climate change strategy 2010 2023
The Ministry of Environment and Urbanization (2011a) İklim Değişikliği Ulusal Eylem Plani 2011–2023. Republic of Turkey Ministry of Environment and Urbanization, Ankara
The Ministry of Environment and Urbanization (2011b) Karbon Piyasalarinda Ulusal Deneyim ve Geleceğe Bakiş. Republic of Turkey Ministry of Environment and Urbanization, Ankara
The Ministry of Environment and Urbanization (2012) Türkiye'nin İklim Değişikliği Uyum Stratejisi ve Eylem Plani. Republic of Turkey Ministry of Environment and Urbanization, Ankara
The Ministry of Environment and Urbanization (2013) Turkey's fifth national communication under the UNFCCC. Turkish Government, Ankara
The Ministry of Environment and Urbanization (2014) Türkiye'de Karbon Piyasasi. http://www.csb.gov.tr/projeler/iklim/index.php?Sayfa=sayfa&Tur=webmenu&Id=12461. Retrieved 2014 йил 4-7
The Ministry of Environment and Urbanization (2015) Republic of Turkey intended nationally determined contribution. http://www.csb.gov.tr/db/turkce/editordosya/The_INDC_of_TURKEY_v_15_19_30-EN.pdf. Retrieved 2015 йил 17-10
The Ministry of EU (2014) Retrieved 2014 йил 9-5 from Türkiye AB Katilim Müzakereleri No: 6. http://www.ab.gov.tr/files/rehber/06_rehber.pdf
The Ministry of EU (2015) Chapter 27—Environment. http://www.ab.gov.tr/index.php?p=92&l=2. Retrieved 25 Sept 2015
The Ministry of Foreign Affairs (2014) Retrieved 2014 йил 8-5 from İklim Değişikliği Çerçeve Sözleşmesi (BMIDÇS) ve Kyoto Protokolü: http://www.mfa.gov.tr/birlesmis-milletler_iklim-degisikligi-cerceve-sozlesmesi-_bmidcs_-ve-kyoto-protokolu-_.tr.mfa
The Ministry of Foreign Affairs (2015a) Convention on biological diversity. http://www.mfa.gov.tr/convention-on-biological-diversity.en.mfa
The Ministry of Foreign Affairs (2015b) United Nations convention to combat desertification. http://www.mfa.gov.tr/united-nations-convention-to-combat-desertification.en.mfa
The Ministry of Foreign Affairs (2015c) Convention on the protection of the Black Sea against pollution (Bucharest Convention). http://www.mfa.gov.tr/convention-on-the-protection-of-the-black-sea-against-pollution-_bucharest-convention_.en.mfa
Türkeş M (2002) İklim Değişikliği: Türkiye İklim Değişikliği Çerçeve Sözleşmesi İlişkileri ve İklim Değişikliği Politikalari. In TUBİTAK, Vizyon 2023: Bilim ve Teknoloji Stratejileri Teknoloji Öngörü Projesi, Çevre ve Sürdürülebilir Kalkinma Paneli Vizyon ve Öngörü Raporu. TUBİTAK
Turkish Statistical Institute (2014) GHG inventory: 1990–2012. Turkish Statistical Institute, Ankara
UNFCCC (2000) FCCC/CP/2000/5/Add.1. http://unfccc.int/resource/docs/cop6/05a01.pdf. Retrieved 2015 йил 20-9
UNFCCC (2001) Amendment to the list in Annex II to the convention. http://unfccc.int/resource/docs/cop7/13a04.pdf. Retrieved 2015 йил 10-9
UNFCCC (2015a) GHG data from UNFCCC. http://unfccc.int/files/inc/graphics/image/jpeg/total_excl_2014.jpg
UNFCCC (2015b) Glossary of climate change acronyms. http://unfccc.int/essential_background/glossary/items/3666.php#L. Retrieved 15 Sept 2015
WWF (2014) Retrieved 2014 йил 9-5 from Küresel İklim Değişikliği ve Türkiye: http://www.wwf.org.tr/ne_yapiyoruz/ayak_izinin_azaltilmasi/iklim_degisikligi_ve_enerji/iklim_degisikligi/kuresel_iklim_degisikligi_ve_turkiye/

The Financial Impact of Terrorist Attacks on the Value of the Oil and Gas Industry: An International Review

5

David Holwerda and Bert Scholtens

Abstract

Energy firms operate in a strategic industry and their operations are vulnerable to terrorist attacks. We investigate how terrorism impacts stock returns of these firms. We analyze the effect of 105 terrorist attacks on oil and gas companies during 2001–2012. We find that there is no evidence that shareholders respond in a significant manner to these attacks. The reason may be that financial market participants are already got used to terrorism and that attacks on oil and gas companies occurring on a large scale and, therefore, are already included in the risk premium. As such, the financial market participants seem to assume that firms already efficiently manage the threat of terrorism in the energy industry. We conclude that financial markets seem to be efficient in absorbing the impact of terrorist attacks.

Keywords

Energy finance • Terrorism • Stock market • Event study • Energy security

D. Holwerda
Department of Economics, Econometrics and Finance, University of Groningen, P.O. Box 800, 9700 AV Groningen, The Netherlands

B. Scholtens (✉)
Department of Economics, Econometrics and Finance, University of Groningen, P.O. Box 800, 9700 AV Groningen, The Netherlands

School of Management, University of Saint Andrews, The Gateway, North Haugh, St Andrews, Fife KY16 9RJ, Scotland, UK
e-mail: L.J.R.Scholtens@RUG.NL

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_5

5.1 Introduction

This paper investigates the impact of terrorist attacks on the stock market returns of firms in the oil and gas industry. Investigating how sensitive companies are for this type of events is very important in enterprise risk management. Since the 9/11 attacks the effect of terrorism on financial markets has been investigated by various studies. From 9/11 onwards, it became clear that terrorism is a risk that investors have to face (Chen and Siems 2004; Brounen and Derwall 2010; Chesney et al. 2010). Most studies about terrorism take a security perspective and focus on the impact at the country level (see e.g., Smith Stegen 2011). Furthermore, most energy security studies take a country perspective (see e.g., Blum and Legey 2012; Zhang et al. 2013; Lilliestam 2014). However, in many instances, it is companies that are being hit by terrorists and this is a real risk for energy projects (Komendantova et al. 2012) as well as for companies or even complete industries (Kollias et al. 2013). Kollias et al. (2013) investigate the effects of war and terrorism on the covariance between oil prices and major stock market indices with the help of GARCH. They find that the covariance is affected by war but that terrorism does not seem to affect the covariance between the S&P500 and the FTSE100 and oil returns, but does so for the CAC40 and DAX. To complement the literature, we will focus on the firm perspective. In particular energy firms are prone to terrorism as they manage strategic resources and have operations that are vulnerable, such as pipelines, oil depots, etc. Therefore, we investigate the effect of a terrorist attack on an oil or gas firm's returns. Based on the definition of the National Consortium for the Study of Terrorism and Responses to Terrorism (2013) (hereafter START), we define terrorism as "*the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear coercion, or intimidation*".

Most studies about terrorism and corporations discuss the effect of major terrorist attacks on stock returns. Chen and Siems (2004) examine the effect of terrorism on global capital markets using 14 major terrorist events in the period of 1915 until 2001. Besides significant negative reactions, they find that US capital markets appear to be more resilient in recent times than they have been in the past. Eldor and Melnick (2004) find that the stock market reacts negatively to attacks in Israel. Arin et al (2008) investigate whether there is any difference in the reaction of different countries on terrorism. They find that the response to these attacks varies across the six countries investigated. It appears that Spain and the UK are least affected by the attacks. This would suggest that financial market participants in these two countries are more resilient to terrorist attacks. Brounen and Derwall (2010) find that terrorist attacks lead to a mild short-term effect, mainly on the event day. Apart from the attack on 9/11, financial markets restore to pre-attack levels within a week. The attacks on 9/11 had a clear long-term effect on the financial market, mainly due to an increase of systemic risk. Chesney et al. (2010) study the impact of terrorism on the behavior of stock, bond and commodity markets. They point out that the non-parametric approach is essential to a correct interpretation of the findings. Karolyi and Martell (2010) find that especially Royal Dutch Shell is hit

hard by terrorist attacks. Suleman (2012) studies the effect of terrorism with regard to the Karachi stock market in Pakistan (2012). He finds that news of terrorist attacks has a negative impact on all the sector indices, but that the effect on individual companies is insignificant. Kollias et al. (2013) use 14 terrorist events in their study, derived from secondary sources. Seven are in what they call the center, and seven in what is called periphery. They rely on a BEKK-GARCH model to establish the effect of terrorism (and war) on the covariance between stock market indices and oil prices. Kollias et al. (2013) find that terrorism does affect this relationship for CAC40 and DAX, but not for S&P500 and FTSE100, and that especially there is an effect with 'center' attacks rather the 'periphery' ones.

According to START's Global Terrorism Database, the number of terrorist attacks on companies in the utility sector is increasing. Karolyi and Martell (2010) argue that information about terrorist attacks can induce investors to demand either a higher risk premium or flee the market searching for more stable financial assets. It is relevant for both the investors as well as for the companies to know about the effect of terrorist attacks on company returns. Previous studies on the effect of terrorism on financial markets focuses mainly on major terrorist events or the effect of general terrorist events on stock prices of industries or even the stock market as a whole. However, these studies do not account for potential differences in sensitivity and vulnerability of different industries. Furthermore, they tend to be biased as they mainly investigate terrorist attacks on 'western' corporations. Our research focuses on terrorist attacks on international oil and gas companies. We do conduct an event study to detect the impact of these attacks on the stock market return of the corporations. We look into different subsamples of the data to investigate interesting cross-sectional characteristics, such as firms that are hit incidentally versus those that are hit more frequently.

Here, we particularly focus on the effect of terrorism that is aimed at a specific oil and gas company on the company's stock market returns. In contrast to Karolyi and Martell (2010) and Kollias et al. (2013), we do not focus on the most spectacular attacks as we feel this would result in a selection bias. We test the following hypothesis: Companies that are the target of a terrorist attack experience a significant abnormal return at or short after the event date.

5.2 Data and Methods

Our dataset consists of oil and gas firms that were attacked by terrorists between 2001/2010 and 2012/2012. October 2001 was used as starting point for the reason that this was the year terrorism became a number one priority due to the 9/11 attacks. The year 2012 was the last year for which accurate data was available at the time our research took place. The dates of the attack s are obtained from the Global Terrorism Database. The company had to be listed at a stock exchange at the time of the attack. Events of threatened use of violence and prevented attacks are not included. The final dataset consists of 105 terrorist attacks on gas and oil firms. Tables 5.1 and 5.2 show main data characteristics. Table 5.1 shows that four of the

Table 5.1 Companies involved and distribution of the attacks

Company	Number of attacks	Percentage of total
Ecopetrol	22	21.0
Sui Southern Gas Company	20	19.1
Royal Dutch Shell	13	12.4
Agip/ENI	11	10.5
EnCana	6	5.7
Chevron	5	4.8
Gazprom	4	3.8
Pakistan Petroleum Limited	4	3.8
Oil and Gas Development Company	4	3.8
Oil and Natural Gas Corporation	3	2.9
Sui Northern Gas Company	3	2.9
British Petroleum	2	1.9
Indian Oil Corporation Limited	2	1.9
Pakistan State Oil	2	1.9
Nexen Inc.	1	1.0
Petrobank Energy and Resources Ltd.	1	1.0
Atmos Energy	1	1.0
China Petroleum and Chemical Corporation	1	1.0
Total	105	100

18 companies are involved in the majority (namely 63 %) of the events: Ecopetrol, Sui Southern Gas Company, Royal Dutch Shell and Agip/ENI. The majority of events (66 out of 105) relates to firms headquartered in 'emerging' countries, the remainder to firms in 'developed' countries. Furthermore, only seven terrorist attacks did occur in 'developed' countries. Table 5.2 reveals that the number of terrorist attacks seems to have increased. This is because four fifths of the recorded terrorist attacks on energy companies did occur in the second half of the period under review.

To investigate the impact of terrorist attacks on the value of energy companies, we use the event-study methodology, which is based on the efficient market hypothesis. This hypothesis states that as new information becomes available, it is fully taken into consideration by investors assessing its current and future impact. This approach is undertaken on a frequent basis in the finance literature (MacKinlay 1997). Boersen and Scholtens (2011) use it to study the impact of accidents on the value of energy corporations. The method is also employed in other studies after the impact of terrorist attacks on firm value (e.g. Chen and Siems 2004). We account for both firm- and market specific information (Campbell et al. 2010). The event day is defined as the day on which the attack took place. When the event day was not a trading day, the first trading day after the attack is used as the event day. The event window consists of the event day and 2 days after the event day. Because a terrorist attack is completely unexpected, this research does not take into account of any days prior to the attack. A short event window is also examined in order to see

Table 5.2 Distribution of terrorist attacks over time

Year	Number of attacks	Percentage of total
2001	1	1.0
2002	0	–
2003	4	3.8
2004	1	1.0
2005	3	2.9
2006	10	9.5
2007	5	4.8
2008	15	14.3
2009	21	20.0
2010	12	11.4
2011	16	15.2
2012	17	16.2
Total	105	100

how fast the market digested the news and we use cumulative average abnormal returns (CAARs) as well to assess the size of the impact.

To arrive at the expected returns with which the actual returns of the firm's stock are confronted in the event window, we rely on the market and risk adjusted returns model (Campbell et al. 2010). In order to use this model, the returns in the event window have to be adjusted with the normal returns of the firm. To this extent, we apply an estimation window of 250 trading days. Given that we investigate unexpected terrorist attacks, it is important to keep the event window small. The actual returns R_{it} are calculated by applying the following formula:

$$R_{it} = ln\left(\frac{P_t}{P_{t-1}}\right) \tag{5.1}$$

where P_t is the price at trading day t and P_{t-1} is the price at the previous trading day. The market and risk adjusted returns model is specified as follows:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \tag{5.2}$$

where:

$$\alpha_i = \mu_i - \beta_i \mu_m \tag{5.3}$$

$$\beta_i = \frac{\sum_{t-249}^{t-1}(R_{i,t} - \mu_i)(R_{m,t} - \mu_m)}{\sum_{t-249}^{t-1}(R_{m,t} - \mu_m)^2} \tag{5.4}$$

where α_i is the intercept estimated over the estimation window, μ_i is the average stock return in the estimation window, μ_m is the average market return in the estimation window, β_i describes the asset's risk in relation to the market index estimated over the estimation window, and R_{mt} is the return on the market index on the trading day. We use the country index of the country where the company

attacked is listed as the market index (Appendix). As such, we adjust for country-wide factors.

To calculate the average abnormal returns (AARs) in the event window the following formula is used:

$$AAR_t = \frac{\sum_{i=1}^{N} AR_{i,t}}{N} \tag{5.5}$$

Calculating the CAAR is required while measuring the effect of the attack in the entire event window. We calculate the CAAR by summing up all the AARs in the event window:

$$CAAR_i = \sum_{t_0}^{t_2} AAR_t \tag{5.6}$$

For the analysis of the data, both a non-parametric test and a parametric test is used. For the parametric testing, we rely on the Student T-test, and for non-parametric testing we employ a sign test. The Student T-test is a relatively straightforward test, which gives a clear first analysis of the data. We define the test statistic for AAR and CAAR as:

$$T = \frac{\overline{x} - \mu_0}{s/\sqrt{N}} = \frac{AAR}{s/\sqrt{N}} \tag{5.7}$$

$$T = \frac{CAAR_t}{\sigma_{CAAR_t} \Big/ \sqrt{n}} \tag{5.8}$$

where N is the number of observations and s is the standard deviation of the estimation window. For the test statistics a p-value is calculated using the Student T distribution with N-1 degrees of freedom. In case of $P < \alpha$ the results will be considered significant for α values of 0.05.

For the non-parametric testing, we use the sign test. The advantage of a non-parametric test is that it can be used for testing the data without imposing any parametric assumptions. Campbell et al. (2010) argue that especially the sign test performs very well in a multi-country setting and with a three day event window, which is the same setting for our data. The test statistic can be defined as:

$$Z_G = \frac{w - N\widehat{p}}{\sqrt{\left[N\widehat{p}(1-\widehat{p})\right]}} \tag{5.9}$$

where w is the number of stocks on the event date for which the abnormal return is positive, and $\widehat{p}$ is defined as:

$$\widehat{p} = \frac{1}{N} \sum_{i=1}^{N} \frac{1}{M_i} \sum_{t=-249}^{-1} S_{it} \tag{5.10}$$

$$With\, S_{it} = \begin{cases} 1 \ if\ u_{it} > 0, \\ 0 \ otherwise. \end{cases} \tag{5.11}$$

where M is the number of non-missing returns in the estimation window for security i.

A limitation of this research design is that the majority of the events took place between the years 2009 and 2012. Another limitation is the fact that only the short-term reaction of the firm has been studied, not taking into account the possibility of longer-term effects on cash flows nor risk premium effects.

5.3 Results

The main characteristics of the AARs in the estimation window are provided in Table 5.3. It shows that the alpha is not significantly different from zero which suggests that companies that are hit by terrorist attacks do not outperform. The beta is 0.88 which is in line with that of the energy industry in general. As should be the case, the market and risk adjusted returns in the estimation window are zero on average. However, they clearly are not normally distributed.

Next we turn to the main analysis. We first discuss the estimation results for the AARs and CAARs in the event window, which are in Tables 5.4 and 5.5. Then, we turn to the results of the sensitivity analyses in Table 5.6.

The results in Table 5.4 shows the AAR in the days of the event window. Although a minor negative effect is found on day one, this effect is not significant. Table 5.5 displays the CAARs of two different event windows. Again, no statistically significant results are found by using the (parametric) Student *t*-test and the (non-parametric) sign test.

Table 5.3 Descriptive statistics estimation window

	Alpha	Beta	Market and risk adjusted returns
Average	0.0002	0.8792	0.0000
Median	0.0002	0.8662	−0.0004
STD	0.0008	0.2509	0.0162
Minimum	−0.0028	−0.1764	−0.2422
Maximum	0.0023	1.3414	0.1626
Skewness	−0.1129	−1.6066	−0.2791
Kurtosis	1.2210	4.9254	14.8966
Jarque-Bera	14.0692	61.3892	620.5494

$N = 105$. Degrees of freedom: 104

Table 5.4 AAR in event window

Day	AAR	p-value of the parametric test	p-value of the non-parametric test
0	0.0015	0.8346	0.2177
1	−0.0016	0.8492	0.5000
2	0.0039	0.9916	0.9608

Table 5.5 CAAR for two different event windows

	CAAR	p-value of the parametric test	p-value of the non-parametric test
[0;1]	0.0006	0.5172	0.2912
[0;2]	0.0050	0.9131	0.7123

Table 5.6 Sensitivity analysis

Panel A: Frequency comparison						
Time	Group 1[a]	Group 2[b]	Difference	Degrees of freedom	t value	p value
0	0.0017	0.0014	0.0003	104	0.1723	0.8635
1	−0.0003	−0.0039	0.0036	104	2.1723	0.0243
2	0.0027	0.0059	0.0032	104	2.0452	0.0434
Panel B: Period comparison						
Time	Group 1[c]	Group 2[d]	Difference	Degrees of freedom	t value	p value
0	−0.0076	0.0000	0.0076	56	3.5055	0.0007
1	−0.0024	−0.0003	0.0021	56	0.9638	0.3374
2	0.0030	0.0024	0.0006	56	0.2893	0.7729
Panel C: Country comparison						
Time	Group 1[e]	Group 2[f]	Difference	Degrees of freedom	t value	p value
0	0.0028	−0.0058	0.0083	104	0.2833	0.7775
1	0.0047	0.0044	0.0003	104	0.9712	0.3337
2	−0.0032	0.0001	0.0033	104	0.7910	0.4307

[a]Group 1: >10 attacks *N: 66*
[b]Group 2: ≤10 attacks *N: 39*
[c]Group 1: 2001–2007 *N: 24*
[d]Group 2: 2011–2012 *N: 33*
[e]Group 1: 'Developed' *N: 39*
[f]Group 2: 'Emerging' *N: 66*

The results from Tables 5.4 and 5.5 suggest that terrorist attacks do not significantly impact the market returns of the firms that are hit. This implies that terrorism does not seem to result in abnormal returns for oil and gas companies. Therefore, we conclude that there is no evidence for our hypothesis about the impact of terrorist attacks on energy firms. This finding is in line with that of Suleman

(2012), partly in line with that of Kollias et al. (2013), and it contradicts the outcomes of Karolyi and Martell (2010). While the latter two rely on a selection of a small number of terrorist attacks, our study investigates a large number of attacks and takes 'minor' attacks into account as well. Therefore, we feel that we do contribute to the existing literature by not only having a broad coverage of terrorist attacks (not only those that are widely covered in western media) but also investigating the response to attacks in various countries.

The sensitivity analysis is reported in Table 5.6. The first sensitivity analysis regards companies that are attacked more than ten times, and companies that have been attacked at most ten times. These boundaries have been chosen with regards to the timespan of this research, starting from 2001 until 2012. More than ten attacks in this timespan averages to one attack per year, which can be perceived as regularly. Appendix shows that this regards four companies. Panel A reports the findings. It appears that on the event day both groups react slightly positive, with no significant difference between the two. Interesting is that although both groups react, the group of companies which is attacked less than ten times reacts significantly more than the group of companies which is attacked more than ten times. This is in line with finance theory: It appears that the market more appropriately 'prices' the risks of attacks of those firms with a richer history of previous attacks. But the market updates its assessment of firms that are rarely attacked and the stock prices move accordingly. The reversal of the market's reaction on day 2 compared to that on day 1 suggests mean reversion.

The effect that financial markets might be getting used to terrorism is being analyzed by comparing the years 2001–2007 with 2011–2012 (see Panel B in Table 5.6). We leave out the in-between period 2008–2010 as we are not able to find a clear a priori break in the series. There is a negative reaction of −0.7 % on day 0 in the period of 2001–2007, which is significantly different from the response in the period 2011–2012, when no reaction is found. On day 1 and 2 after the terrorist attack, no statistically significant reaction is detected. As this sensitivity analysis goes into whether financial markets might be getting used to terrorism, the comparison suggests that financial markets are becoming less sensitive to terrorism indeed. The result from this analysis fuels the argument that financial markets are getting used to terrorism and that the findings of Chen and Siems (2004) may be valid for non-US financial markets as well.

Our third and last sensitivity analysis compares the reaction of stock market participants to terrorist attacks on firms headquartered in 'developed' countries in relation to those on firms which have their headquarters in 'emerging' countries. The former group holds companies from Canada, Italy, UK, and the US. The latter has companies from China, Colombia, India, Pakistan, and Russia. Panel C in the Table 5.6 shows that on the event day there is a slightly negative response in the

emerging countries and a very small positive one in the developed countries. On the first day after the event, the response to firms from both types of countries is about the same and slightly positive. On the second day after the event, we witness a slightly negative response with companies from developed markets and no response from firms headquartered in emerging markets. In none of the cases we detect a significant difference in the response. This might be due to the fact that most of the attacks did occur in emerging markets. Relatedly, whether participants in developed markets would respond stronger to terrorist attacks than those in emerging markets cannot be tested with our dataset.

5.4 Conclusion

We investigate the effects of terrorism on the stock market returns of corporations in the oil and gas industry, i.e. the financial market perspective regarding terrorism. This is important from the perspective of strategic risk management. We analyze 105 terrorist attacks aimed at oil and gas companies in the period 2001–2012. We hypothesize that companies that are the target of a terrorist attack will experience an abnormal return at the event date or in the two days after the attack. Previous literature suggests either zero or negative returns. For the energy companies studied, we were not able to detect a significant response of the stock market returns to terrorist attacks. This result is in line with Suleman (2012) and partly with that of Kollias et al. (2013), but contrasts with less focused and older studies. We do find that companies that are attacked more often react significantly different from companies that are attacked less often. Furthermore, it appears as if investors in energy firms seem to be almost getting used to terrorism, because they react significantly less negative in 2011–2012 compared to 2001–2007. This in fact suggests that financial market participants come to view terrorism regarding energy firms as a 'fact of life' and seem to assume that firms already efficiently manage the threat of terrorism in the energy industry (Karolyi and Martell 2010). Overall, we conclude that financial markets seem to be efficient in absorbing the impact of terrorist attacks.

From a policy perspective, our findings do not infer that one should not worry about attacks on energy companies. Cities, regions or countries—and, of course, especially the people living there—may be vulnerable to terrorist attacks (Lilliestam 2014). However, the protection of energy firms as such need not be the first priority in energy security. In contrast, it seems that protecting vulnerable infrastructure would be short-term priority, whereas switching to resilient energy systems is a long term strategy. Here, energy companies have an important role to play as they are key actors in the transition to a more resilient energy system.

Appendix: Company Characteristics

Company	Number of attacks	Country listed	Market index used
Ecopetrol	22	Colombia	MSCOLML
Sui Southern Gas Company	20	Pakistan	MSPAKIL
Royal Dutch Shell	13	United Kingdom	MSUTDKL
Agip/ENI	11	Italy	MSITALL
EnCana	6	Canada	MSCNDAL
Chevron	5	United States	MSUSAML
Gazprom	4	Russia	
Pakistan Petroleum Limited	4	Pakistan	MSPAKIL
Oil and Gas development Company	4	Pakistan	MSPAKIL
Oil and Natural gas Corporation	3	India	MSINDIL
Sui Northern Gas Company	3	Pakistan	MSPAKIL
British Petroleum	2	United Kingdom	MSUTDKL
Indian Oil Corporation Limited	2	India	MSINDIL
Pakistan State Oil	2	Pakistan	MSPAKIL
Nexen Inc.	1	Canada	MSCNDAL
Petrobank Energy and Resources Ltd.	1	Colombia	MSCOLML
Atmos Energy	1	United States	MSUSAML
China Petroleum & Chemical Corporation	1	China	MSCHINL
Total	105		

References

Arin KP, Ciferri D, Spagnolo N (2008) The price of terror: the effects of terrorism on stock market returns and volatility. Econ Lett 101:164–167

Blum H, Legey LFL (2012) The challenging economics of energy security: ensuring energy benefits in support of sustainable development. Energy Econ 34:1982–1989

Boersen A, Scholtens B (2011) Stocks and energy shocks: the impact of energy accidents on stock market value. Energy 36:1698–1702

Brounen D, Derwall J (2010) The impact of terrorist attacks on international stock markets. Eur Financ Manage 16:585–598

Campbell CJ, Cowan AR, Salotti V (2010) Multi-country event study methods. J Bank Financ 34:3078–3090

Chen AH, Siems TF (2004) The effect of terrorism on global capital markets. Eur J Polit Econ 20:349–366

Chesney M, Reshetar G, Karaman M (2010) The impact of terrorism on financial markets: an empirical study. J Bank Financ 35:253–267

Eldor R, Melnick R (2004) Financial markets and terrorism. Eur J Polit Econ 20:367–386

Karolyi GA, Martell R (2010) Terrorism and the stock market. Int Rev Appl Financ Iss Econ 2:285–314

Kollias C, Kyrtsou C, Papadamou S (2013) The effects of terrorism and war on the oil price—stock index relationship. Energy Econ 40:743–752

Komendantova N, Patt A, Barras L, Battaglini A (2012) Perception of risks in renewable energy projects. Energy Policy 40:103–109

Lilliestam J (2014) Vulnerability to terrorist attacks in European electricity decarbonisation scenarios. Energy Policy 66:234–248

MacKinlay AC (1997) Event studies in economics and finance. J Econ Lit 35:13–39

National Consortium for the Study of Terrorism and Responses to Terrorism (START) (2013) Global terrorism database. http://www.start.umd.edu/gtd. Retrieved 17 Feb 2014

Smith Stegen K (2011) Deconstructing the 'energy weapon': Russia's threat to Europe as a case study. Energy Policy 39:6505–6513

Suleman MT (2012) Stock market reaction to terrorist attacks: empirical evidence from a frontline state. Aust Account Bus Financ J 6:45–64

Zhang H-Y, Ji Q, Fan Y (2013) An evaluation framework for oil import security on the supply chain with a case study focused on China. Energy Econ 38:87–95

Part II

Social Responsible Investments

When Corporate Social Responsibility Causes Tone Inflation in Earnings Press Releases: Evidence from the Oil and Gas Industry

6

Özgür Arslan-Ayaydin and James Thewissen

Abstract

This study focuses on the impact of corporate social responsibility (CSR) on managers' reporting behavior of qualitative information in the oil and gas industry. Firms in the oil and gas industry have garnered enormous attention from their stakeholders, who place increasing expectations on them to engage in socially responsible investments. However, there is ample evidence that CSR investments addressing broader stakeholder concerns do not necessarily lead to maximization of shareholders' wealth. Based on 1700 earnings press releases (EPR) issued by the universe of US firms in the oil and gas industry between 2005 and 2014, we show that managers of more socially responsible firms opportunistically inflate the tone of their qualitative disclosures to signal their shareholders that CSR investments are not executed at the expense of their wealth. We also show that the tone of the EPR of socially responsible firms in the oil and gas industry contains less incremental information value to predict future firm performance, which lends considerable support to our assumption that optimistic tone in EPR is used for covering up the poorer accounting performance.

Keywords

Corporate social responsibility • Oil and gas industry • Impression management • Future firm performance

Ö. Arslan-Ayaydin
University of Illinois at Chicago, Chicago, IL 60607, USA
e-mail: Orslan@uic.edu

J. Thewissen (✉)
Accounting, Finance and Insurance, Katholieke Universiteit Leuven, Korte Nieuwstraat 33, 2000 Antwerp, Belgium
e-mail: James.Thewissen@kuleuven.be

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_6

This research was carried out thanks to the Flemish IWT and the Hercules Foundation (Project No. AKUL/11/02). We thank Bert Scholtens for his valuable comments, as well as the participants at the participants at the 2015 CEVI's 5th Multinational Energy and Value conference in Istanbul. The authors wish to acknowledge the assistance of Natallia Kolas.

6.1 Introduction

Firms in the oil and gas industry (henceforth, oil and gas firms) are subject to the sharp scrutiny from their stakeholders—the government, customers and activists—who monitor any wrong- doing and demand them to act socially responsibly (Smolarski and Vega 2013).[1] However, corporate social responsibility (CSR) is increasingly being regarded as a way of spending stockholders' wealth that neither benefits shareholders, nor reflects their preferences. Barnea and Rubin (2010) bring a new light to the concept of social responsibility in corporations and describe CSR as a conflict between firm insiders and outsiders. They show that stakeholders who are affiliated with the firm have an interest to increase CSR expenditure to a higher level than that which maximizes firm value. Managers may cater to this request of stakeholders because they gain unique benefits from a high CSR rating, as a good social rating enhances their reputation as being decent individuals who respect their employees, communities and the environment. While insiders may benefit from CSR, shareholders may not approve of a high CSR expenditure, if it reduces firm value. CSR activities therefore lead to a conflict between shareholders' profit-maximizing objective and stakeholders' interests to limit the firm's negative impact on its environment.

We argue in this paper that managers of good CSR firms in the oil and gas industry resort to impression management techniques by manipulating the tone of the qualitative statements of financial disclosures, to signal to shareholders that their wealth is not threatened by their CSR involvement. We contribute to the literature by investigating the impact of CSR on managers' incentives to manipulate the tone contained in qualitative financial information, and in particular the tone of earnings press releases (EPR). Quantitative disclosures are subject to GAAP enforced by independent auditors or the SEC monitoring of periodic filings. However, the key feature of EPR is that they are unregulated voluntary disclosures, giving the management almost full discretion on what information to release to investors. There exist only a few general guidelines that advise managers on how to best report qualitative information. EPRs are required to be "accurate and complete so as not to mislead" (Trautmann and Hamilton 2003). Yet, words are more elastic than numbers in conveying an impression. Such disclosures are thus harder to regulate or to litigate against and offer managers an opportunity to more subtly manipulate market participants' perceptions of future firm performance. For this

[1] Prominent tragedies illustrate the risks this industry is exposed to, with, for instance, the indigenous unrest such as anti-Shell protests in Nigeria, the involvement of oil companies in human rights abuses such as BP in Colombia and the oil spill by Exxon Valdez and BP.

reason, if managers are willing to be perceived favorably by their shareholders, they will be incentivized to increase the tone of their EPR.

We first test whether CSR activities of oil and gas firms lead managers to opportunistically inflate the tone of the qualitative information contained in their financial disclosures. We hypothesize that, if investors interpret a optimistic tone in EPR as a positive signal about a firm's future performance, managers of firms with good CSR practices will manage investors' expectations by increasing the use of positive words in the press release. We next explore the informational content of the tone of firms that undertake CSR policies. Davis et al. (2012) find that the tone of EPR predicts future firm performance, as measured by return on assets. However, if managers inflate the tone of EPR, we can expect the tone to be less informative of future firm performance, as CSR activities increase.

Based on a sample of 1700 EPR written by managers of oil and gas firms between 2005 and 2015, we find that a firm's CSR intensity significantly influences the quality of qualitative information contained in its EPR. We show that managers of CSR intensive oil and gas firms resort to impression management techniques by aggressively using positive words in their EPR; an effect that cannot be explained by the firm's past performance, information uncertainty or firm fixed effects. This result suggests that managers attempt to convince the shareholders that CSR activities are not conducted at the expense of the firm value.

We next show that the tone of the EPR predicts future firm performance after correcting for hard financial information. However, the marginal effect of tone decreases as CSR increases. In addition, as we segregate between CSR strengths and concerns, only the inflated section of tone due to CSR strengths reduces the informational value of the tone of EPR to predict future firm performance. We interpret this result as evidence that the tone of the earnings press releases of oil and gas firms with good CSR practices has a lower informational value.

Our chapter proceeds as the following. Section 6.2 provides the hypotheses development. In Sect. 6.3, we describe the data and the variables used. Section 6.4 describes our results and finally, Sect. 6.5 concludes.

6.2 Literature Review

6.2.1 CSR and Impression Management in the Oil and Gas Industry

Through exploration, production, transportation and refining, oil and gas firms have significant environmental and political implications. These firms have a high potential to disturb natural habitats and pose threats on health and safety. Governments, customers and activists constantly seek the means to monitor oil and gas firms so as to reduce the risk of negative externalities and execute punishment on them. While this monitoring is typically resolved through laws and regulations, stakeholders expect oil and gas firms to self-regulate by doing more to safeguard against risks to society than merely comply with the law.

However, the question of whether managers should attend to the interests of either shareholders or stakeholders, or both of them, is longstanding in the economics, finance and management literature. As Kacperczyk (2009) notes, two opposing theoretical views led to separate streams of research focusing on the purpose of the firm. The first theory emphasizes the shareholder value (see Jensen and Meckling 1976; Fama and Jensen 1983; or more recently Jensen 2002) and is based on the argument that the sole objective of the firm is to attend to the interests of those owning the claims to the firm's residual profit or assets. On the other hand, stakeholder theory advances the idea that managers running a firm should balance the interests of all stakeholders, because not one group of stakeholders has a priority over other groups (see, e.g., Freeman et al. 2007). Some previous studies defend that CSR is nothing more than spending stockholders' wealth in ways that neither benefit shareholders nor reflect their preferences. Williamson (1993) shows that agency problems are agitated with the addition of other stakeholders to the equation because CSR primarily benefits managers who, at the expense of shareholders, earn a good reputation among key stakeholders (e.g., local politicians, non-governmental organizations or, labor unions). In other words, managers ought to cater to shareholders' needs first, and to stakeholders' needs only when it advances shareholder return.

Barnea and Rubin (2010) find that these differing objectives lead to a strong conflict of interest between shareholders and managers. They show that managers may increase CSR expenditures to a higher level than that which maximizes firm value, as they gain unique benefits from a high CSR rating. A good social rating improves their reputation as being decent individuals who respect their employees, communities and the environment. However, they find that other shareholders do not approve of a high CSR expenditure if it reduces firm value. Prior et al. (2008) also report evidence of this conflict between shareholders and stakeholders. They investigate the impact of CSR activities on a firm's earnings management and argue that CSR activities are a powerful tool for obtaining support from stakeholders and reduce the likelihood of being fired due to pressure from discontented shareholders whose interests have been damaged by the implementation of earnings management practices. In other words, managers who manage earnings numbers garner support from stakeholders with the objective to ensure their entrenchment.

However, firms also use more subtle techniques to manage outsiders' impressions of firm performance and prospects, namely by manipulating the content and presentation of information in corporate documents with the purpose of "distorting readers' perceptions of corporate achievements" (Godfrey et al. 2003). Hooghiemstra (2000) describes impression management as "a field of study within social psychology studying how individuals present themselves to others to be perceived favorably by others." In a corporate reporting context, impression management is regarded as attempts "to control and manipulate the impression conveyed to users of accounting information" (Clatworthy and Jones 2001). Managers are thus presumed to use corporate reports as impression management vehicles to strategically manipulate the perceptions and decisions of shareholders (Yuthas et al. 2002).

These quotes implicitly assume that managers consciously engage in these practices. There is increasing evidence of managers' incentives to strategically manipulate the tone of their financial disclosures. For instance, Davis et al. (2012) show that managers can act strategically in choosing the narrative outlets such as EPR to describe firm performance. They argue that language in EPR is relatively unconstrained and difficult to verify ex post when compared to audited financial statements and explicit earnings numbers. Similarly, Arslan-Ayaydin et al. (2016) find that managers inflate the tone of their EPR to maximize the value of their stock-based compensation. They also indicate that investors are aware of managers' bias and discount the tone of EPR when reacting to the news at earnings announcement.

We argue that managers of oil and gas firms resort to impression management techniques by inflating the tone of the qualitative information contained in EPR with the objective of convincing their shareholders that, while attending to the interest of stakeholders, their wealth is not threatened. Our first hypothesis posits that investing in CSR practices to cater to stakeholders constitutes an incentive for managers of oil and gas firms to manage shareholders' impression. For this reason, they provide an overoptimistic style of communication, with the objective of easing the concerns of their shareholders.

Hypothesis 1 Ceteris paribus, the better is the firm's CSR performance, the higher is the manager's incentive for tone inflation in earnings press releases.

6.2.2 The Information Value of EPR of CSR Firms in the Oil and Gas Industry

Previous literature provides strong evidence that the market uses qualitative information from EPR to infer managers' private information about the firm's prospects and value. For instance, Henry (2008), Demers and Vega (2010) and Price et al. (2012) conclude that the tone of EPR is significantly positively correlated with short window contemporaneous returns around the date that the disclosures are made even after controlling for a firm's financial information and earnings surprises. Davis et al. (2012) also document the immediate effect of the tone of EPR on the perception of investors about its future performance. They find that the tone of EPR contains incremental information value to predict future firm performance, measured in terms of return on assets. However, if managers inflate the tone of EPR to align stakeholder and shareholders incentives, we can expect the tone to be less informative of future firm performance, as corporate social responsibility activities increase. Therefore, our second hypothesis is as follows:

Hypothesis 2 Ceteris paribus, a firm's corporate social responsibility weakens the association between the tone in earnings press releases and the firm future quarterly performance, measured in terms of returns on assets.

6.3 Sample and Variable Description

We now describe our sample of quarterly EPR and define the tone, CSR and control variables used in our tests. A summary of the variable descriptions is given in Table 6.1.

6.3.1 Sample Selection

Our analysis focuses on the 2005–2014 EPR issued by the universe of US firms covered by the Kinder, Lydenberg and Domini Research and Analytics database (KLD) in the oil and gas industry. The main benefit of the KLD data is that it is an independent investment research center that specializes in firm ratings of environmental, social and governance performance for use in investment decisions. KLD uses both internal (e.g. annual reports) and external (e.g., articles in the business press) sources to conduct year-by-year assessments of the social performance. Since the assessment is based on objective information (Waddock and Graves 1997), KLD safeguards against inflated assessments about a firm's social performance (Liston-Heyes and Ceton 2008; Waddock and Graves 1997). For instance, in the case of regulatory problems, the criteria are rated as dollars paid for fines (Waddock and Graves 1997). Given that the criteria are applied similarly for each firm in each year, the dataset gives consistent ratings (Harrison and Freeman 1999; Waddock and Graves 1997) over time and across industries. Because KLD provides a quantifiable and enhanced CSR measure and is an independent rating system (Hillman and Keim 2001), it has been used in a growing body of research on CSR issues (see e.g. Hillman and Keim 2001; Johnson and Greening 1999; Waddock and Graves 1997).

We select firms in the oil and gas industry based on their primary Standard Industrial Classification (SIC) code. We keep the firms whose SIC starts with 13; that is: 1300 (oil and gas extraction), 1311 (crude petroleum and natural gas), 1321 (natural gas liquids), 1380 (oil and gas field services), 1381 (drilling oil and gas well), 1382 (oil and gas exploration services), 1389 (oil and gas field services, NEC). For this group of firms, we retrieve the EPR from the Edgar website of the SEC.[2] The SEC publishes the EPR, in accordance to Section 409 of the Sarbanes-Oxley Act requiring that public firms that issue earnings releases furnish them to the SEC on a Form 8-K within four business days. We then parse the 8-K documents

[2] Other sources include BusinessWire, used e.g. in Huang et al. (2014), and NewsWire, used in Davis et al. (2012), among others. See also Henry (2008) for other research on the information content of EPR based on the information provided by the SEC's Edgar platform.

Table 6.1 Variable definitions

Panel A—Compustat/CRSP/IBES items		
Item	Item name	
Compustat/CRSP/IBES items		
$A_{j,q,t}$	Total assets of firm j at the beginning of quarter q of year t	Compustat #6
$Y_{j,q,t}$	Income before extraordinary items of firm j at the end of quarter q of year t	Compustat #18
$CSHO_{j,q,t}$	Common shares outstanding of firm j at the end of quarter q of year t	Compustat #25
$B_{j,q,t}$	Book value of equity of firm j at the end of quarter q of year t	Compustat #60
$P_{j,d,q,t}$	Price of firm j on day d, quarter q of year t	CRSP
$R_{j,d,q,t}$	Stock return of firm j on day d of quarter q of year t	CRSP
$R_{M,d,q,t}$	S&P500 return on day d of quarter q of year t	CRSP
$D_{j,t}$	Total dividends per share by ex date	Compustat #26

Panel B—Dependent variables		
Variable	Variable description	Definition
$FutROA_{j,q,t}$ (in %)	Return on assets of the quarter following quarter q of year t for firm j	$Y_{j,q+1,t}/A_{j,q+1,t}$
$PW_{j,q,t}$ (NWj,q,t)	Number of positive (negative) words in the earn-ings press release of firm j in quarter q of year t	
$TW_{j,q,t}$	Number of words in the earnings press release of firm j in quarter q of year t	
$Tone_{j,q,t}$ (in %)	Tone in the earnings press release of firm j of quarter q of year t	$100 = \frac{PW_{j,q,t} - NW_{j,q,t}}{TW_{j,q,t}}$

Panel C—Corporate social responsibility variables		
Variable	Variable description	Definition
$CSR_{j,t}$	Corporate social responsibility for firm j in year t	$CSRStrength_{j,t}$ - $CSRConcern_{j,t}$
$Strength_{j,t}$ $(Concern_{j,t})$	Number of corporate social responsibility strengths (concerns) for firm j in year t	
$CSRStrength_{j,t}$	Number of corporate social responsibility strengths (concerns) for firm j in year t, standardized by the total number of possible strengths ($S_{j,t}$)	$\frac{\sum_{s=1}^{S} Strength_{j,t,s}}{S_{j,t}}$

(continued)

Table 6.1 (continued)

Panel C—Corporate social responsibility variables		
Variable	Variable description	Definition
$CSRConcern_{j,t}$	Number of corporate social responsibility con- cerns for firm j in year t, standardized by the total number of possible concerns $(C_{j,t})$	$\frac{\sum_{c=1}^{C} Concern_{j,t,c}}{C_{j,t}}$

Panel D—Control variables		
Variable	Variable description	Definition
$ROA_{j,q,t}$ (in %)	Return on assets of firm j for quarter q of year t	$Y_{j,q,t}\ /A_{j,q,t}$
$MC_{j,q,t}$	Market capitalization on the last day d of the quarter q of year t (in $ mil)	$P_{j,d,q,t} \cdot CSHO_{j,q,t}$
$BTM_{j,q,t}$	Book-to-market ratio of firm j for quarter q of year t	$B_{j,q,t}/MC_{j,q,t}$
$CAR[-62,-2]_{j,q,t}$ (in%)	Cumulative abnormal return of firm j for the $[d-62,d\text{-}2]$ trading day window, where d=0 is earnings announcement day of quarter q of year t	$\sum_{d=62,}^{-2} [R_{j,d,q,\,t} - \alpha_{j,q,t} - \beta_{j,q,t} \cdot R_{M,d,q,t}]$
$\sigma_{ROA,j,q,t}$	Standard deviation of ROA over the four quarter preceding the end of fiscal quarter q of year t	$\left[\frac{1}{4} \cdot \sum_{i=1}^{4} \left(ROA_{j,q-i,t} - \widehat{ROA_{j,q-i,t}}\right)\right]^{\frac{1}{2}}$
$Div_{j,t}$	Total dividends	$D_{j,t,} \cdot CSHO_{j,t}$
$Lev_{j,q,t}$	Total debt divided by total assets of fiscal quarter q of year t	$\frac{Debt_{j,q,t}}{A_{j,q,t}}$
$PT_{j,t}$	Firm strength	Piotroski (2000)
$OH_{j,t}$	Ohlson bankruptcy risk	Ohlson (1980)
$Qtr^{l}{}_{q}$	Dummy indicator, which is zero, except when the quarter q corresponds to fiscal quarter l is defined as the fiscal quarter of the earnings press release	
$Year^{y}{}_{t}$	Dummy indicator, which is zero, except when the year t corresponds to the fiscal year y	
$Ind^{s}{}_{j}$	Dummy indicator, which is zero, except when the firm j operates in industry s (defined as the first two digits of the Global Industry Classification Standard)	
$Firm^{f}{}_{j}$	Dummy firm indicator, which is zero, except when f differs from j	

into vectors of words, keeping only the text within the tag "<TYPE>EX 99.1".[3] This leads to a sample of 2173 quarterly EPR.

Content and minimum length conditions are included to ensure that the tone estimate obtained from the textual analysis of the EPR is reliable. Following Davis et al. (2012), we impose that there is a minimum text length of 100 words in the EPR. To further ensure that the sample includes only EPR, we manually read all the press releases with a size of less than 10 kilobytes and eliminate those that are not relevant. As described below, our analysis needs to control for a number of accounting and financial market variables. This leads to our final sample, consisting of 1638 firm year-quarter observations.

6.3.2 Measure of Tone in Earnings Press Releases

To measure the tone of the EPR, we follow the definition of Davis et al. (2012) and Arslan-Ayaydin et al. (2016) and compute the spread between the percentage of positive and negative words, divided to the total number of words:

$$Tone_{j,q,t} = 100 \cdot \frac{PW_{j,q,t} - NW_{j,q,t}}{TW_{j,q,t}}, \tag{6.1}$$

with $TW_{j,q,t}$ the total number of words in the EPR of firm j in quarter q of year t, and $PW_{j,q,t}$ and $NW_{j,q,t}$ are the number of positive and negative words, respectively. This approach thus considers a press release as a "bag of words", and counts the occurrences of a word in a list of positive words and negative words.

There exist various lists of words, called dictionaries, however, there is no consensus in the literature regarding which wordlist is more appropriate for the analysis of language in contexts such as financial disclosures. To avoid choosing an inappropriate library, we average over the (standardized) tone obtained by using three established lists of words, namely the positive and negative wordlists defined by Henry (2008), those defined by Loughran and McDonald (2011) and the word list in the DICTION 7.0 software. All three of them are already popular choices in practice. DICTION is used by Davis et al. (2012); Davis and Tama-Sweet (2012); Demers and Vega (2010) to analyze EPR. A limitation of general word lists such as DICTION is that they do not analyze language in the context of financial disclosures. Prior studies (see e.g. Demers and Vega 2010; Henry 2008; Loughran and McDonald 2011) suggest that generic linguistic algorithms such as DICTION

[3] We hereby follow the following sequence of steps to parse the text (see e.g. Davis et al. 2012; Davis and Tama-Sweet 2012; Henry 2008; Loughran and McDonald 2011): (i) Remove figures; (ii) Re-encode characters such as   (blank space) or &AMP (&) back to their original ACSII form; (iii) Remove all text appearing within < TABLE > HTML tags, where more than 10 % of the nonblank characters are numbers; (iv) Remove HTML; (v) Parse into tokens. For the parsing we use a regular expression (regex) to parse the remaining string variable into all collections of two or more alphabetic characters.

Fig. 6.1 Word clouds of all words found in earnings press releases and of positive/negative words. (**a**) Word Cloud of all the words found in earnings press releases. (**b**) Word Cloud of positive and negative words found in the earnings press releases

may yield noisy measures of "positive" and "negative" linguistic tone in the context of financially-oriented text passages. To overcome this, we also use the Henry (2008) and Loughran and McDonald (2011) word lists specifically designed for financial disclosures. To illustrate the words appearing in EPR, we report in Fig. 6.1 the list of most frequent (positive and negative) words appearing in the EPR, where the font size is function of the frequency the word appears in our sample of EPR.

We find that the tone measure based on the three lists are significantly positively correlated but not perfectly. This high level of correlation is consistent with each measure capturing the underlying construct of tone plus some idiosyncratic error.[4] While correlations between the tone from individual libraries are between 44 and 60 %, we find that the correlation of each library with our standardized average measure of tone ($Tone^{EW}_{j,q,t}$) is between 80 and 88 %. In the following sections, we focus our discussion on the standardized average tone measure and test for the robustness of our results to the different libraries. Unless specified differently, $Tone_{j,q,t}$ corresponds to $Tone^{EW}_{j,q,t}$.

[4] Correlations across the variables do not pose a threat of endogeneity. To save space, the results are not reported but available upon request.

6.3.3 Measure of CSR

KLD evaluates CSR on criteria including corporate governance, community relations, diversity, employee relations, environment and product.[5] Following prior studies (Waddock and Graves 1997; Johnson and Greening 1999; Chatterji et al. 2009), we define our variable corporate social responsibility ($CSR_{j,t}$) as total strengths minus total concerns in KLD's six social rating categories: corporate governance, community, diversity, employee relations, environment, and product.

Each category includes a list of criteria that are rated following a binary scheme. If the assessment verified that a company fulfills certain criteria for a category (strengths or concerns), it is indicated by value one, whereas zero denotes neutrality. For example, a company that develops clean energy systems to limit their impact on climate change has a 'one' in the category *Clean Energy*. If it had to pay fines for environmental issues, this will be shown in the category *Regulatory Problems* as a 'one'. A firm earns a zero for that category if it pays no fines at all. If a firm shows the same activity or impact every year, they are also rated each year in the same way. KLD further aggregates data for environmental performance, where all items for strengths and of concerns are equally-weighted.[6]

The number of strengths and concerns for each category has evolved over time as KLD refined the database. For example, in 2007, there are six possible strengths in the environment category and seven possible concerns for SAFECO Corporation. In 1995, there were only five possible environmental strengths as well as seven concerns. As a result, it is not possible to directly compare strengths or concerns within a category across years. However, such a comparison is essential for our work because we are interested in both the time-series and the cross-sectional dimensions of CSR activities. We therefore scale the strengths and concerns for each firm-year to obtain two indices that range from 0 to 1. To achieve this, we follow Servaes and Tamayo (2013) and divide the sum of strengths (concerns) for each firm year by the number of possible strengths (concerns) in each category year, formally defined as

[5] KLD also screens on alcohol, gambling, military contracting, nuclear power, and tobacco, but these five criteria only involve firms that are committed to such activities beyond specific thresholds in these categories and are not eligible for inclusion in the Domini 400 Social Index that KLD constructs for CSR firms. Following Kim et al. (2012), we did not consider these exclusionary categories in constructing CSR scores, as these dimensions do not pertain to firms' discretionary activities.

[6] A weighted measure of environmental performance that would regroup each category in function of their importance with respect to environmental matters would be more appropriate. However such a weighting scheme would require detailed understanding and theoretical background of these measures (Hillman and Keim 2001), which is out of the scope of this paper.

$$CSRStrength_{j,t} = \frac{\sum_{s=1}^{S} Strength_{j,t,s}}{S_{j,t}}, \tag{6.2}$$

and

$$CSRConcern_{j,t} = \frac{\sum_{c=1}^{C} Concern_{j,t,c}}{C_{j,t}}, \tag{6.3}$$

where $Strength_{j,t,s}$ $(Concern_{j,t,s})$ is the KLD strength (concern) s (c) for firm j in year t and $CSRStrength_{j,t}$ $(CSRConcern_{j,t})$ is the weighted strength (concern) of firm j in year t. The total number of strengths (concerns) for firm j in year t is denoted as $S_{j,t}$ ($C_{j,t}$).

Corporate social responsibility ($CSR_{j,t}$) is then defined as the spread between the firm's weighted strengths and concerns:

$$CSR_{j,t} = CSRStrength_{j,t} - CSRConcern_{j,t}. \tag{6.4}$$

Although the data collection process and appraisal of firm social performance is an ongoing, continuous process, KLD actually assembles the data at the end of each calendar year, and compiles the data into the spreadsheets at the beginning of the next year (Oikonomou et al. 2012). Therefore, to avoid any look ahead bias, we start measuring the tone of EPR for year t, based on the KLD score from year $t-1$.

6.3.4 Future Firm Performance and Control Variables

6.3.4.1 Future Firm Performance

As a proxy for future firm performance, we use firm j's return on assets ($FutROA_{j,q,t}$) at the end of the following quarter $q+1$. We rely on an accounting measure of performance because they are more sensitive to managers' manipulations than market measures. As argued by Orlitzky et al. (2003), indicators such as ROA are subject to managers' discretionary allocations of funds to different projects and policy choices, and thus reflect internal decision-making capabilities and managerial performance rather than external market responses to organizational actions.

Davis et al. (2012) show that the tone of EPR is strongly positively correlated with a firm's profitability. To isolate the effect of CSR on tone, we control for "hard information" variables that have been shown in prior literature to be correlated with a firm's profitability. We select hard information variables from a set of earnings predicting covariates identified by Fama and French (2006), each defined in

Table 6.1. Accounting data employed to compute performance are obtained from the Compustat database, which contains financial accounting data for all listed U.S. firms.

6.3.4.2 Firm Size, Dividends and Book-to-Market Ratio

We include firm size $MC_{j,t}$, which is measured as the natural logarithm of market value of equity (#25 · #199) at the end of the fiscal year. We expect smaller firms to be less profitable (Fama and French 1995). The book-to-market ratio $BTM_{j,t}$ is known to be negatively related to profitability (firms with lower $BTM_{j,t}$ tend to be more profitable). We define book-to-market as the book value of equity (#6-#18), divided by $MC_{j,t}$. We predict investment to be positively related to future performance (Fama and French 2006). Previous work also shows that dividend-paying firms tend to be more profitable (Fama and French 2001). We include the ratio of dividends to book equity ($D_{j,t}$). Dividend is defined as the number of shares outstanding (#25), times the total dividend per share (#26).

6.3.4.3 Past Profitability

We also include past firm and stock market profitability as control variables. The return on assets ($ROA_{j,t}$) is measured as the earnings before extraordinary items at the end of fiscal year t, scaled by the total assets at the beginning of the year. The $ROA_{j,t}$ coefficient is predicted to be positive and lower than 1, consistent with prior research documenting mean reversion in performance metrics (Barber and Lyon 1997). Based on Fama and French (2006), we predict that current stock market performance is positively related to future firm performance. We define $CAR[-62,-2]_{j,q,t}$ as the firm's stock return for fiscal quarter q in year t. The cumulative abnormal return from the $[d-62,\ d-2]$ trading day window ($CAR[-62,\ -2]$), where $d=0$ is the earnings announcement day of quarter q in year t. We estimate benchmark returns using the market model with an estimation window of $[d-315,\ d-63]$ trading days prior to the earnings announcement of fiscal quarter q of year t.

6.3.4.4 Firm Strength, Probability of Debt Default and Firm Risk

Our model also includes a composite measure of firm strength $PT_{j,t}$ defined by Piotroski (2000) to predict stock returns. $PT_{j,t}$ is the sum of a firm's scores on the nine variables at the end of fiscal year t, with higher values indicating a stronger past performance. $OH_{j,t}$ is defined as the probability of debt default. Developed by Ohlson (1980) and used by Griffin and Lemmon (2002) to predict stock returns, $OH_{j,t}$ is the fitted value from Ohlson's (1980) cross-section logit regression that uses accounting fundamentals for year t to assess the probability of default on debt, with higher values implying weaker firms. We expect a positive (negative) correlation between future performance and $PT_{j,t}$ ($OH_{j,t}$), respectively.

Based on Core et al. (1999), we introduce a variable $\sigma_{ROA,j,t}$ to those introduced by Fama and French (2006). $\sigma_{ROA,j,t}$ captures firm risk as a control in our model. It is defined as the standard deviation of $ROA_{j,t}$ over the preceding five years. We expect a positive relation between future firm performance and past volatility.

6.3.4.5 Agency Issues

Finally, in the spirit of Jensen (1986), we also correct for potential agency problems by focusing on book leverage. High leverage limits the free cash flow available for managers to allocate to CSR investments, which do not necessarily enhance shareholder value. As a result, high leverage restricts the means for managers to build a good reputation among stakeholders at the expense of shareholders and therefore abates agency concerns. We expect a positive relation between leverage and future performance.

6.3.5 Summary Statistics

Panel A of Table 6.2 reports the summary statistics of our variables of interest. The average oil and gas firm of our sample has a substantial size of $8724 million, a book-to-market ratio of 0.631, is profitable and has a negative past stock market performance. Its leverage ratio is of 51 % and a probability of going bankrupt of 23 %.

We now move to our variables of interest. Oil and gas firms have, on average, a CSR score that is negative, with a value of −0.039. Figure (b) in Panel B of Table 6.2 shows the evolution of the CSR score over the sample period. Until 2013, the average number of strengths is lower than the number of concerns, leading to a $CSR_{j,t}$ score that is negative with a value around −0.05. In 2013, the situation reverses and the average $CSR_{j,t}$ becomes positive with a value of 0.05.

Figure (a) in Panel B of Table 6.2 reports the average tone level of EPR over time. Although the *Henry* measure of tone $Tone^{HEN}_{j,q,t}$ is constantly more optimistic, all measures of tone follow a similar trend and provide a good indication of the overall economic conditions. In the period of 2005–2008, the average tone of EPR is fairly constant and plummets in 2008. The tone then increases again in the period of 2011–2014. This volatility in the economic conditions explains why the average tone is positive, while its median is substantially negative.

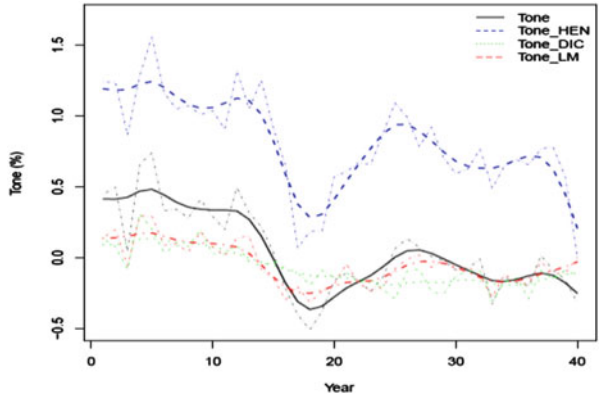
Table 6.2 Descriptive statistics

Panel A—Summary statistics					
Variable	Mean	St. Dev	Min	Median	Max
Tone, future firm performance and corporate social responsibility variables					
$Tone_{j,q,t}$	0.008	0.791	−3.609	−0.045	3.126
$CSR_{j,t-1}$	−0.039	0.101	−0.316	−0.041	0.658
$CSRStrength_{j,t-1}$	0.046	0.091	0.000	0.000	0.789
$CSRConcern_{j,t-1}$	0.085	0.068	0.000	0.061	0.333
$FutROA_{j,q,t}$	0.005	0.052	−0.570	0.011	0.245
Control variables					
$ROA_{j,t,q}$	0.009	0.042	−0.399	0.012	0.245
$MC_{j,t,q}$ (in $ mil.)	8,724	18,340	0.012	2,284	152,914
$BTM_{j,t,q}$	0.631	0.521	0.001	0.517	8.126
$CAR[-62, -2]_{j,t,q}$	−0.017	0.209	−1.444	−0.003	1.485
$\sigma_{ROAj,t,q}$	0.021	0.031	0.0003	0.010	0.255
$Div_{j,t,q}$	0.003	0.012	0.000	0.000	0.233
$Lev_{j,t,q}$	0.515	0.148	0.008	0.526	1.000
$PT_{j,t,q}$	6.239	1.597	1	6	9
$OH_{j,t,q}$	0.236	0.208	0.005	0.172	0.990

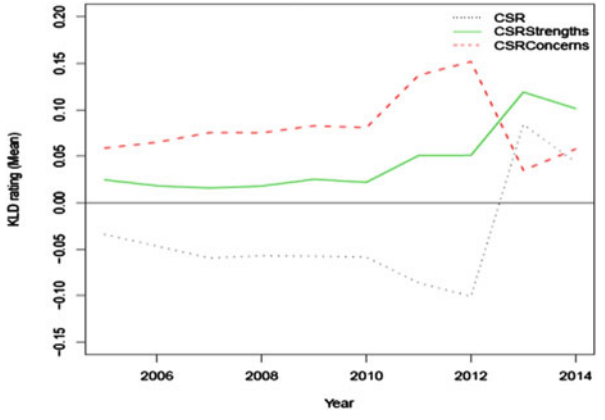
(continued)

Table 6.2 (continued)

Panel B—The tone in earnings press releases and corporate social responsibility by year



(a) Evolution of the tone of earnings press releases by library between 2005 and 2014



(b) Evolution of CSR between 2005 and 2014

Panel A reports the summary statistics of our variables of interest. Figure (a) in Panel B reports the average corporate social responsibility score ($CSR_{j,t}$), strength ($CSRStrength_{j,t}$) and concern ($CSRConcern_{j,t}$) by year. Figure (a) and (b) in Panel B respectively depict the evolution of the tone of earnings press releases by year and by library

6.4 Results

Do socially responsible oil and gas firms behave differently from other firms while reporting their qualitative information? Does the tone of EPR of socially responsible firms hold more information value to predict future firm performance? These are the two central questions that we will answer in this section. We first test the relation between CSR and the tone in EPR across oil and gas firms between 2005 and 2014. We find that the managers of socially responsible firms are significantly more optimistic in their EPR. We next investigate if the tone of EPR of socially responsible firms has lower informative content to predict future firm performance and find that CSR has a moderating effect in the relationship between future firm performance and tone. These results hold after we correct for hard, quantitative information and is robust to the choice of our libraries.

6.4.1 The Effect of Corporate Social Responsibility on the Tone of Earnings Press Releases

In our first hypothesis, we test whether oil and gas firms that behave responsibly inflate the tone of their EPR. We define the following linear least-squares model in which we regress the tone on the corporate social responsibility score ($CSR_{j,t-1}$):

$$Tone_{j,q,t} = \beta \cdot CSR_{j,t-1} + \gamma' \cdot Controls_{j,q,t} + \epsilon_{j,q,t}, \tag{6.5}$$

where $Controls_{j,q,t}$ corresponds to the vector of control variables that have been shown in the prior literature to explain the tone in EPR, each of which are defined in Panel D of Table 6.1.

Table 6.3 presents the estimation results for Eq. (6.5), where we have suppressed the estimated coefficients on the firm, quarter and year dummy variables for presentation purposes. We test for the significance of the coefficients using Newey-West standard errors. In Panel A of Table 6.3, Model (1) presents the results based on Eq. (6.5) estimated with year and quarter fixed effects, but without control variables. We find a positive coefficient for the $CSR_{j,t-1}$ variable, which suggests that firms with a higher CSR score are associated with a significant increase in the tone of EPR. We next correct for firms fixed effects by including firm-specific dummy variables to Eq. (6.5). The variable $CSR_{j,t-1}$ remains positive and highly significant at a 1 % confidence level. The Adj.R^2 sharply increases from 9.5 to 54.5 %. In Model (1) of Panel B of Table 6.3, we add the control variables to exclude a potential alternative explanation for our findings, which increases the Adj.R^2 further to 58 %. After adding the control variables, we find that the estimated coefficient of $CSR_{j,t-1}$ is substantially larger and remains highly significant at a 1 % level. As a robustness check, we report the results for each list of words included in the $Tone_{j,q,t}$ measure, namely DICTION 7.0, Henry (2008) and Loughran and McDonald (2011) libraries. In Table 6.4, we find that, for each library, the tone in EPR is significantly inflated as the firm's CSR activities increase.

Table 6.3 The tone of earnings press releases and corporate social responsibility

	Panel A—Baseline Models		*Panel B—With control variables*	
$Tone_{j,q,t}$	Model 1	Model 2	Model 1	Model 2
(Intercept)	**0.520*****			
	(0.085)			
Corporate social responsibility variables				
CSR_{j-1}	**0.682*****	**0.526*****	**0.0672*****	
	(0.223)	(0.193)	(0.187)	
$CSRStrength_{j,t-1}$				**0.454***
				(0.252)
$CSRConcerns_{j,t-1}$				**−1.164*****
				(0.425)
Control variables				
$ROA_{j,t,q}$			0.517	0.479
			(0.523)	(0.524)
$InMC_{j,t,q}$			0.068	**0.073***
			(0.043)	(0.043)
$InBTM_{j,t,q}$			**−.194*****	**−0.192*****
			(0.041)	(0.041)
$CAR[-62, -2]_{j,t,q}$			0.058	0.057
			(0.067)	(0.067)
$\sigma_{ROAj,t,q}$			−0.134	−0.062
			(0.574)	(0.576)
$Div_{j,t,q}$			−2.101	−2.189
			(1.560)	(1.561)
$Lev_{j,t,q}$			**0.586****	**0.562****
			(0.268)	(0.269)
$PT_{j,t,q}$			**0.047*****	**0.048*****
			(0.010)	(0.010)
$OH_{j,t,q}$			**−0.478****	**−0.479****
			(0.223)	(0.223)
Firm fixed effects	No	Yes	Yes	Yes
Year and quarter fixed effect	Yes	Yes	Yes	Yes
R^2	10.3	58.2	62.1	62.1
Adj. R^2	9.5	54.1	58.0	58.0
Num. obs.	1638	1638	1636	1636

Note: This table presents the estimation results of Hypothesis 1. The significance of the coefficients is tested using Newey-West standard errors
*, **, and *** denote statistical significance at the 10 %, 5 %, and 1 % levels, respectively, based on a two-sided t-test. The p-values are bold where they are less than or equal to the significance level cut-off of 0.1.

In addition, as argued by Oehme and Kemp (2013), some studies aggregate the data by taking the difference between the number of concerns from the strengths to have one estimate for each firm (see e.g. Hillman and Keim 2001; Waddock and

Table 6.4 Robustness checks—Corporate social responsibility and the tone of earnings press releases

$Tone_{j,q,t}$	$Tone_{j,q,t}$	$Tone_{j,q,t}$	$Tone^{HEN}_{j,q,t}$	$Tone^{DIC}_{j,q,t}$
Corporate social responsibility variables				
$CSR_{j,t-1}$	**0.672*****	**0.374*****	**0.392*****	**0.421*****
	(0.187)	(0.131)	(0.192)	(0.119)
Control variables				
$ROA_{j,t,q}$	0.517	0.422	0.430	0.122
	(0.523)	(0.367)	(0.535)	(0.332)
$\sigma_{j,t,q}$	−0.134	−0.114	−0.958	0.579
	(0.574)	(0.402)	(0.587)	(0.365)
$InBTM_{j,t,q}$	**−0.194*****	**−0.114*****	**−0.259*****	−0.016
	(0.041)	(0.029)	(0.042)	(0.026)
$InMC_{j,t,q}$	0.068	**0.055***	0.005	**0.050***
	(0.043)	(0.030)	(0.044)	(0.027)
$CAR_{j,t,q}$	0.058	0.056	0.039	0.009
	(0.067)	(0.047)	(0.068)	(0.042)
$Div_{j,t,q}$	−2.101	**−1.840***	0.238	**−1.639***
	(1.560)	(1.094)	(1.597)	(0.992)
$Lev_{j,t,q}$	**0.586****	**0.375****	0.344	**0.320***
	(0.268)	(0.188)	(0.275)	(0.171)
$PT_{j,t,q}$	**0.047*****	**0.034*****	**0.050*****	0.007
	(0.010)	(0.007)	(0.011)	(0.007)
$OH_{j,t,q}$	**−0.478****	**−0.337****	−0.144	**−0.319****
	(0.223)	(0.156)	(0.228)	(0.141)
Firm fixed effects	Yes	Yes	Yes	Yes
Year and quarter fixed effect	Yes	Yes	Yes	Yes
R^2	62.1	53.5	80.6	56.7
Adj. R^2	58.0	48.6	78.5	52.1
Num. obs.	1636	1636	1636	1636

Note: This table presents the robustness checks of Hypothesis 1. The significance of the coefficients is tested using Newey-West standard errors
*, **, and *** denote statistical significance at the 10 %, 5 %, and 1 % levels, respectively, based on a two-sided t-test. The p-values are bold where they are less than or equal to the significance level cut-off of 0.1.

Graves 1997). This is a problematic method since we show in the results section that both are significantly and positively correlated. Consolidating the two values would give similar results for companies that are rather neutral and companies that have high ratings in both strengths and concerns. This would not only decrease the variation of the data (Sharfman and Fernando 2008), but would also reduce the amount of information provided by KLD scores. Therefore, Model (2) of Panel B of Table 6.3 further decomposes the CSR score into total strengths ($CSRStrength_{j,t-1}$) and total concerns ($CSRConcern_{j,t-1}$). The result confirms the conclusions of Model (1) and shows that there exists a positive correlation between tone inflation and CSR. In other words, as a firm's CSR strengths increases, the tone of EPR is

significantly more optimistic and cannot be explained by the firm's past performance, agency issues or information uncertainty. On the other hand, the higher the firm's concerns, the more pessimistic the qualitative information of EPR will be.

These results are consistent with Hypothesis 1 and suggest that a firm's CSR significantly influences the quality of qualitative information contained in firm's EPR. We show that managers of CSR oil and gas firms resort to impression management and appear to be more optimistic in their EPR. This effect cannot be explained by the firm's agency issues, past performance, information uncertainty or firm fixed effects. We interpret this result as managers attempting to show to investors that, along with investing in their stakeholders, they also attend to the interests of their shareholders.

6.4.2 Corporate Social Responsibility, the Tone of Earnings Press Releases and Future Firm Performance

In the previous section, we show that firms with better CSR policies significantly inflate the tone of EPR to align the interests of their shareholders' and stakeholders. Given that managers use optimistic tone in their press releases, we should expect the tone of firms with good CSR practices to have a lower informational value to predict future firm performance. We predict that the $Tone_{j,q,t}$ is positively correlated with future firm performance, but that its effect is mitigated by the firm's tone inflation due to CSR practices. To measure the incremental effect of managers' language, we include a set of control variables that are known to have information content. Our model tests for the significance of the coefficients using Newey-West standard errors:

$$FutROA_{j,q,t} = \alpha + [\beta + \theta \cdot CSRStrength_{j,t-1} + \lambda \cdot CSRConcern_{j,t-1}] \cdot ToneDEC_{j,q,t} + \gamma' \cdot Controls_{j,q,t} + \epsilon_{j,q,t}, \quad (6.6)$$

where $Controls_{j,q,t}$ corresponds to the set of vectors that have been shown in the prior literature to explain the tone in EPR, each of which are defined in Panel D of Table 6.1. To gauge economic significance more easily, we use quarterly decile ranks for our key variable, $ToneDEC_{j,q,t}$.

Panel A of Table 6.5 presents the estimation results for Eq. (6.6), where we have suppressed the estimated coefficients on the firm, industry and year dummy variables for presentation purposes. All control variables have the expected sign, except for $OH_{j,q,t}$ that is positive and significant. Consistent with existing literature, the coefficient on $ROA_{j,q,t}$ is positive and statistically significant, while $\sigma_{ROA,j,q,t}$ is significantly negative. ln $BTM_{j,q,t}$ is negative and highly significant and past stock market performance ($CAR[-62, -2]_{j,q,t}$) is significant and positive. The firm's

Table 6.5 The tone of earnings press releases, corporate social responsibility and future firm performance

	Panel A—Baseline regression		Panel B—Robustness checks	
$FutROA_{j,q,t}$	$Tone_{j,q,t}$	$Tone_{j,q,t}$	$Tone^{HEN}_{j,q,t}$	$Tone^{DIC}_{j,q,t}$
(Intercept)	0.037	0.036	0.039	0.043
	(0.027)	(0.027)	(0.028)	(0.027)
Tone corporate social responsibility variables				
$ToneDEC_{j,q,t}$	0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
$ToneDEC_{j,q,t} \cdot CSRConcern_{j,t-1}$	−0.003	*−0.002*	*0.000*	*−0.003*
	(0.006)	(0.006)	(0.005)	(0.006)
$ToneDEC_{j,q,t} \cdot CSRStrength_{j,t-1}$	**−0.008*****	**−0.009****	**−0.008*****	**−0.007****
	(0.003)	(0.004)	(0.003)	(0.003)
Control variables				
$ROA_{j,t,q}$	**0.345*****	**0.343*****	**0.343*****	**0.345*****
	(0.073)	(0.073)	(0.073)	(0.073)
$InMC_{j,t,q}$	**0.006*****	**0.006*****	**0.006*****	**0.006*****
	(0.002)	(0.002)	(0.002)	(0.002)
$InBTM_{j,t,q}$	**−0.011*****	**−0.011*****	**−0.011*****	**−0.012*****
	(0.003)	(0.003)	(0.003)	(0.003)
$CAR[-62, -2]_{j,t,q}$	**0.022****	**0.022****	**0.022****	**0.022****
	(0.009)	(0.009)	(0.009)	(0.009)
$\sigma_{ROAj,t,q}$	**−0.105***	**−0.107***	**−0.102**	**−0.108***
	(0.063)	(0.063)	(0.063)	(0.063)
$Div_{j,t,q}$	0.081	0.076	0.086	0.074
	(0.058)	(0.058)	(0.060)	(0.058)
$Lev_{j,t,q}$	**−0.052*****	**−0.053*****	**−0.051*****	**−0.050*****
	(0.018)	(0.017)	(0.018)	(0.017)
$PT_{j,t,q}$	**0.002*****	**0.002*****	**0.002*****	**0.003*****
	(0.001)	(0.001)	(0.001)	(0.001)
$OH_{j,t,q}$	**0.040****	**0.041****	**0.039****	**0.038***
	(0.020)	(0.019)	(0.020)	(0.020)
Year and quarter fixed effects	Yes	Yes	Yes	Yes
R^2	27.4	27.4	27.4	27.4
Adj. R^2	26.3	26.3	26.3	26.3
Num. obs.	1617	1617	1617	1617

Note: This table presents the estimation results and the robustness checks of Hypothesis 2. The significance of the coefficients is tested using Newey-West standard errors. The p-values are bold where they are less than or equal to the significance level cut-off of 0.1.
*, **, and *** denote statistical significance at the 10 %, 5 %, and 1 % levels, respectively, based on a two-sided t-test

dividend ($Div_{j,q,t}$) is also positive but insignificant. $PT_{j,q,t}$ is highly significant and positive. These coefficients hold irrespective of the inclusion of quarter and year fixed effects.

As expected, the coefficient on the interaction term $ToneDEC_{j,q,t} \cdot CSRStrength_{j,t-1}$ is negative and highly significant at a 1 % confidence level. This result suggests that the informational value of tone to predict future firm performance decreases as the firm's CSR practices increase. This means that the tone of EPR cannot be solely used as a signal to predict future firm performance and that it should be adjusted by its uninformative component. However, we find that only the inflated section of tone due to $CSRstrength_{j,t-1}$ reduces the informational value of the tone of EPR to predict future firm performance. The coefficient of the $ToneDEC_{j,q,t} \cdot CSRConcern_{j,t-1}$ variable is also negative but insignificant at standard confidence levels. Panel B of Table 6.5 conducts robustness checks based on the DICTION, Henry (2008) and DICTION libraries and confirm these results. We interpret our findings as evidence that the tone of oil and gas firms with good CSR practices contains less informational value, as managers have motivations to create an impression on their shareholders.

6.5 Conclusion

Prior literature defends that CSR is being increasingly regarded as a conflict between managerial decisions at the cost of shareholders' value maximization and those benefiting stakeholders' interests by limiting the firm's negative impact on its environment. However, perhaps more so than in any other industry, governmental and non-governmental organizations and people demand CSR from oil and gas firms by forcing them to attend to stakeholders' needs proactively.

This chapter argues that managers resort to impression management by inflating the tone of EPR in order to communicate to shareholders that their wealth is not threatened by catering to stakeholders' needs. Based on a sample of 1700 EPR written by managers of oil and gas firms between 2005 and 2014, we find that a firm's CSR significantly influences the quality of qualitative information contained in firm's EPR. We show that managers of CSR oil and gas firms resort to impression management by using positive words more aggressively in press releases. This effect cannot be explained by the firm's agency problems, past performance, information uncertainty or firm fixed effects. This result suggests that managers attempt to convince investors that, along with investing in their stakeholders, they also attend to the interests of their shareholders. We also find that, as a result of tone inflation, the tone contained in EPR of CSR firms contains less informational value to predict future firm performance.

This observation would have important consequences for the quality of financial disclosures. If discretionary narrative disclosures are used for impression management rather than incremental information purposes, then financial reporting quality will be undermined. In addition, if managers engage in impression management, and if users are susceptible to it, this may end up in misallocation of capital. Our results also provide guidance to investors on how to interpret the tone of EPR of oil and gas firms. The tone of narrative disclosures of oil and gas firms cannot be solely used as a signal to predict future prospects of these firms and should be adjusted

according to managers' incentives. Furthermore, our findings have implications for the regulators seeking the integrity of firms' financial disclosures because we show that managers may not only manipulate the hard information through earnings management, but also the 'soft' information in order to manipulate investors' impressions about a firm's future performance.

References

Arslan-Ayaydin O, Boudt KB, Thewissen J (2016) Managers set the tone: equity incentives and the tone of earnings press releases. J Bank Financ (Forthcoming)

Barber B, Lyon J (1997) Detecting long-run abnormal stock returns: the empirical power and specification of test statistics. J Financ Econ 43:341–371

Barnea A, Rubin A (2010) Corporate social responsibility as a conflict between shareholders. J Bus Ethics 97:71–86

Chatterji AK, Levine DI, Toffel MW (2009) How well do social ratings actually measure corporate social responsibility? J Econ Manage Stud 18:125–169

Clatworthy M, Jones M (2001) The effect of thematic structure on the variability of annual report readability. Account Audit Account J 14:311–326

Core J, Holthausen R, Larcker D (1999) Corporate governance, chief executive officer compensation and firm performance. J Financ Econ 51:371–406

Davis AK, Tama-Sweet I (2012) Managers' use of language across alternative disclosure outlets: earnings press releases versus MD&A. Contemp Account Res 29(3):804–837

Davis A, Piger J, Sedor L (2012) Beyond the numbers: measuring the information content of earnings press release language. Contemp Account Res 29:845–868

Demers E, Vega C (2010) Soft information in earnings announcements: News or noise? Working paper, INSEAD

Fama E, French K (1995) Size and book-to-market factors in earnings and returns. J Financ 50:131–155

Fama E, French K (2001) Disappearing dividends: changing firm characteristics or lower propensity to pay. J Financ Econ 60:3–43

Fama E, French K (2006) Profitability, investment and average returns. J Financ Econ 82:491–518

Fama E, Jensen M (1983) Separation of ownership and control. J Law Econ 26:301–325

Freeman R, Harrison J, Wicks A (2007) Managing for stakeholders: survival, reputation, and success. Yale University Press, New Haven

Godfrey J, Mather P, Ramsay A (2003) Earnings and impression management in financial reports: the case of CEO changes. Abacus 39:95–123

Griffin J, Lemmon M (2002) Does book-to-market equity proxy for distress risk or mispricing? J Financ 57:2317–2336

Harrison J, Freeman R (1999) Stakeholders, social responsibility, and performance: empirical evidence and theoretical perspective. Acad Manage J 42:479–485

Henry E (2008) Are investors influenced by how earnings press releases are written? J Bus Commun 45:363–407

Hillman A, Keim G (2001) Shareholder value, stakeholder management, and social issues: what's the bottom line? Strateg Manage J 22:125–139

Hooghiemstra R (2000) Corporate communication and impression management—new perspectives why companies engage in social reporting. J Bus Ethics 27:55–68

Huang X, Teoh SH, Zhang Y (2014) Tone management. Account Rev 89:1083–1113

Jensen M (1986) Agency cost of free cash flow, corporate finance, and takeovers. Am Econ Rev 76:323–329

Jensen M (2002) Value maximization, stakeholder theory, and the corporate objective function. Bus Ethics Q 12:235–256

Jensen M, Meckling W (1976) Theory of the firm: managerial behavior, agency costs, and capital structure. J Financ Econ 3:305–360
Johnson R, Greening D (1999) The effects of corporate governance and institutional ownership types on corporate social performance. Acad Manage J 42:564–576
Kacperczyk A (2009) With greater power comes greater responsibility? Takeover protection and corporate attention to stakeholders. Strateg Manage J 30:261–285
Kim Y, Park M, Wier B (2012) Is earnings quality associated with corporate social responsibility? Account Rev 87:761–796
Liston-Heyes C, Ceton G (2008) An investigation of real versus perceived CSP in S&P500 firms. J Bus Ethics 89:283–296
Loughran T, McDonald B (2011) When is a liability not a liability? Textual analysis, dictionaries, and 10-ks. J Financ 66:35–65
Oehme N, Kemp R (2013) Ecoactivity and innovativeness: what is their relation to environmental performance in consumer firms and industrial firms. In: Costantini V, Mazzanti M (eds) The dynamics of environmental and economic systems. Springer, New York
Ohlson J (1980) Financial ratios and the probabilistic prediction of bankruptcy. J Account Res 18:109–131
Oikonomou I, Brooks C, Pavelin S (2012) The impact of corporate social performance on financial risk and utility: a longitudinal analysis. Financ Manage 41:483–515
Orlitzky M, Schmidt FL, Rynes SL (2003) Corporate social and financial performance: a meta-analysis. Org Stud 24(3):403–441
Piotroski J (2000) Value investing: the use of historical financial statement information to separate winners from losers. J Account Res 38:1–42
Price S, Doran J, Peterson D, Bliss B (2012) Earnings conference calls and stock returns: the incremental informativeness of textual tone. J Bank Financ 36:992–1011
Prior D, Surroca J, Triba J (2008) Are socially responsible managers really ethical? Exploring the relationship between earnings management and corporate social responsibility. Corp Gov Int Rev 16:160–177
Servaes H, Tamayo A (2013) The impact of corporate social responsibility on firm value: the role of customer awareness. Manage Sci 59:1045–1061
Sharfman M, Fernando C (2008) Environmental risk management and the cost of capital 29. Strat Manage J 29:569–592
Smolarski J, Vega J (2013) Extreme events: a study of small oil and gas firms. Account Financ 53:809–836
Trautmann B, Hamilton G (2003) Informal corporate disclosure under federal securities law: press releases, analyst calls and other communications. CCH, Chicago
Waddock S, Graves S (1997) The corporate social performance-financial performance link. Strat Manage J 18:303–319
Williamson O (1993) Calculativeness, trust, and economic organization. J Law Econ 36:453–486
Yuthas K, Rogers R, Dillard J (2002) Communicative action and corporate annual reports. J Bus Ethics 41:141–157

Governing Energy Transitions: Transition Goals in the Swiss Energy Sector

7

Reinier Verhoog and Matthias Finger

Abstract

European countries are currently committing to energy transitions so as to make the supply of electricity more sustainable. In this chapter we present our theoretical extension of a transition framework with the concepts of power, agency and politics in order to study the governance challenges of energy transitions. Furthermore, we demonstrate the application of our extended framework to a case in the Swiss energy sector. We focus on analyzing the distribution and gradual concentration of power within the sector and its implications for the energy transition. We conclude that the promotion of renewable energy through subsidization leads to a price scissor effect that squeezes small Swiss utilities out of the market by lowering electricity consumption and wholesale prices, while increasing self-production by households. The power increasingly lies with several large utilities, cities and cantons that are currently committing to ambitious energy transition goals. Such a concentration of power and alignment of goals can help in accelerating the energy transition in Switzerland.

Keywords

Agency • Energy transition • Framework • Politics • Power • Transition research

7.1 Introduction

Energy systems will undergo significant changes in the coming decades as European countries are committing to energy transitions. Energy transitions vary greatly from country to country as they are determined largely by the established

R. Verhoog (✉) • M. Finger
Management of Network Industries, College of Management of Technology, École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland
e-mail: reinier.verhoog@epfl.ch

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_7

infrastructure, institutions,[1] politics and global events. More precisely, we can state that national energy systems are under increasing pressure from outside the established (*regime*) energy system: such as climate change and nuclear disasters in the *landscape* of the system (Geels 2002; Broto et al. 2014), innovations in *niches* (Geels 2002), and from within the established system such as *regime* stakeholders responding to opportunities and threats (Smith et al. 2005).

For example, the Netherlands transitioned from electricity production using coal and oil in the 1960s to a mix of natural gas, coal and nuclear in the 1980s and 1990s, including a significant share of decentralized combined heat and power (CHP) plants (Verbong and Geels 2007). This transition was mainly driven by an abundance of natural gas resources in the Netherlands (*regime*), willingness of industrial stakeholders (*regime*) to adopt natural gas CHP technologies (*niche*) and the oil crisis (*landscape* pressure). Despite the environmental benefits of gas over coal, the Dutch government is under increasing pressure to meet European emission targets (*landscape*).

Another example is Germany, which adopted the Renewable Energy Act (EEG) in 2000, as well as the decision to phase-out nuclear energy. The adopted feed-in tariff (FIT) in Germany greatly stimulated the investments in renewables such as solar panels. These developments were mainly driven by public sentiment (*regime*) against nuclear energy and support for renewable energy. This sentiment was strengthened after the Fukushima disaster (*landscape*) (Laes et al. 2014).

These examples illustrate significant changes to large energy systems, which did not come about easily. Energy systems are characterized by high asset specificity, long asset lifetimes, and stakeholders who dominate the market and have a vested interest in maintaining the status quo (Finger et al. 2005). Furthermore, both examples illustrate the reliance of national governments on other stakeholders to realize the transitions in their national energy systems. We can state that the power[2] and agency[3] of individual stakeholders is limited and that both power and agency are increasingly (re)distributed amongst stakeholders. Thus, energy transitions present a governance challenge, where a collective of stakeholders is responsible for the evolution of the system, rather than a single powerful stakeholder.

Switzerland in particular is facing significant technical and social challenges to realize its energy transition as outlined in the Energy Strategy 2050, which is highlighted hereafter. First, the centralized energy infrastructure is under pressure to change as a result of the decision to phase-out nuclear energy. Around 40 % of the total energy production in Switzerland, or 25–26 TWh nuclear energy

[1] *Institutions* are defined as (1) *informal rules* such as customs, traditions, norms and religion, and (2) *formal rules* such as laws and property rights (North 1991, p. 97).

[2] *Power* is defined as (1) *power-over* "A has power over B to the extent that he can get B to do something that B would not otherwise do" (Dahl 1957, p. 203), and (2) *power-to* "the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance" (Weber 1978, p. 53).

[3] *Agency* is defined as "the ability to take action and make a difference over a course of events." (Giddens 1984, p. 14).

(International Energy Agency 2012), will have to be replaced with new renewables such as solar, wind, micro-hydro, biomass, and geothermal energy. The nuclear reactors will remain in operation for as long as they can be operated safely and the four nuclear plants are expected to be shut down between 2019 and 2034. Furthermore, there are social barriers to the realization of renewable energy sources such as windmills, as well as technical limitations due to network congestion and required grid reinforcements. Second, Switzerland is characterized by its decentralized government structure and fragmented energy sector with around 700 companies active in the production, distribution and supply of electricity. Third, new stakeholders, such as prosumers (e.g. consumers which are producing energy with solar panels), energy cooperatives, and investors are entering the energy sector. As a result, the Swiss national government has to steer the energy transition through a multi-level governance approach. Multi-level governance considers the interactions between public and private stakeholders working towards the realization of collective goals (Lange et al. 2013, p. 406). Multi-level governance is concerned with the changing roles of key stakeholders, power, agency, and politics. Thus, we address following research question in this chapter: How is the Swiss energy transition governed under changing social and technical system dimensions?

Transition research has paid significant attention to the study of energy transitions over the past decade (Chappin 2011; Markard et al. 2012) with the development of early transition frameworks (e.g. strategic niche management (Kemp et al. 1998; Rip and Kemp 1998), multi-level perspective (MLP) (Geels 2002) and transition management (Rotmans et al. 2001). These frameworks are useful for studying transitions as they address, for example, policy-making, technological systems, social systems, and lock-in effects. However, transition research has been criticized for neglecting concepts which are important when addressing multi-level governance issues, such as those present in energy transitions: power, agency (e.g. Smith et al. 2005, 2010) and politics (e.g. Meadowcroft 2009; Scrase and Smith 2009).

To address this conceptual problem contributions have been made to address power (e.g. Avelino and Rotmans 2009; Geels 2014), agency (e.g. Geels and Schot 2007) as well as politics (e.g. Hess 2013; Kern 2012; Voß and Bornemann 2011). However, an integrated theoretical solution is currently missing. In this chapter we adopt the MLP (described in more detail in Sect. 7.2) since it provides a descriptive framework which includes regime, landscape and niche processes that stabilize and destabilize regimes of the studied systems. Specifically, we address the closely related roles of power, agency and politics in energy transitions to add additional narrative and analytical power to the MLP.

We have structured this chapter as follows. First, we introduce the MLP and more recent theoretical contributions addressing power, agency and politics. Second, our main theoretical contribution is to extend the MLP with an integrated conceptualization of power, agency and politics. Third, our practical contribution is to demonstrate the usefulness of the extended framework by applying it to a case from the Swiss energy sector. We conclude the chapter by reflecting on the research question and insights from the Swiss energy transition.

7.2 Multi-level Perspective

The MLP is a descriptive mid-range transition framework that is best illustrated by its three levels (Fig. 7.1) and explanatory mechanisms. The *regime* captures the currently established stakeholders, institutions, governance structures and technical system to explain the inertia that we observe in infrastructures. The regime typically resists change due to the high asset specificity, high asset lifetimes, interests of established stakeholders, and slow process of institutional change. New technologies develop in *niches*, which are protected spaces where development can take place outside of the selection environment (e.g. markets) of the regime (Schot 1998). New technologies are often inferior during their start-up phase, but can potentially outperform established technologies in the long-term. *Landscapes* are external to the regime and niche, and represents external pressures and shocks such as environmental change and crises. The landscape influences both the regime and the niche, but feedback is limited and landscapes are even more inert than regimes (Geels 2002). There is *hierarchy* between the three levels, where the regime and landscape constrain and enable niches to develop over time. The landscape can also open up a regime for a niche, e.g. climate change opening energy systems to renewable energy production technologies. It should be noted that the regime could also open up itself due to internal pressures, or pressure from other regimes. The MLP does not only represent multiple levels, but also multiple stakeholders, institutions and technologies within those levels.

Perhaps the biggest strength of MLP is its compelling rationale, as summarized by Markard and Truffer (2008, p. 609): "Innovation and transition processes can be explained by the interplay of stabilizing mechanisms at the regime level and (regime-) destabilizing landscape pressures combined with the emergence of radical innovations at the niche level". Specifically, the MLP pays attention to the following mechanisms and concepts (Geels 2002, 2005; Rip and Kemp 1998)

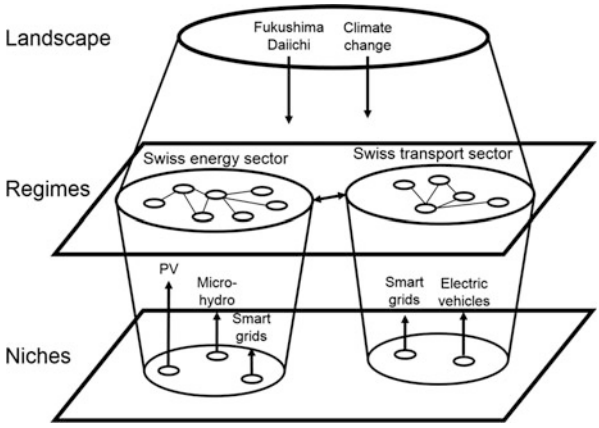


Fig. 7.1 Multi-Level Perspective (*adapted from* Geels 2002, p. 1262)

(1) *radical innovations* play a key role, as these innovations are required to change the regime, (2) s*election* of innovations and technologies, which happens in the regime, helps explain why the regime is self-reinforcing and why niches need to be protected. Radical innovations are rarely selected during their early lifetime, as they are almost always economically inferior to their alternatives, (3) *institutions* also help explain the stability of regimes by explicitly describing the routines in behavior that are present in the established regime, and (4) technological *lock-in* which increases the stability of regimes (Unruh 2002).

However, the technology and niche focus of the MLP is somewhat of a double-edged sword. First, the theoretical and conceptual foundation of the MLP cause it to have a bottom-up and technological bias due to its focus on radical technological innovation in niches (Lawhon and Murphy 2012). An important role is attributed to the development and protection of innovation niches, which could overshadow the internal renewal process of regimes (Smith et al. 2005). Second, politics are mainly reduced to an exogenous force as part of the landscape (Geels 2002). Third, power and agency are claimed to not have been explicitly addressed (Smith et al. 2005). Especially the lack of attention to power, agency and politics is important for studying the governance of energy systems. We will now go into more depth on how the concepts of power and agency have already been addressed after the conception of the MLP.

Geels and Schot (2007) refer to the duality of structure theory by Giddens (1984) when addressing *agency* in the MLP. They highlight the importance of following and reproducing institutions. The reproduction of institutions contributes to their stability, making the institutions more constraining, thus reducing the agency of agents. Agency is conceptualized using a rule-based actions model, which can be understood as *power-to* (do something). The rule-based actions model covers (1) the creation of formal *rules of the game* (e.g. regulation) through rule-creation and rule alteration, and (2) the *play of the game* (e.g. contracting) through rule-using and rule-following (Williamson 1998, p. 26). The *game* as used here is a set of actions and interactions of stakeholders, such as participation in a political process, investments in power production assets, or the engagement in competition or cooperation by firms.

Geels (2014) did not address *power* in more detail until recently, and identifies three types of power: (1) *instrumental power*, which refers to the use of resources by agents, (2) *discursive strategies* such as agenda setting, and (3) *institutional power*, referring to a wider regime reinforcing and stabilizing institutional context. This conceptualization mainly focuses on agents and institutions and their *power-over* other agents. This conceptualization is insufficient when studying transitions in socio-technical systems, such as the energy system, as we will show in the next section that markets and technologies also play an important role in power relations in energy systems.

7.3 Conceptualizing Power, Agency and Politics

The concepts of power, agency and politics are intimately related through the concept of power. We address this relationship by specifying which system elements can hold power and agency, or engage in political processes.

There are three distinct elements of socio-technical systems that can hold power. First, *stakeholders* can hold *power-over* other stakeholders through relationships, resources and discourse (Geels 2014), as well as *power-over* technologies through ownership. The power relationship between stakeholders is more complex, as the relative power of stakeholders is important to consider as well as the directionality of the relationship (e.g. one-sided dependence or mutual dependence). The power of stakeholders over other stakeholders is determined not only by their own characteristics (e.g. available resources), but also their broader institutional (e.g. norms and laws), social (relationships with other stakeholders), political, economic and technological (e.g. power plant mix) environment (Haugaard 2010, p. 425). Furthermore, stakeholders are the only system element having the *power-to* do something. In other words, stakeholders are the only system element to have agency if we recall the definition of Giddens (1984, p. 14): "the ability to take action and to make a difference over a course of events". Thus, with a systemic view of power we can see how *power-over* directly influences the *agency* of stakeholders by enabling or constraining their ability to take action.

Second, *institutions* hold significant power-over stakeholders (Fuenfschilling and Truffer 2014; Geels 2014) by enabling and constraining certain actions. At the same time, institutions are created, changed and used by stakeholders (North 1990) in political processes and the play of the game. Markets are a special type of institution, which have high incentive mechanisms (power-over stakeholders) (Williamson 1985, 1996) and strong selection mechanisms for technologies (power-over technologies) (Nelson and Winter 1982; Langlois and Robertson 2002), which structure the behavior of stakeholders operating within those markets (Frantzeskaki and de Haan 2009). Markets also have significant barriers to entry for immature renewable technologies (in niches) that public support could manage in various ways (Finon and Perez 2007), which reduces the agency of potential market entrants (Grünewald et al. 2012).

Third, technologies shape the set of feasible options in the system, thus having power-over stakeholders and other technologies (Fuenfschilling and Truffer 2014). For example, centralized electricity distribution and transmission systems have implications for investments in decentralized renewable energy sources, by limiting the feasible options that stakeholders have. On the other hand, smart-grid technologies can enable stakeholders to select from a wider range of technological solutions including local energy storage and production options.

We now turn to the issue of politics and how it can be understood in terms of power. Politics is the struggle for power resulting in the blockage of efforts to change policies, and the development of coalitions to overcome such blockages (Hess 2013, p. 849). We argue here that the political processes of blockage and coalition forming can be represented in a stylized way by means of veto power

(Tsebelis 2000). Veto power means that the policy-change cannot be realized without the support of that stakeholder. An example is a vote on new policy in parliament, where a majority is required to pass the law. The political party that is blocking the vote has veto power in this case, since the party is required to reach a majority vote. Furthermore, veto player theory helps explain policy inertia, as representatives of large groups of stakeholders are likely to prefer options that are closer to the status quo (Tsebelis 2000).

We propose to use and extend the types of power that were already defined for the MLP (Geels 2014) to ensure that it is conceptually compatible with the MLP. We extend the power definition of the MLP with two additional system elements that can hold power: technologies and markets. Furthermore, power is relational between system elements (Geels and Schot 2007; Tyfield 2014), therefore we use the power-over relation as defined by Avelino (2011). Power-over is defined as mutual dependence, one-sided dependence or independency between the stakeholders. Second, technologies shape the feasible options that agents have by creating synergy, antagonism (restricting, resting or disrupting) or neutrality between technologies. Finally, we stress again that all power is relative between system elements, such that element A can have more or less power than element B. We illustrate our theoretical contribution to the MLP in Fig. 7.2. It should be noted that these system elements and connections can exist in all and between all levels of the MLP, and are not constrained to the regime alone.

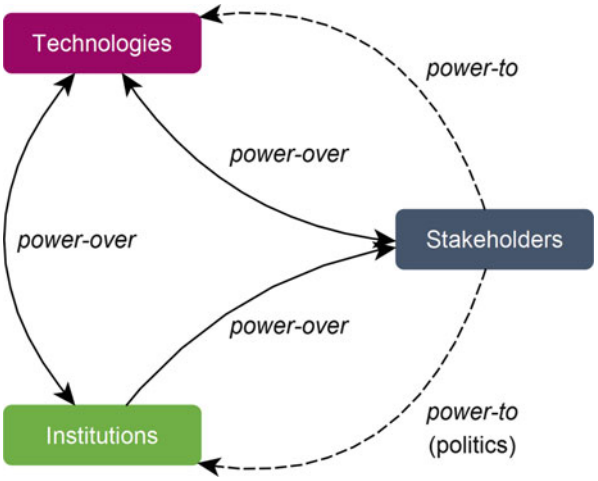


Fig. 7.2 Conceptual framework for power, agency and politics in transition studies. The conceptual framework links the concepts of power, agency and politics together through stakeholders. Stakeholders can hold both power-over and agency (power-to) and engage in political processes. Institutions and technologies (physical assets) are created, changed and reproduced through the actions of stakeholders. Simultaneously, technologies and institutions hold power-over stakeholders. Stakeholders also hold power-over other stakeholders. Thus, stakeholders have the ability to influence their environment, while having certain actions enabled or constrained by their environment at the same time

7.4 Concentration of Power in the Swiss Energy Regime

The Swiss energy system currently has a low-carbon energy mix relying mainly on centralized energy production from nuclear energy (36.4 %) and hydro (57.9 %) (Swiss Federal Office of Energy 2014). The Swiss Energy Strategy 2050 details the replacement of nuclear energy with new renewables such as wind and solar. There is only a small penetration of distributed renewable energy sources (RES) such as PV in Switzerland, and a low share of RES in the energy system in general. A higher share of RES would bring economic and technical challenges for the Swiss energy system. First, distributed renewables feed into the system at the distribution level for which the networks were originally not designed. As a result, grid reinforcements and investments in smart grid technology are to be expected if the Energy Strategy 2050 is to be realized. Second, an increase in RES will drive down the wholesale market price of electricity when the Swiss market is liberalized because RES will push other plants out of the merit order, while being offered at close to zero costs to the market. However, this effect is likely to be moderated in Switzerland due to the low share of gas fired power plants and high share of hydro storage. Another important characteristic of the Swiss energy system is the large number of utilities. There are currently around 700 utilities in Switzerland (Elcom 2015), of which most are publicly owned by Swiss cities and cantons.

Our analysis focuses mainly on the Swiss utility companies and other stakeholders involved with the integration of RES. Large companies such as Alpiq, BKW, AXPO, CKW, EWZ and Repower own and operate a large share of the production and network assets in Switzerland, and hold a large amount of shares in the transmission system operator Swissgrid. Most of these large utilities have Swiss cantons and/or cities as their shareholders (this also applies to Alpiq). Thus, cantons and cities (e.g. Zurich and Geneva) hold power-over large utilities. The amount of shares is indicated in Table 7.1. While these large utilities are important, we cannot ignore the large amount of smaller utilities that operate in Switzerland, which in most cases are also owned by cities and municipalities. Thus, the same power-over relationship applies to the smaller utility companies and their shareholders. Historically, the involvement in energy policy has been larger at the cantonal level than at the federal level (Kriesi and Jegen 2001).

The Swiss Federal Government has the power-to alter existing policy, such as the feed-in tariff (FIT) scheme that is implemented in Switzerland. However, EnDK[4] represents the Swiss cantons and has significant power-over the Federal Government and is able to block policy creation and alteration efforts by the Federal Government. As a result, in certain situations, EnDK can be considered a veto player. EnDK represents a very large number of stakeholders, which has implications for the feasible set of policy options (Tsebelis 2000). The feasible

[4] Konferenz Kantonaler Energiedirectoren.

Table 7.1 Overview of the larger Swiss utility companies and their shareholders

Utility company	Major shareholders	Shares (%)
Alpiq Holding AG (ALPIQ)	Consortium of Swiss minority shareholders	31.4
Axpo Holding AG (AXPO)	City of Zurich	18.3
	EWZ	18.4
	Canton of Aargau	14.0
BKW Energie AG (BKW)	Canton of Bern	52.5
Centralschweizerische Kraftwerke AG (CKW)	AXPO	81.0
	Canton of Luzern	9.9
Elektrizitatswerk der Stadt Zurich (EWZ)	City of Zurich	100
Repower	Canton of Graubünden	58.3
	AXPO	33.7
Services Industriels de Genève (SIG)	Canton of Geneva	55.0
	City of Geneva	30.0

The distribution of shares is a good indication of the power that cities and cantons hold over the utility companies. The information was extracted from the 2014 annual reports of the utility companies

set of policy options is limited for the Federal Government, as the energy transition goal involving a nuclear phase-out and high share of RES (e.g. PV) is far removed from the status quo.

Government support is necessary for RES because, although desirable from a social welfare perspective, their private costs are not competitive in power generation systems dominated by large electricity generation plants. Three reasons account for the bias against RES in electricity markets: (1) environmental costs are not adequately internalized for conventional electricity generation technologies. However, in Switzerland all CO_2 produced by gas fired power plants will have to be completely offset; (2) the absence of scale effects on costs, due to the small size of the plants, and (3) the intermittent production of RES such as wind and PV creates negative externalities. While there has been some local success with voluntary purchase programs of green electricity by consumers in Switzerland, additional support is required to stimulate the investments. Currently, the FIT imposes an obligation on electricity distributors to purchase renewable energy from any RES source in their service area at a minimum guaranteed tariff per kilowatt-hour that is fixed over a long period of time. Utilities are obliged by law to accept the FIT of solar energy of consumers, which can have significant consequences for their distribution networks under peak and fluctuating production. Thus, the FIT holds significant power-over utilities, reducing their agency (power-to). The FIT in Switzerland is an example of niche protection from within the regime, aiming to strengthen the niche. However the FIT suffers from a large waiting list for all RES as the funding is limited. Taking PV as an example: in July 2015 there was 390 MW of installed capacity, a further 118 MW was approved and a total of 2000 MW was on the waiting list (Frei and Ruch 2015).

Table 7.2 Relative power of the pro-growth and pro-ecology coalitions in 1998

Coalitions	Relative power		
	Geneva	Bern	Zurich
Pro-ecology	67.5	59.2	51.4
Pro-growth	30.8	51.8	74.0

Adapted from Kriesi and Jegen (2001, p. 279)

Subsidization of RES such as PV at the niche level to replace currently available nuclear production capacity leads to an increase in the energy price for consumers, and a decrease in the wholesale price of electricity. As a result, utilities in Switzerland are under pressure from what we call as the "price scissor effect": consumers will consume less or produce their own energy using PV, while the utility receives lower prices for their production. As a result there is a trend of small utilities to outsource their operations to larger utilities in Switzerland, because the smaller utilities are being squeezed out of the market as long as the distributed RES is protected through a FIT. This outsourcing trend concentrates the power in the regime to a select number of utilities, cities and cantons. The cities and cantons that are expected to gain the most power are Bern, Zurich, Aargau and Graubünden.

This concentration of power could potentially increase the feasible set of policy options of the Federal Government, if the goals of these cities and cantons are aligned with those of the Federal Government with regards to the energy transition. Indeed, it seems to be the case that there is a shift in the position of several major players in Switzerland. A detailed study of actor constellations was carried out for Switzerland by Kriesi and Jegen (2001) in which the power of cantonal stakeholders and their positions in regards to energy policy was analyzed for the cantons of Geneva, Bern, Zurich, Grisons, Valais and Vaud. We now focus on the positional shifts of the cantons of Geneva, Bern and Zurich (Table 7.2). As expected, Geneva was very early to adopt the ambitious 2000 W society vision due to its powerful pro-ecology coalition and weaker pro-growth coalition.[5] In Bern, which committed to the vision in 2014 (Stadt Bern 2015), the power was slightly in favor of the pro-ecology coalition. Perhaps more surprisingly, Zurich committed to the 2000 W society vision in 2008 (City of Zurich 2011), despite its weaker pro-ecology coalition. A recent study by Markard et al. (2015) analyzed the coalitions at the national level between 2001 and 2013 and found that the coalitions were very stable during this period. While the pro-growth coalition is still dominant, increased support for a nuclear phase-out, energy efficiency and renewables is observed. Markard et al. (2015) conclude that the coalitions have taken positions closer to each other, allowing for compromise seeking and policy change, which is very typical in Switzerland. While the study does not focus on the cantonal level, the recent policy developments with regards to the 2000 W society in Bern, and especially Zurich, suggest a similar shift in positions at the cantonal level.

[5] Broadly speaking, the pro-growth coalition is in favor of economic growth, while the pro-ecology coalition is in favor of environmental protection.

Furthermore, there is interaction between niche technologies and regime technologies, as high shares of PV constrain the feasible options for future grid development, and vice versa. Historically, electric grids used to be vertically integrated with large power plants producing electricity for end-users, and single-direction electricity flowing from production units through the transmission and distribution grids to the consumer. No matter where, most DSOs have historically operated grids with radial topologies, from high-voltage/mid-voltage substations to the end-users. Electricity flow was unidirectional only, and consumption loads largely inflexible. In this context, DSO activities were mainly focused on long term grid planning and design rather than on real-time operation, by investing in grid reinforcement in a passive way. Distributed RES such as PV introduces bidirectional flows and electricity production fluctuations with potentially high peaks, which limits the feasibility of simple grid reinforcements. Instead, more innovative solutions are likely required such as smart-grids and local energy storage. These technologies are part of different niches exerting pressure on the regime, but we do not address these niches in more detail in this chapter (Fig. 7.3).

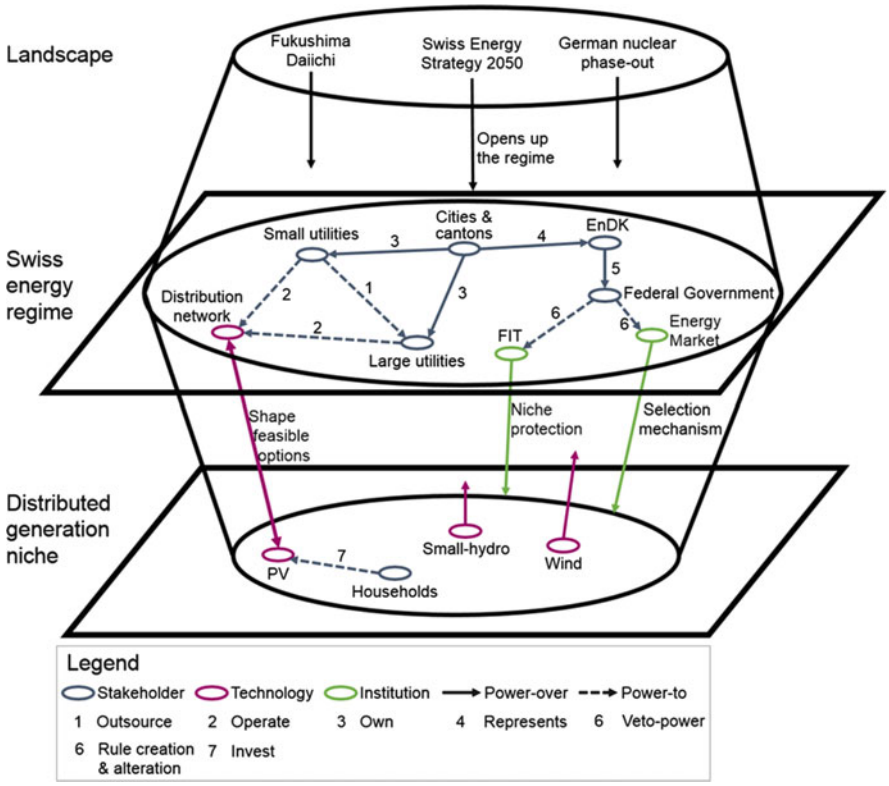


Fig. 7.3 Multi-level power, agency and politics analysis of the Swiss energy sector

7.5 Summary and Conclusions

Governments are facing significant governance challenges in the coming decades with regards to the energy transitions they are committing to. Switzerland is in a particularly challenging situation, as it envisages to phase-out nuclear energy production, which accounts for around 40 % of the country's electricity production. Apart from the technological challenges related to the integration of distributed renewable energy sources and required grid reinforcements, the country is also facing social acceptance issues of wind, geothermal and micro-hydro projects. Given these challenges, we addressed the following research question: How is the Swiss energy transition governed under changing social and technical system dimensions?

In order to answer this question, we draw upon the transition research field, and on the multi-level perspective (MLP) in particular. The MLP has proven useful for the study of transitions in numerous scientific publications. However, the MLP has been criticized for neglecting concepts such as power, agency and politics. These concepts are important when addressing multi-level governance issues, such as those present in energy transitions. Despite numerous theoretical contributions, an integrated theoretical approach is still missing. Our theoretical contribution pertains to the extension of the MLP with the concepts of power, agency and politics so as to add an additional narrative and analytical force to the framework.

Our practical contribution lies in the application of the extended MLP framework to a case in the Swiss energy market. Three conclusions can be drawn from the analysis of the landscape, regime and niche interactions and resulting power dynamics: (1) there is pressure from the landscape to significantly change the energy regime as a result of the Fukushima Daiichi reactor accident and German nuclear phase-out. However, while the Federal Government is the competent policy-maker for the FIT, it does not have full agency to create and alter these policies. This is because the policy options of the Federal Government are limited by the EnDK, which represents a large number of stakeholders which (as a group) are mostly interested in maintaining the status quo; (2) subsidization of RES (such as PV at the niche level) to replace currently available nuclear production capacity leads to an increase in the energy price for consumers, and a decrease in the wholesale price of electricity. As a result, the utilities in Switzerland are under pressure from what we call as the *price scissor effect*: consumers will consume less or produce more of their own energy (e.g. through PV), while the utility company receives lower prices for their production. We observe a trend of small utilities to outsource their operations to larger utilities in Switzerland, because the smaller utilities are being squeezed out of the market as long as the distributed RES niche is protected through a FIT; (3) due to the concentration of power, there is a potential for a larger feasible policy set, as certain powerful stakeholders have ambitious transition goals which are more closely aligned. We learnt that power within the regime would concentrate within a few large utilities. The cities and cantons that are expected to gain most power are Bern, Zurich, Aargau and Graubünden. This

concentration of power and alignment of goals can help in accelerating the energy transition in Switzerland.

There are some limitations to the analysis. First, we only analyze a brief period of the Swiss energy transition, whereas the actual transition plays out over multiple decades. Secondly, we only consider the electricity sector and have not explored sectors that are becoming increasingly integrated with the energy sector, such as the transportation sector and the ICTs. There are numerous relationships between these sectors that further complicate the power, agency and political dynamics. Third, we only present one illustrative case for Switzerland, which has implications for the generalizability of our findings. However, an important strength of our framework is that it provides the concepts to illustrate the relatively low power the Swiss Federal Government has and how the feasible policy options are being constrained by EnDK. Furthermore, we illustrate how this situation is dynamic and can improve in the future to stimulate, not inhibit, the Swiss energy transition. While we do not dispute the importance of the government to steer the energy transition, we urge to use caution when assessing the role, power and agency of a government to steer a transition (for another example see; Arapostathis et al. (2013) who studied the natural gas transition in the United Kingdom). We believe that our extension of the MLP is useful to carefully assess these characteristics in an energy transition.

We recommend multiple venues for future research. First, computer simulation is not often used in simulation studies (Chappin 2011) but would allow for a long-term and dynamic assessment of power, agency and politics in energy transitions. Second, case studies that address the interactions between multiple regimes can uncover important power, agency and political dynamics. An example could be a case study on the transition towards electric vehicles and smart grids, which captures the interactions between the electricity sector, the transportation sector and the ICTs. Third, while the concepts of power, agency and politics have been conceptually addressed before, they are often not considered in the analyses of energy transitions. We hope that an integrated conceptual solution, which is consistent with the MLP, can serve as a first step to giving these concepts the attention they deserve in qualitative and quantitative transition studies.

Acknowledgments This research has been supported by the Swiss Competence Center for Research in Energy, Society and Transition (SCCER CREST). The authors acknowledge the helpful comments and suggestions of Yannick Perez, Gianluigi Viscusi and two anonymous reviewers.

References

Arapostathis S, Carlsson-Hyslop A, Pearson PJ, Thornton J, Gradillas M, Laczay S, Wallis S (2013) Governing transitions: cases and insights from two periods in the history of the UK gas industry. Energy Policy 52:25–44

Avelino F (2011) Power in transition: empowering discourses on sustainability transitions. Doctoral dissertation, Erasmus Universiteit Rotterdam, Rotterdam

Avelino F, Rotmans J (2009) Power in transition: an interdisciplinary framework to study power in relation to structural change. Eur J Soc Theory 12(4):543–569
Broto VC, Glendinning S, Dewberry E, Walsh C, Powell M (2014) What can we learn about transitions for sustainability from infrastructure shocks? Technol Forecast Soc Change 84 (1):186–196
Chappin ÉJL (2011) Simulating energy transitions. Doctoral dissertation, Delft University of Technology, Delft
City of Zurich (2011) On the way to the 2000-watt society. City of Zürich, Zürich
Dahl RA (1957) The concept of power. Behav Sci 2(3):201–215
ElCom (2015) Tätigkeitsbericht der ElCom 2014. ElCom, Bern
Finger M, Groenwegen J, Kunneke R (2005) Quest for coherence between institutions and technologies in infrastructures. Compet Regul Netw Ind 6(4):227–260
Finon D, Perez Y (2007) The social efficiency of instruments of promotion of renewable energies: a transaction-cost perspective. Ecol Econ 62(1):77–92
Frantzeskaki N, de Haan H (2009) Transitions: two steps from theory to policy. Futures 41 (9):593–606
Frei H, Ruch N (2015) Kostendeckende Einspeisevergüting (KEV): Anmeldestatistik. Stiftung KEV, Frick
Fuenfschilling L, Truffer B (2014) The structuration of socio-technical regimes—conceptual foundations from institutional theory. Res Policy 43(4):772–791
Geels FW (2002) Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. Res Policy 31(8):1257–1274
Geels FW (2005) Processes and patterns in transitions and system innovations: refining the co-evolutionary multi-level perspective. Technol Forecast Soc Change 72(6):681–696
Geels FW (2014) Regime resistance against low-carbon transitions: introducing politics and power into the multi-level perspective. Theory Cult Soc 31(5):21–40
Geels FW, Schot J (2007) Typology of sociotechnical transition pathways. Res Policy 36 (3):399–417
Giddens A (1984) The constitution of society: outline of the theory of structuration. University of California Press, California
Grünewald PH, Cockerill TT, Contestabile M, Pearson PJ (2012) The socio-technical transition of distributed electricity storage into future networks—system value and stakeholder views. Energy Policy 50:449–457
Haugaard M (2010) Power: a family resemblance concept. Eur J Cult Stud 13(4):419–438
Hess DJ (2013) Industrial fields and countervailing power: the transformation of distributed solar energy in the United States. Glob Environ Chang 23(5):847–855
International Energy Agency (2012) Energy policies of IEA countries: Switzerland 2012 review. International Energy Agency, Paris
Kemp R, Schot J, Hoogma R (1998) Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. Technol Anal Strateg Manage 10 (2):175–198
Kern F (2012) The discursive politics of governing transitions towards sustainability: the UK carbon trust. Int J Sustain Dev 15(1–2):90–106
Kriesi H, Jegen M (2001) The Swiss energy policy elite: the actor constellation of a policy domain in transition. Eur J Polit Res 39(2):251–287
Laes E, Gorissen L, Nevens F (2014) A comparison of energy transition governance in Germany, the Netherlands and the United Kingdom. Sustainability 6(3):1129–1152
Lange P, Driessen PP, Sauer A, Bornemann B, Burger P (2013) Governing towards sustainability—conceptualizing modes of governance. J Environ Policy Plan 15(3):403–425
Langlois RN, Robertson PL (2002) Firms, markets and economic change: a dynamic theory of business institutions. Routledge, New York
Lawhon M, Murphy JT (2012) Socio-technical regimes and sustainability transitions Insights from political ecology. Prog Hum Geogr 36(3):354–378

Markard J, Truffer B (2008) Technological innovation systems and the multi-level perspective: towards an integrated framework. Res Policy 37(4):596–615
Markard J, Raven R, Truffer B (2012) Sustainability transitions: an emerging field of research and its prospects. Res Policy 41(6):955–967
Markard J, Suter M, Ingold K (2015) Socio-technical transitions and policy change – advocacy coalitions in Swiss energy policy. SPRU Work Pap Ser (SWPS) 13:1–37
Meadowcroft J (2009) What about the politics? Sustainable development, transition management, and long term energy transitions. Policy Sci 42(4):323–340
Nelson RR, Winter SG (1982) An evolutionary theory of economic change. Harvard University Press, Cambridge
North DC (1990) Institutions, institutional change and economic performance. Cambridge University Press, Cambridge
North DC (1991) Institutions. J Econ Perspect 5(1):97–112
Rip A, Kemp R (1998) Technological change. Battelle, Battelle
Rotmans J, Kemp R, Van Asselt M (2001) More evolution than revolution: transition management in public policy. Foresight 3(1):15–31
Schot J (1998) The usefulness of evolutionary models for explaining innovation. The case of the Netherlands in the nineteenth century. Hist Technol Int J 3:173–200
Scrase I, Smith A (2009) The (non-) politics of managing low carbon socio-technical transitions. Environ Polit 18(5):707–726
Smith A, Stirling A, Berkhout F (2005) The governance of sustainable socio-technical transitions. Res Policy 34(10):1491–1510
Smith A, Voß JP, Grin J (2010) Innovation studies and sustainability transitions: the allure of the multi-level perspective and its challenges. Res Policy 39(4):435–448
Stadt Bern (2015) Energie- und Klimastrategie 2025 Stadt Bern. Stadt Bern, Bern
Swiss Federal Office of Energy (2014) Schweizerische Elektrizitätsstatistik 2013. Swiss Federal Office of Energy, Bern
Tsebelis G (2000) Veto players and institutional analysis. Governance 13(4):441–474
Tyfield D (2014) Putting the power in 'socio-technical regimes'–E-mobility transition in China as political process. Mobilities 9(4):585–603
Unruh GC (2002) Escaping carbon lock-in. Energy Policy 30(4):317–325
Verbong G, Geels F (2007) The ongoing energy transition: lessons from a socio-technical, multi-level analysis of the Dutch electricity system (1960–2004). Energy Policy 35(2):1025–1037
Voß JP, Bornemann B (2011) The politics of reflexive governance: challenges for designing adaptive management and transition management. Ecol Soc 16(2):9
Weber M (1978) Economy and society: an outline of interpretive sociology (E. Fischoff et al., trans.). University of California Press, Berkeley
Williamson OE (1985) The economic institutions of capitalism: firms, markets, relational contracting. The Free Press, New York
Williamson OE (1996) The mechanisms of governance. Oxford University Press, Oxford
Williamson OE (1998) The institutions of governance. Am Econ Rev 88(2):75–79

The Effect of the Relationship Between Oil Price and Stock Markets in Energy Sustainable Countries

8

Şahnaz Koçoğlu, Mehmet Baha Karan, and Ayhan Kapusuzoğlu

Abstract

The aim of this paper is to analyze and understand the relation between oil price and stock markets in the energy sustainable countries. The main hypothesis of the study is that the economies of the countries in which energy is sustainable are more resistant to changes in oil prices. The energy sustainability in this study is defined according to the Energy Sustainability Index prepared by World Energy Council (WEC). The relationship between the stock market performance of the group and oil prices was analyzed through Johansen Co-integration Test and Granger Causality Test in the 2004–2014 and 2008 Financial Crisis period (2008–2010). The result of the top 7 countries in the Energy Sustainability Index indicates that the stock market performance of the group is not co-integrated with oil prices. However, there is a co-integration between stock market performance and oil prices in the seven countries at the bottom, so economies of the bottom 7 countries are sensitive to oil prices. During the crisis period, a co-integration appears between the variables. Finally, none of the sub-indexes are individually fully compatible with the main index co-integration outcomes in the total period.

Keywords

Oil prices • Stock markets • Energy sustainability index • World energy council • Co-integration • Causality

Ş. Koçoğlu (✉)
Gazi University, Ankara, Turkey
e-mail: sahnazkocoglu@gmail.com

M.B. Karan
Hacettepe University, Ankara, Turkey
e-mail: mbkaran@hacettepe.edu.tr

A. Kapusuzoğlu
Yıldırım Beyazıt University, Ankara, Turkey
e-mail: akapusuzoglu@ybu.edu.tr

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_8

8.1 Introduction

The Pulitzer-Prize winning author and leading authority on energy, international politics and economics Daniel Yergin (1991), calls twentieth Century the age of oil and claims that the history of oil started with industrialization and its importance in the modern economy has continuously increased since then. The relationship between oil prices and economic activities has been attracting the attention of researchers for the past 40 years. Hamilton's early study (1983) has proven that oil was more than an input for production and it had long ago become an economic indicator which has the ability to change the economic stability of most of the countries. After his inspiring study, oil has become one of the most attractive research areas for the economists.

Not only the effect of oil prices on stock markets, but also the factors affecting the relationship between stock markets and oil prices have been analyzed in the literature for different countries. The previous studies reveal that, the role of oil price in the economy is complicated and it is challenging to clearly explain the relationship between oil prices, economy and stock markets. For instance, Huang et al. (1996) does not detect an important relationship between oil price shocks and stock returns for some any markets such as that of the S&P 500 stock market, but Gisser and Goodwin (1986) reveal compatible results regarding the role of oil price. Mork et al. (1994) mention that there is an asymmetric relation between production and oil prices in the seven OECD countries. Furthermore, Cologni and Manera (2009) argue that the effect of oil prices has been decreasing in time for the developed countries. The recent study of Kilian and Vega (2011) claims that oil prices generally do not respond to US macroeconomic variables. The studies on emerging markets are also confusing. Basher and Sadorsky (2006) find strong evidence that oil price risk impacts stock price returns in emerging markets. Maghyereh (2004) claims that oil shocks have no significant impact on stock index returns in emerging economies. On the contrary, Filis et al. (2011) reveal that during the financial crisis oil prices exhibit a positive correlation with stock markets. All these studies bring out how the nature of the oil price-stock market relationship changes depending on different economic and financial conditions. However, oil price-stock market index relationship within the framework of energy sustainability has not been studied deeply yet.

Sustainability in all sorts of areas has been a hot topic in recent years. Long-lasting economic growth is not possible when the environment is sacrificed for short term interests. For sustainable economic development, protection of the environment is crucial while the protection of the environment and global warming are not the sole reason for the increasing importance of sustainability. Especially, sustainability in energy is a matter of political and economic sovereignty for all countries as the energy market is very competitive because of limited resources. For energy sustainability, countries firstly should decrease their dependence on unsustainable energy resources as the whole world has experienced the dramatic consequences of dependence on fossil fuels, especially on oil in the shape of economic crisis, global warming and wars in the last century.

Despite its importance, the awareness of energy sustainability is still not very high. For that purpose, United Nations started an initiative called "Sustainable Energy for all" and defined it in the frame of three objectives: access to modern energy by

everyone, increasing energy efficiency and extending the usage of renewable energy. Because of the rising importance of energy sustainability, World Energy Council (WEC) has been preparing an Energy Sustainability Index to measure the energy sustainability performance of the countries and to help them for improvement in this area. The countries analyzed within the index, are ranked based on their performance on energy sustainability. WEC analyzes energy sustainability through two dimensions. Firstly, the political, economic and social developments of the countries are evaluated as part of the Contextual Performance. The second dimension measures the Energy Performance of the countries through three energy performance sub-dimensions: Energy Security, Energy Equity and Environmental Sustainability. The most successful countries in one of these three sub-dimensions get A as the best grade while the least successful ones get D as the worst grade. Finally, the countries are ranked based on both their Contextual Performance and Energy Performance in the Energy Sustainability Index. The Energy Sustainability Index suggests that countries with good grades in Energy Performance dimensions and high ranking in the index are considered as the most successful countries while the countries with bad grades in Energy Performance dimensions and low ranking in the index still need serious improvement in the energy sustainability area. It should be underlined that the contextual performance, which includes political, social and economic issues has a considerable weight in the main index.

We took the Energy Sustainability Index to a further level and argued that the economies of the successful countries in the index should not depend on unsustainable fossil fuels. Moreover, it is expected to decrease the connection between oil price and economy in those countries. To achieve this aim, two indicators representing fossil fuels and economies have to be identified. Oil was chosen among other fossil fuels in this study because, despite the widespread usage of coal and increasing importance of natural gas, oil as a fossil fuel has still the most strategic importance in the world economy. Although oil has certain disadvantages such as its role in the increasing carbon dioxide emission, global warming and wars in countries all around the world, oil is not only an indispensable input for the industry but also a significant economic indicator. As the economic indicator, stock market indices were used in this study as all sorts of financial and economic information in the market was incorporated into the stock markets. In this study, we expect that the stock market of a country that is successful at energy sustainability should not be affected by oil price changes or the stock market of a country that is not successful at energy sustainability should be affected by oil price changes.

To sum up, this study is the one of the first studies on energy sustainability, economic performance, and energy prices. For that purpose, it investigated the relationship between oil price and the stock market index of the countries grouped according to their performance in different categories of energy sustainability. Although several academic studies exist about the relationship between oil price and stock markets, those about how the energy sustainability affects this relationship are still missing. In this direction, this paper aims to fill this gap in the literature. The rest of the paper is organized as follows: The explanation of the Energy Sustainability Index is given in the next section. The review of the literature is presented in Sect. 8.3. Section 8.4 provides data and methodology. Section 8.5

includes the summary of the empirical findings. The paper ends with the conclusions and policy implications.

8.2 The Energy Sustainability Index

The World Energy Council, which was founded in 1923, is a non-governmental organization that provides information regarding energy strategies. Because of the increasing importance of energy sustainability, World Energy Council (WEC) has been preparing an Energy Sustainability Index with the partnership of Oliver Wyman. The countries analyzed within the index, are ranked based on their performance on energy sustainability. Table 8.1 summarizes how the energy sustainability is measured by WEC. The first yearly energy sustainability index of WEC presented in 2011.

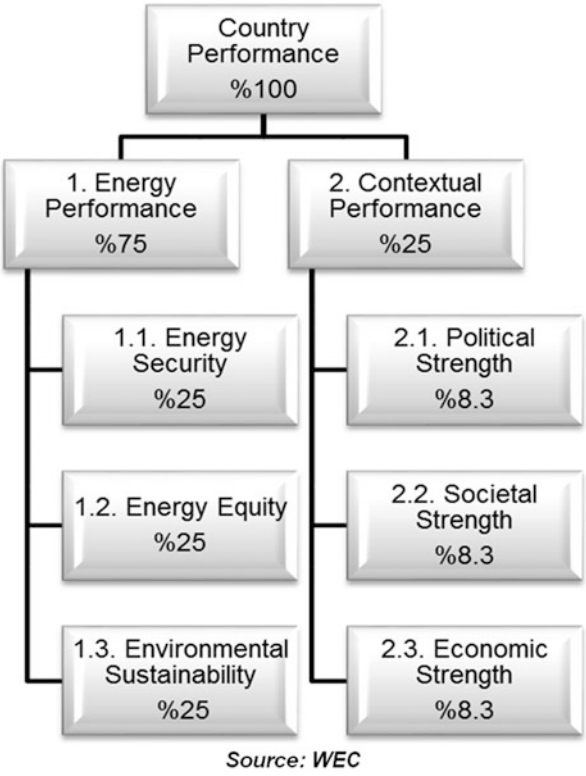
WEC analyzes Energy Sustainability through two main dimensions which are Energy Performance and Contextual Performance. The political, economic and social development of the countries is evaluated in the Contextual Dimension. The effect of the Contextual Performance in the index is 25 % while 75 % belongs to Energy Performance. In the Energy Performance dimension, the energy performance of the countries is measured through three sub-dimensions: Energy Security, Energy Equity and Environmental Sustainability. These three energy dimensions in the index methodology are defined as;

- Energy Security: "The effective management of primary energy supply from domestic and external sources, the reliability of energy infrastructure, and the ability of participating energy companies to meet current and future demand."
- Energy Equity: "The accessibility and affordability of energy supply across the population."
- Environmental Sustainability: "The achievement of supply and demand-side energy efficiencies and the development of energy supply from renewable and other low-carbon sources."[1]

The countries are ranked based on their overall performance on both contextual performance and energy performance in the index. However, WEC also grades countries according to their performance in three energy sub-dimensions. The most successful performance in one of the dimensions would be graded A while the poorest performance will be graded D. A country with high performance from Energy Security and Energy Equity and relatively low performance in Environmental Sustainability would get a grade of AAB. The most successful countries in these three sub-dimensions get AAA, while the least successful ones get DDD. Lastly, the countries are ranked based on their overall performance in all the

[1] WORLD ENERGY COUNCIL. (World Energy Council 2013a, b). World Energy Trilemma: World Energy Trilemma Time to Get Real—The Case for Sustainable Energy Investment, Project Partner: Oliver Wyman, London: World Energy Council Publication. ISBN: 978 0 946121 22 9, pp. 5.

Table 8.1 Energy sustainability index methodology



Source: WEC

dimensions explained above. The top countries in the index are considered as the most successful countries in energy sustainability while the countries at the bottom of the list still need serious improvement in the energy sustainability matters. The 2013 Energy Sustainability Index is used in this study. A specific year is used as the ranking, and the grades of the countries do not show very significant change throughout the 2011–2014 period. It should be noted that a change in rankings requires huge infrastructure investments and important political changes. The studied countries with their grades in the 2013 Energy Sustainability Index are presented in Table 8.2.

Table 8.2 2013 Energy sustainability index grades and rankings of the countries analyzed in this study

Energy security grades				Energy equity grades				Environmental sustainability grades				Index ranking	
A	B	C	D	A	B	C	D	A	B	C	D	Top countries	Bottom countries
Switzerland	Austria	Ireland	Luxembourg	Switzerland	Slovakia	Colombia	China	Switzerland	Canada	United States	Australia	Switzerland	Morocco
Denmark	Norway	Taiwan	Hong Kong	Denmark	Argentina	Peru	Nigeria	Denmark	New Zealand	Greece	Oman	Denmark	Kenya
Sweden	France	Italy	Latvia	Sweden	Czech Republic	Romania	Pakistan	Sweden	Germany	Czech Republic	Russia	Sweden	Lebanon
United Kingdom	Germany	Croatia	Singapore	United Kingdom	Ecuador	Bulgaria	Kenya	United Kingdom	Netherlands	Malaysia	Kuwait	Austria	Pakistan
Canada	Netherlands	Iceland	Mauritius	Canada	Russia	Indonesia	India	Spain	Finland	Mexico	Estonia	United Kingdom	India
New Zealand	Finland	Lithuania	Korea	New Zealand	Portugal	Brazil	Botswana	Austria	Japan	Poland	Jordan	Canada	Zambia
Spain	Japan	Chile	Israel	Spain	Panama	Philippines	Zambia	Norway	Belgium	Egypt	Bulgaria	Norway	Jamaica
Australia	Belgium	Oman	Malta	Australia	Hungary	Turkey		France	Taiwan	Venezuela	Indonesia		
United States	Portugal	Kuwait	Montenegro	United States	Tunisia	South Africa		Portugal	Iceland	Chile	South Africa		
Slovakia	Panama	Estonia	Jordan	Austria	Malaysia	Sri Lanka		Panama	Luxembourg	Korea	Thailand		
Colombia	Hungary	Sri Lanka	Botswana	Norway	Mexico	Thailand		Ireland	Hong Kong	Israel	Jamaica		
Argentina	Brazil	Thailand	Morocco	France	Poland	Montenegro		Italy	Slovakia	Malta	China		
Czech Republic	Tunisia	Kenya	Lebanon	Germany	Egypt	Morocco		Croatia	Argentina	Romania	Pakistan		
Ecuador	Malaysia	India	Zambia	Netherlands	Venezuela	Lebanon		Lithuania	Ecuador	Turkey	India		
Peru	Greece		Jamaica	Finland	Ireland	Jamaica		Latvia	Hungary	Morocco			
Romania	Mexico			Japan	Italy			Mauritius	Tunisia	Lebanon			
Russia	Poland			Belgium	Croatia			Colombia	Singapore	Nigeria			
Bulgaria	Philippines			Greece	Lithuania			Brazil	Peru				
Indonesia	Turkey			Taiwan	Chile				Philippines				
China	Egypt			Iceland	Kuwait				Sri Lanka				
Nigeria	Venezuela			Oman	Estonia				Montenegro				

	South Africa			Luxembourg	Latvia				Kenya				
	Pakistan			Hong Kong	Singapore				Botswana				
					Mauritius				Zambia				
					Korea								
					Israel								
					Malta								
					Jordan								

Source: WEC

8.3 Literature Review

Researchers have been attracted to the relation between the oil prices and the stock market indices that are the best indicator of the economic growth because of the data with high frequency. In the studies, whether the country analyzed is developed or developing had been an important factor.

The results on developed countries are not fully consistent. Jones and Kaul (1996) measure how the stock prices are affected by the oil prices in the US, Canada, Britain, and Japan. They conclude that the stock prices react seriously to the oil price changes in Japan and Britain, while the reaction in the US and Canada is due to the future cash flow changes for the firms. On the other hand, Kilian and Vega (2011) do not find a significant relationship between oil price shocks and stock returns for some developed countries. Particularly Apergis and Miller (2009) analyzes eight developed countries,[2] and claims that international stock market returns do not respond in a large way to oil market shocks.

The works for emerging economies provided conflicting results as well. Maghyereh (2004) finds that during the period of 1998–2004 the emerging economies don't show a significant reaction to oil price changes. He argues that oil price is an overvalued factor for the stock markets in emerging economies. However, Basher and Sadorsky (2006) come up with different results. In their research covering the period 1992–2005, oil is found as an important factor affecting the stock markets of emerging economies.

Also, literature regarding the evolving nature of the relationship between oil prices and stock markets is reviewed. Although there is a common belief that oil prices have a negative correlation with the stock markets, this is not precisely the case anymore. As Kilian and Park (2009) state, oil price and stock market prices are affected by the same economic forces. Therefore, they might move in the same direction. Positive expectations for global economic growth, for instance move the oil prices and stock markets upward together. Moreover, crude oil is not only a commodity that is a significant input for the production, but it is a financial asset as D'ecclesia et al. (2014) mention. The dynamics behind the oil price and stock market returns are beyond the traditional demand and supply relation. Reboredo and Rivera-Castro (2014) state that before the 2008 financial crisis, oil prices do not have an effect on the stock market returns in Europe and the USA while positive interdependence is observed during the crisis period. Therefore, the nature of the relation between oil prices and stock markets is too complex and it is difficult to clarify briefly.

Oil exporter countries' stock markets differentiate regarding their reaction to oil price changes. Hammoudeh and Aleisa (2004) examine how the stock markets of Gulf States react to the oil price changes. They revealed that Saudi Arabia stock

[2] These countries are mostly placed at the upper levels of Energy Sustainability Index of WEC. These are Australia, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

market index has the power to predict the oil prices. Maghyereh and Al-Kandari (2007) find a nonlinear relation between the stock market returns and oil prices in Bahrain, Kuwait, Oman and Saudi Arabia. Arouri et al. (2010) argue that the stock markets of Qatar, Oman, Saudi Arabia and UAE react to the oil shocks while the reaction of Bahrain and Kuwait was found statistically insignificant.

As a brief, the studies analyzing the relation between oil prices and stock markets are varied. How the energy sustainability affects the relation between the stock markets and oil prices has not been studied yet, and this study opens a new avenue in the literature. Moreover, it is almost no comparative study in literature for the relationship between oil price and stock market performance of the high energy sustainable and the low energy sustainable countries. The main hypothesis of the study is that "the economies of energy sustainable countries are more resistant to oil price changes". More clearly, we expect a very weak connection between oil prices and performance of stock markets for energy sustainable countries. The conflicting results of previous studies, particularly about developed countries that possess advanced energy markets in literature are supporting our argument.

8.4 Data and Methodology

8.4.1 Data

As we explained in the previous section, World Energy Council ranks the countries based on their performance on energy sustainability and then grades them in energy sustainability sub-dimensions. 2013 Energy Sustainability Index rankings and grades were used in this study, assuming rankings of the indexed countries seem mostly stable throughout the analysis period. Considering the objective of this study, we, firstly, grouped the countries based on their rankings in the Energy Sustainability Index. Although, 129 countries were evaluated by the WEC, only the data of 73 countries were available. The list can be seen in Table 8.2. The reason of this loss is that some countries in the index do not have a stock market and some countries having a stock market do not have enough data for the period covered in this study. Firstly, we analyze the Top 7 (Switzerland, Denmark, Sweden, Austria, United Kingdom, Canada and Norway) and Bottom 7 (Morocco, Kenya, Lebanon, Pakistan, India, Zambia and Jamaica) performers in the main Sustainability Index (Country Performance) which are represents 10 % of our sample. We underline that all of the top 7 are developed countries and nearly half of them have no oil reserves, meanwhile the bottom 7 countries are mostly emerging countries and oil importers. The idea behind that grouping is to see if there is a difference between the best and worst performers in the Energy Sustainability Index. The countries at the top of the index are grouped as Top 7 and the countries at the bottom of the index are grouped

as Bottom 7. Co-integration and Causality tests reveal striking relationships between stock exchange index performance and oil prices in these groups. After finding the initial results for top-bottom countries, a deeper analysis is applied by grouping countries according to their performance at the Energy Sustainability's sub-dimensions which are Energy Security, Energy Equity, and Environmental Sustainability. The countries are grouped based on the grades they took for the dimension examined. Firstly, two groups were formed for the Energy Security and the most successful countries with A were put in the group Energy Security A and the worst performers were put in the group Energy Security D. We particularly don't form B and C groups to underline the differences between two poles. This procedure was applied for all three sub-dimensions and at the end, six groups of countries are formed: Energy Security A and D, Energy Equity A and D, Environmental Sustainability A and D, With the groups of Top 7 and Bottom 7, we composed eight groups of countries in total. Then, the relation between the stock markets of eight groups of countries and oil price is analyzed.

After groupings, the arithmetic average of the daily stock index values of countries in each group is taken. The arithmetic average of the stock market values of the countries in the group is accepted as a stock market index representing the stock market performance of the group in question. Data of each group has been the arithmetic average of the daily stock index values of the countries in the group. Then the relation between oil prices and the stock market index of the group are examined. Firstly, unit root tests are conducted to reveal if the time series is stationary or not. Then the relation between the groups and the oil price is examined through Johansen Co-integration analysis and Granger Causality Tests.

The data used in this study were obtained from the World Energy Council (http://www.worldenergy.org), U.S. Energy Information Administration (http://www.eia.gov) and DataStream and covered the period 13.02.2004–14.02.2014. Daily price data on the stock markets for 10 years and daily price data of Europe Brent Spot Price FOB (Dollars per Barrel) is used as it is a benchmark for oil prices. Then a sub-period is created to observe any differing relation between stock market indices and oil prices during the financial crisis. Figure 8.1 depicts that the financial crisis period has been accepted as a 3 year period covering the years 2008–2010, since the World Gross Product is very volatile for emerging and developed countries during the period. The econometric software used to compute the results was Eviews 7.

8.4.2 Methodology

Before the co-integration analysis, unit root test that is a test for stationary should be carried out. If the time series data has unit root problem, in other words, if the series is not stationary, the regression may provide fake results. For that purpose, Augmented Dickey-Fuller Test (1979) and Phillips and Perron (1988) Unit Root tests for two different models (Constant, Constant and Trend) are used to test whether the

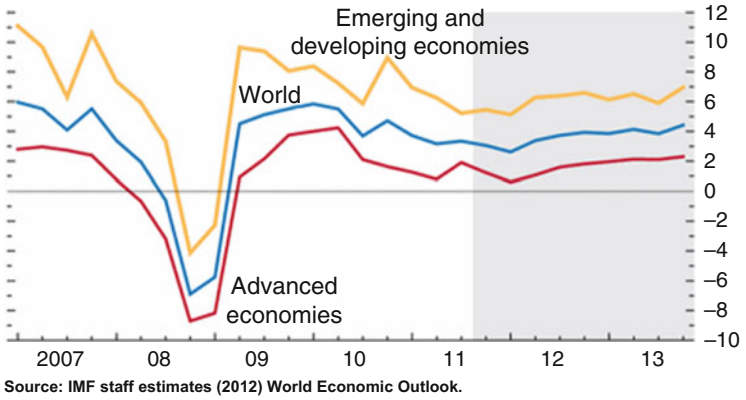


Fig. 8.1 Global GDP growth (Percent; quarter over quarter, annualized). *Source*: (IMF staff estimates (2011) World Economic Outlook)

average stock index values of the eight groups and the oil price itself have a unit root problem. H_0 hypothesis says that the series has a unit root while H_1 says that series does not have a unit root.

Co-integration was first developed by Granger (1981) to analyze if there is a long-term relation between two-time series and improved by Engle and Granger (1987). They state that a stationary relation can be observed between non-stationary variables. Johansen (1988, 1995) improves the Engle-Granger model to test if there is more than one co-integration vector. In this study, Johansen Co-integration analysis is used. The hypothesis tested, and the equations are provided below. H_0 hypothesis indicates that there is no co-integration between variables while H_1 indicates that there is a co-integration between variables. Johansen proposes two different likelihood ratio tests of significance of canonical correlations: the trace test and maximum eigenvalue test. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of r +1 co-integrating vectors (Hjalmarsson and Osterholm 2007). As the VAR lag order selection criteria, Schwarz Information Criterion is used. The equations are presented below:

$$\Delta Y_t = \prod \mathrm{y}_{t-1} + \sum_{i=1}^{\mathrm{a}-1} \Gamma_i \Delta Y_{t-i} + \mathrm{B}\mathrm{x}_t + \epsilon_t$$

$$\prod = \sum_{i=1}^{\mathrm{k}} \mathrm{a}_i - 1$$

$$\Gamma = -\sum_{j=i+1}^{k} a_j$$

Co-integration analysis proves a long-term relation between variables but says nothing about the causality. For that purpose, Granger Causality test (1969) is carried out. In the case of detection of a relation of co-integration that indicates the existence of a long-term relation, relations of causality must be analyzed by using VECM. If there is no relation of co-integration then it shall be analyzed through VAR (Chimobi and Igwe 2010). The standard Granger causality is defined as follows: "X is said to Granger cause Y if Y can be better predicted using the histories of X than it can by not using the histories of X." Below is the equation of a model with two variables.

$$\Delta Y_t = a_1 + \sum_{i=1}^{l} \beta_{1i} \Delta X_{t-i} + \sum_{i=1}^{m} \mu_{1i} \Delta Y_{t-i} + \delta_{1i} ECT_{t-1} + u_{1t}$$

$$\Delta X_t = a_2 + \sum_{i=1}^{l} \beta_{2i} \Delta X_{t-i} + \sum_{i=1}^{m} \mu_{2i} \Delta Y_{t-i} + \delta_{2i} ECT_{t-1} + u_{2t}$$

In the equations, u_{1t} and u_{2t} denote error terms which do not exhibit zero means, a finite covariance matrix and series correlation; and k denotes the lag number for both variables. After validating the equation, the relationship is formulated as from X to Y. The analyses reveal whether two variables influence each other with lag effects, and if they do, whether this causality is uni-directional (from X to Y or from Y to X) or bi-directional (both from X to Y and from Y to X).

8.5 Empirical Findings

The descriptive statistics of the variables for both 2004–2014 period and crisis period are given in Tables 8.3 and 8.4 respectively. Tables 8.3 and 8.4 provide a general view of all these samples and a total number of observations used in the analysis. Although the data does not resemble a normal distribution, it seems suitable for our analysis.

The Augmented Dickey-Fuller and Phillips-Perron unit root tests are performed for the eight groups and oil prices at the level are examined for two models (constant, constant and trend). For the unit root tests, the inclusion of a constant to the model is necessary, especially for economic time series (Vogelvang 2005). However, when a deterministic trend in the series is present, a deterministic trend should be included in the model. The most common Dickey-Fuller model considering the effect of the deterministic trend together with the constant is the model with constant and trend (Sevultekin and Nargelecekenler 2010). Because of that, the further analyses are based on the model with constant and trend, although the

Table 8.3 All period descriptive statistics results (2004–2014)

	Oil	Top-7	Bot-7	Energy security-A	Energy security-D	Energy equity A	Energy equity D	Environmental sustainability A	Environmental sustainability D
Mean	80.9	4123.07	17899.48	4011.74	13208.23	4713.75	9925.25	7511.36	12022.41
Median	76.6	4151.25	17954.46	4215.43	13409.37	4666.26	10650.43	7479.78	12115.56
Maximum	143.9	502.419	22660.95	5600.21	17523.28	7027.66	18720.58	10598.12	14986.87
Minimum	30.96	2558.34	12864.32	2218.91	7758.27	2886.02	3466.94	4821.61	7933.56
Standard Deviation	27.04	619.79	1621.16	856.34	2016.89	818.77	3604.47	1339.47	1406.22
Skewness	0.03	−0.19	0.40	−0.56	−0.09	0.49	−0.19	0.07	−0.17
Kurtosis	1.80	2.32	3.63	2.30	2.77	2.84	2.55	2.49	2.53
Jarque-Bera	156.57	66.10	114.87	189.73	10.10	109.56	37.21	30.64	37.21
Covariance	–	8413.41	23472.76	16834.95	35063.77	7738.83	70387.32	14937.31	28957.58
Correlation	–	0.50	0.53	0.72	0.64	0.34	0.72	0.41	0.76
Observation	2611	2611	2611	2611	2611	2611	2611	2611	2611

Table 8.4 Crisis Period-Descriptive Statistics Results (2008–2010)

	Oil	Top-7	Bot-7	Energy security-A	Energy security-D	Energy equity A	Energy equity D	Environmental sustainability A	Environmental sustainability D
Mean	79.36	3917.41	17730.34	3922.66	13873.12	4617.24	10648.77	7731.25	11706.93
Median	76.67	3951.55	17160.97	4048.67	13365.13	4609.95	10725.17	8094.22	11395.87
Maximum	143.95	5109.88	22660.95	5202.29	17307.87	6573.92	13210.18	10231.48	14986.87
Minimum	33.73	2558.34	14854.27	2441.67	11658.51	2886.02	8783.18	4833.51	9302.73
Standard Deviation	23.48	582.87	2347.61	662.80	1547.21	818.47	954.63	1258.63	1625.64
Skewness	0.52	−0.21	0.84	−0.58	0.84	0.19	0.25	−0.48	0.64
Kurtosis	3.10	2.30	2.24	2.38	2.39	2.51	2.69	2.41	2.26
Jarque-Bera	36.17	21.48	112.90	56.62	104.84	12.52	11.35	41.58	71.59
Covariance		12353.52	46590.58	12090.31	28845.15	17192.08	8498.69	23984.80	34550.84
Correlation		0.90	0.84	0.77	0.79	0.89	0.37	0.81	0.90
Observation		784	784	784	784	784	784	784	784

Table 8.5 Unit root test results (level)

	Augmented Dickey Fuller		Phillips Perron	
	Constant	Constant and Trend	Constant	Constant and Trend
Oil price	−1.866 (0.348)	−2.418 (0.369)	−1.884 (0.339)	−2.418 (0.369)
Top 7	−1.866 (0.348)	−1.885 (0.661)	−1.771 (0.395)	−1.783 (0.712)
Bottom 7	−3.046 (0.030)**	−2.883 (0.168)	−3.193 (0.020)**	−3.071 (0.113)
Security A	−1.850 (0.356)	−1.758 (0.724)	−1.816 (0.373)	−1.686 (0.757)
Security D	−2.870 (0.049)**	−2.143 (0.520)	−2.648 (0.083)*	−2.113 (0.537)
Equity A	−1.743 (0.409)	−1.732 (0.736)	−1.672 (0.445)	−1.659 (0.768)
Equity D	0.769 (0.993)	−0.203 (0.993)	0.248 (0.975)	−0.730 (0.970)
Sustainability A	−2.105 (0.242)	−1.974 (0.614)	−2.103 (0.243)	−1.970 (0.616)
Sustainability D	−2.496 (0.116)	−2.371 (0.394)	−2.521 (0.110)	−2.432 (0.362)

Note: () MacKinnon (1996) one-sided p-values

results for both models are presented. All the groups according to the Augmented Dickey-Fuller and Phillips-Perron unit root tests with constant and trend, model have a unit root at the level. The next test which is Augmented Dickey-Fuller and Phillips-Perron unit root tests (first differences) are carried out. All the groups get stationary at the first differences. The unit root tests were also performed for the crisis period, but we didn't find results deviating from the total observed period. The unit root test results for 2004–2014 period are presented in Tables 8.5 and 8.6.

The results indicate that the series are suitable for Johansen Co-integration analysis. For the lag criteria, Schwarz-Info Lag was used while performing the co-integration test. The co-integration test results for the period 2004–2014 is presented in Table 8.7 and for the purpose of simplicity, the table that combines and summarizes all the results including the crisis period (2004–2014/2008–2010) is prepared at Table 8.8.

The findings of the top and down 7 countries in the main index (country index) are reported initially. The result of top 7 counties indicates that there is no co-integration between stock market performance and oil prices as we expected in the total period. This result supports the study of Huang et al. (1996). Cologni and Manera (2009) and Apergis and Miller (2009). The economies of the highly sustainable countries are independent from oil prices.

For the short run relations, we employed causality test (Table 8.9). For the co-integrated groups, VECM Granger causality test and for the groups that are not co-integrated, the VAR Granger Causality test is carried out. For top 7 countries,

Table 8.6 Unit root test results (first differences)

	Augmented Dickey Fuller		Phillips Perron	
	Constant	Constant and trend	Constant	Constant and trend
Oil price	−49.539*** (0.000)	−49.534*** (0.000)	−49.531*** (0.000)	−49.526*** (0.000)
Top 7	−48.058*** (0.000)	−48.050*** (0.000)	−47.970*** (0.000)	−47.960*** (0.000)
Bottom 7	−48.669*** (0.000)	−48.693*** (0.000)	−49.989*** (0.000)	−49.979*** (0.000)
Security A	−43.814*** (0.000)	−43.816*** (0.000)	−43.678*** (0.000)	−43.677*** (0.000)
Security D	−48.185*** (0.000)	−48.247*** (0.000)	−49.290*** (0.000)	−49.186*** (0.000)
Equity A	−43.291*** (0.000)	−43.285*** (0.000)	−43.141*** (0.000)	−43.134*** (0.000)
Equity D	−22.112*** (0.000)	−22.127*** (0.000)	−54.889*** (0.000)	−54.854*** (0.000)
Sustainability A	−49.104*** (0.000)	−49.112*** (0.000)	−49.067*** (0.000)	−49.075*** (0.000)
Sustainability D	−32.227*** (0.000)	−32.237*** (0.000)	−47.496*** (0.000)	−47.491*** (0.000)

Note: MacKinnon (1996) one-sided p-values

although there is a bi-directional causality between exchange index performance and oil prices, in the long run the two variables vary independently. On the other hand, the outcomes of the down 7 countries that are unsustainable in energy issues are also awaited and parallel with the literature (Nandha and Hammoudeh 2007). There is a co-integration between stock market performance and energy prices for these counties, so economies of down 7 countries are sensitive to oil prices in the long term.

In the second stage of the analysis, the same procedure for sub-index countries is applied and sought a similar pattern. The results reveal that there is a co-integration between market and oil prices in both periods for the groups, Energy Security A and Environmental Sustainability A. The co-integration disappears during the total period for Energy Security D and Energy Equity A. There is an exchange market-oil prices co-integration for Environmental Sustainable countries in the total period, however there is none in the crisis period. Energy Equity D is the only group that is not co-integrated with the oil prices in both periods.

For the co-integrated groups, VECM Granger causality test and for the groups that are not co-integrated, the VAR Granger Causality test is carried out. The Granger Causality Test results for the total observed are also shown in Table 8.9. The summarized outcomes with the crisis period are presented in Table 8.8.

During the crisis period a co-integration appears between the variables for all A groups, and there exists a uni-directional causality relationship from stock market index to oil prices. This result reveals that the economies of the sustainable countries in crisis periods may be influenced by oil prices. This result is parallel

Table 8.7 Co-integration test results (trace statistics)

	H_o	H_n	Eigen value	Trace statistics	1 % Critical value	5 % Critical value	10 % Critical value
Top 7[1]	r = 0	r = 1	0.002595	12.348 (0.1410)	19.937	15.494	13.428
	r ≤ 1	r = 2	0.002132	5.569** (0.0183)	6.634	3.841	2.705
Bottom 7[1]	r = 0	r = 1	0.003666	13.730 (0.0906)*	19.937	15.494	13.428
	r ≤ 1	r = 2	0.001588	4.147** (0.0417)	6.634	3.841	2.705
Security A[2]	r = 0	r = 1	0.005270	19.384** (0.0123)	19.937	15.494	13.428
	r ≤ 1	r = 2	0.002147	5.605** (0.0179)	6.634	3.841	2.705
Security D[1]	r = 0	r = 1	0.003223	12.512 (0.1340)	19.937	15.494	13.428
	r ≤ 1	r = 2	0.001566	4.089** (0.0431)	6.634	3.841	2.705
Equity A[2]	r = 0	r = 1	0.002915	12.887 (0.1190)	19.937	15.494	13.428
	r ≤ 1	r = 2	0.002020	5.274** (0.0216)	6.634	3.841	2.705
Equity D[1]	r = 0	r = 1	0.002400	6.398 (0.6484)	19.937	15.494	13.428
	r ≤ 1	r = 2	4.98E-05	0.130 (0.7184)	6.634	3.841	2.705
Sustainability A[1]	r = 0	r = 1	0.003982	17.859** (0.0216)	19.937	15.494	13.428
	r ≤ 1	r = 2	0.002851	7.450*** (0.0063)	6.634	3.841	2.705
Sustainability D[1]	r = 0	r = 1	0.003070	14.939* (0.0605)	19.937	15.494	13.428
	r ≤ 1	r = 2	0.002648	6.917*** (0.0085)	6.634	3.841	2.705

Notes: *, **, *** represent the statistical significance level of 10 %, 5 % and 1 % respectively; MacKinnon-Haug-Michelis (1999) p values, [] VAR lag order selection criteria, Schwarz information criterion

to the findings of Filis et al. (2011). Moreover, the decline in oil prices after 2008 crisis is backups this argument. And also, co-integration disappears during the crisis period. In the total period, the direction of causality is from stock market values to oil prices. However, in the crisis period, the economic power of the oil prices appears and the direction is reversed from oil prices to stock market. The Granger Causality test results that are given in Table 8.9 are also inconsistent with our expectations. It is interesting to observe that oil price is not the Granger cause of most of the groups in both periods.

Table 8.8 Co-integration and granger causality test results summary

	2004–2014		2008–2010		
Group name	Co-integration	G. Causality	Co-integration	G. Causality	Change in the crisis period
Top 7	No	SM⇔OP	Yes	SM → OP	Co-integration appears and direction change in causality
Bottom 7	Yes	SM → OP	No	OP → SM	Co-integration disappears and direction change in causality
Energy security A	Yes	SM → OP	Yes	SM → OP	–
Energy security D	No	No	Yes	SM → OP	Co-integration and causality appears
Energy equity A	No	SM → OP	Yes	SM → OP	Co-integration appears
Energy equity D	No	No	No	OP → SM	Causality appears
Environmental sustainability A	Yes	SM → OP	Yes	SM → OP	–
Environmental sustainability D	Yes	SM⇔OP	No	SM → OP	Co-integration disappears and direction change in causality

Briefly the results of the sub-indexes countries, in general are not in harmony with the result of top-bottom 7 countries, except partly with Energy Equity A countries that provide affordable and adequate energy for their population and Environment Sustainability D countries which have very low efficiency and renewable energy sources.

Table 8.9 Granger causality test results (total period)

	Dependent	Independent	Chi-Square	Prob.
Top 7	Top 7	Oil price	2.790910*	0.0948
	Oil price	Top 7	4.507698**	0.0337
Bottom 7	Bottom 7	Oil price	1.733729	0.1879
	Oil price	Bottom 7	3.460390*	0.0629
Security A	Security A	Oil price	1.747873	0.4173
	Oil price	Security A	11.78440***	0.0028
Security D	Security D	Oil price	0.234354	0.6283
	Oil price	Security D	1.339153	0.2472
Equity A	Equity A	Oil price	4.165001	0.1246
	Oil price	Equity A	11.63139***	0.0030
Equity D	Equity D	Oil price	1.541022	0.2145
	Oil price	Equity D	1.135786	0.2865
Sustainability A	Sustainability A	Oil price	0.330507	0.5654
	Oil price	Sustainability A	20.44994***	0.0000
Sustainability D	Sustainability D	Oil price	7.496999***	0.0062
	Oil price	Sustainability D	3.532731*	0.0602

Note: *, **, *** represent the statistical significance level of 10 %, 5 % and 1 % respectively

8.6 Conclusion

The purpose of this study is to analyze the effect of energy sustainability on the relation between oil price and stock markets. Although the relationship between oil price and stock markets under different circumstances has been deeply analyzed for several times, to our point of view, the effect of energy sustainability on this relation has not been studied yet. For that aim, the Energy Sustainability Index of World Energy Council (WEC) is used. To measure the performance of the countries in energy sustainability, firstly top and bottom performers in the Energy Sustainability Index (Country Performance) rankings are identified. In addition to the rankings, the countries are grouped based on their grades they got from energy sustainability sub-dimensions. In the end, 8 groups of countries are formed based on different performance levels in energy sustainability. For each group, the average stock market index values of the countries in the defined group are taken to create a stock market index representing the stock market performance of the group formed based on the performance in energy sustainability. Then the relation between the stock market performance of the group and oil prices are investigated through Johansen Co-integration Test and Granger Causality Test in the 2004–2014 period. The 2008 Financial Crisis, which covers the period of 2008–2010, is also analyzed to detect the differences.

Three main conclusions are drawn from the study. Firstly, it is found that the long-run connection between oil prices and market performance is weak for the A level energy sustainability countries. Also, Granger Causality Test indicates that

there is a two-way short run causality between oil prices and stock market. These findings are consistent with our main hypothesis. However, during the financial crisis, this connection is reconstituted, and one way causality from stock market to oil prices is detected. This result is in harmony with the previous literature.

The second conclusion is about the performance of unsustainable countries. It is found that there is not the only a long-run relationship between oil prices and stock market performances, but also short run causality. During the financial crisis period, long run connection disappears, and direction of causality is changed. We also find the causality from oil prices to stock market in this period. These findings are most consistent with our expectations, except crisis period. It should be noted that the complex nature of oil price and market performance has sometimes presented unexpected results.

Thirdly, the results of the individual indexes are not fully consistent with the main index outcomes and our expectations. Partly high energy equity countries that are mostly developed have obtained results similar to the top 7 countries. We present that achieving a high performance in one of the sub-indexes will not be ensuring a similar performance to that of top level main index counties. The top 7 countries not only have high accomplishments in energy performance (energy security, energy equity, and environmental sustainability) but also in high contextual performance (political strength, societal strength and economic strength).

This picture may provide us evidence that country performance in energy is beyond energy performance. As Daniel Yergin (1991) says, oil industry is fully related to industrialization. Developed countries are achieving high energy sustainability performance and placing at the top of the sustainability index. Their performance is not limited to energy issues; furthermore, they are very successful in political, social and economic issues. On the other hand energy in unsustainable countries have important contextual performance problems and most probably political, economic and social problems which delay solving energy performance problems. Further researchers should confirm or contradict these results by looking at the most recent developments in the energy sustainability, and using more extensive data series and specific tests.

References

Apergis N, Miller SM (2009) Do structural oil-market shocks affect stock prices? Energy Econ 31 (4):569–575

Arouri MH, Lahiani A, Bellalah M (2010) Oil price shocks and stock market returns in oil exporting countries: the case of GCC countries. Int J Econ Financ 2(5):132–139

Basher SA, Sadorsky P (2006) Oil price risk and emerging stock market. Glob Financ J 17 (2):224–251

Chimobi OP, Igwe OL (2010) Financial innovations and the stability of money demand in Nigeria. Bank Financ Lett 2(1):249–257

Cologni A, Manera M (2009) The asymmetric effects of oil shocks on output growth: a Markov-switching analysis for G-7 countries. Econ Model 26(1):1–29

D'ecclesia RL, Magrini E, Montalbano P, Triulzi U (2014) Understanding recent oil price dynamics: a novel empirical approach. Energy Econ 46:S11–S17

Dickey D, Fuller W (1979) Distribution of the estimators for autoregressive time series with a unit root. J Am Stat Assoc 74(366):427–431
Engle RF, Granger WJ (1987) Co-integration and error correction: representation, estimation, testing. Econ J Econ Soc 55(2):251–276
Filis G, Degiannakis S, Floros C (2011) Dynamic correlation between stock market and oil prices: the case of oil importing and oil exporting countries. Int Rev Financ Anal 20(3):152–164
Gisser M, Goodwin TH (1986) Crude oil and the macroeconomy: tests of some popular notions. J Money 18(1):95–103
Granger CWJ (1969) Investigating causal relations by econometric models and cross-spectral methods. Econometrica 37(3):424–438
Granger CWJ (1981) Some properties of time series data and their use in econometric model specification. J Econ 16(1):121–130
Hamilton JD (1983) Oil and the macroeconomy since World War II. J Polit Econ 91(2):228–248
Hammoudeh S, Aleisa E (2004) Dynamic relationship among GCC stock markets and NYMEX oil futures. Contemp Econ Policy 22(2):250–269
Hjalmarsson E, Osterholm P (2007) Testing for cointegration using the Johansen methodology when variables are near-integrated. IMF Working Paper, WP/07/141
Huang RD, Masulis RW, Stoll HR (1996) Energy shocks and financial markets. J Futur Mark 16 (1):1–27
IMF (2011) World economic outlook update. www.imf.org/external/pubs/ft/wco/2011/update/01/pdf/0111.pdf. Accessed May 2012
Johansen S (1988) Statistical analysis of cointegration vectors. J Econ Dyn Control 12(2):231–254
Johansen S (1995) Likelihood-based inference in cointegrated vector autoregressive models. Oxford University Press, Oxford
Jones CM, Kaul G (1996) Oil and the stock markets. J Financ 51(2):463–491
Kilian L, Park C (2009) The impact of oil price shocks on the US stock market. Int Econ Rev 50 (4):1267–1287
Kilian L, Vega C (2011) Do energy prices respond to U.S. macroeconomic news? A test of the hypothesis of predetermined energy prices. Rev Econ Stat 93(2):660–671
MacKinnon JG (1996) Numerical distribution functions for unit root and co-integration tests. J Appl Econ 11:601–618
Maghyereh A (2004) Oil price shocks and emerging stock markets: a generalized VAR approach. Int J Appl Econ Quant Stud 1(2):27–40
Maghyereh A, Al-Kandari A (2007) Oil prices and stock markets in GCC countries: new evidence from nonlinear cointegration analysis. Manage Financ 33(7):449–460
Mork KA, Olsen Ø, Mysen HT (1994) Macroeconomic responses to oil price increases and decreases in 7 OECD countries. Energy J 15(4):19–35
Nandha M, Hammoudeh S (2007) Systematic risk, and oil price and exchange rate sensitivities in Asia-Pacific stock markets. Res Int Bus Financ 21(2):326–341
Phillips PCB, Perron P (1988) Testing for unit root in the time series regression. Biometrika 75 (2):335–346
Reboredo J, Rivera-Castro MA (2014) Wavelet-based evidence of the impact of oil prices on stock returns. Int Rev Econ Financ 29:145–176
Sevultekin M, Nargelecekenler M (2010) Ekonometrik Zaman Serileri Analizi, Eviews Uygulamali. Nobel Yayin Dağitim, pp. 313–317
U.S. Energy Information Administration (2014) Petroleum and other liquids: spot prices. http://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm. Accessed 2 Jan 2014
Vogelvang B (2005) Econometrics: theory and applications with E-Views. Pearson Education, Edinburgh, pp 282–292
World Energy Council (2013a) World energy Trilemma 2013 energy sustainability index, Project Partner: Oliver Wyman. World Energy Council Publication, London. ISBN 978 0 946121 23 6

World Energy Council (2013b) World energy Trilemma time to get real—the case for sustainable energy investment, Project Partner: Oliver Wyman. World Energy Council Publication, London. ISBN 978 0 946121 22 9

Yergin D (1991) Petrol, Para ve Güç Çatişmasinin Epik Öyküsü. (Çev. TUNCAY, K.). Türkiye İş Bankasi Kültür Yayinlari

The Economic Drivers of the Political Will for Social Responsibility in Energy Policy for Fossil Fuel Exporting Countries

9

John L. Simpson, Abdulfatah Alsameen, and John Evans

Abstract

The essence of this chapter is to ascertain the relative importance of domestic and global economic factors when explaining that country's political will to implement policies of social responsibility in fossil fuel exports. Political risk ratings from both developed and developing countries, which export fossil fuels, are treated endogenously. The ratings are hypothetically treated as dependent on global oil and global benchmark and domestic stock market prices. The test results are compared. Evidence is produced, contrary to theory on pure political risk, that domestic and global economic factors do affect political risk (and thus the political will associated with social responsibility) with greater strength in developed countries and with greater strength for all countries in the post global financial crisis (GFC) period. In the cases of primarily developed countries, the increase in wealth from exports have reduced political risk and perhaps created the circumstances where policies of social responsibility are affordable and where such policy implementations are on government agendas.

Keywords

Cointegration • Causality • Political risk • Political will • Social responsibility • Fossil fuels • Exports

J.L. Simpson (✉)
J L Simpson and Associates Pty Ltd, Consultants in Financial Economics, Perth, WA, Australia
e-mail: simmojl@iinet.net.au

A. Alsameen • J. Evans
Curtin University, School of Economics and Finance, Perth, WA, Australia
e-mail: a.alsameen@gmail.com; John.Evans@curtin.edu.au

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_9

9.1 Introduction

Pure political risk may be described as the risk that a country will be unwilling to fulfil its external obligations due to human, social and political reasons, such as riots, strikes and social and civil unrest. The notion of a country's political will and its corresponding level of social responsibility, are imbedded in political risk ratings. Factors that are subjectively assessed for political risk ratings include the quality of bureaucracy, the history of law and order and the extent of the development of democratic processes within government and institutions (That is, all political, human and social factors).

All of these factors impact local and global perceptions of social responsibility in fossil fuel exports. Is it likely that such countries and ratings assessors will consider the impact of, for example, global environmental factors when pursuing fossil fuel export goals? However, there may be underlying economic and financial reasons behind such ratings for fossil fuel exporting countries. Are economic factors important in assessing political will? As mentioned above, political risk reflects political will which reflects levels of social responsibility and the ratings are subjectively determined by a group of international political risk experts. That is, whether or not economic factors are used to ascertain political will, which is, a priori, based only in political, human and social factors.

Political risk is not country risk. Country risk reflects both the ability (according to economic and financial data) and the willingness (political risk data) of a country to meet its external obligations (both financial and social external commitments). The assumption is that fossil fuels have a significant adverse effect on the global environment. There is a growing need to balance global consumption of fossil fuels with development of renewable energy sources.

The literature review covers several important studies that examine the determinants of country risk, however the literature in relation to pure political risk in fossil fuel exporting countries is scant. The data for this chapter consists of monthly political risk ratings (from ICRG), global oil and gas prices, a global benchmark stock market index and country stock market indices for the period from January 2000 to January 2015. In the model for each country the political risk variable is treated endogenously.

The methodology involves a preliminary analysis of level series data in descriptive statistics. This will identify countries of lesser political will and lower levels of social responsibility. On the basis of proven integrated non-stationary processes, a dynamic optimally lagged vector error correction model (VECM) is employed to demonstrate cointegration and exogeneity. This will show the existence of any long-term equilibrium relationships and short-term dynamics.

The results of this study may demonstrate that the balancing task ahead (for fossil fuels versus renewables) may not be an easy one to achieve for certain fossil fuel exporting countries when economic factors are taken into consideration. The central hypothesis is that countries, political will for energy reform in exporting fossil fuels is significantly driven by economic factors that result in increased export income and greater GDP growth. Another question is whether or not economic factors play a greater role in explaining the variance in political risk perceptions and

therefore perceptions of political will and social responsibility for developing fossil fuel exporting countries compared to that for developed countries. Thus the sample consists in the former case of several key OPEC countries (including Saudi Arabia) and in the latter case, several key developed countries (including the United States). These countries are collectively significant energy exporters in terms of global impact and are representative of both OPEC and Non OPEC countries. The question is asked as to whether the policy of each country is directed purely for avaricious wealth creation or is the policy for wealth creation established in order to afford to implement desirable socially responsible export policies.

The first section of the chapter provides an introduction. Then follows a literature review followed by the data, methodology and the model. Then the preliminary and main results are reported followed by a conclusion.

9.2 Literature

The literature review refers to evidence of relationships between economic and financial information and sovereign risk, country risk and political risk. It is necessary to therefore differentiate between the risk concepts according to the definitions implied in the ICRG (2015). Past researchers have confused these risk concepts according to definitions included in ICRG (2015) and definitions provided and cited in Simpson (2007a, b). Country risk is the risk that a country will be either unwilling or unable to meet its external commitments. Thus the inability of the country to meet commitments relates to economic and financial factors. The unwillingness to meet commitments is the political risk component. There may be an underlying economic component in political risk because even though political factors may hypothetically be stated as the reason for not meeting commitments, the country concerned may not have sufficient financial resources to meet those obligations.

Sovereign risk is pure political risk where a country actually repudiates its external obligations for purely political reasons (for example riots, strikes and civil unrest). As mentioned some of the literature confuses these concepts often referring to sovereign risk or political risk as country risk. However, in all cases the researchers are correct in that the risk concept studied has a component which reflects the unwillingness of the country to meet its international obligations and this therefore includes the opinions by risk experts on the countries level of international social responsibility. This may in turn reflect a lack of concern about the global environmental effect of the export of fossil fuels. It may indicate that a country is more concerned about the generation of wealth than global social and environmental impact of their fossil fuel exports. It may also indicate that in order to afford to implement socially responsible policies, wealth must firstly be generated.

The literature is sparse when it involves specific study of fossil fuel exporting countries and political risk as a measure of social responsibility. Recent evidence beyond the GFC on the connection between social responsibility and economic factors is also scant. However, other early evidence suggests that there is a connection between country risk/sovereign risk/political risk and economic and

financial factors. For example, as cited in Simpson and Buyukkara (2013), the researchers Holthausen and Leftwich (1986) find that sovereign risk ratings had a significant effect on bond yields (see also Hand et al. 1992; Cantor and Packer 1996). Also Maltosky and Lianto (1995) find that sovereign risk downgrades are informative to equity markets, but upgrades do not supply markets with new information. Erb et al. (1996) find that country risk measures are correlated with future equity returns, but financial risk measures reflect greater information. They also find that country risk measures are also highly correlated with country equity valuation measures and that country equity value oriented strategies generated higher returns.

Diamonte et al. (1996) find that country risk represents a more important determinant of stock returns in emerging rather than in developed markets. They also find that over the past 10 years country risk had decreased in emerging markets and increased in developed markets. They speculated that if that trend continued the differential impacts of country risks in each of those markets would narrow.

Hill (1998) finds that in times of crisis many investors may be determined to minimise exposure to securities affected by country risk until they have more information, but after a period of calm the spreads being offered appear to be too high relative to the risks. After more investors return to the market the spreads get less and when there is another crisis the cycle recommences. Radelet and Sachs (1998) find country/sovereign risk ratings agencies were too slow to react to crises and when they did react it was suggested that their ratings intensified and prolonged the crisis. Ferri et al. (1999) find ratings agencies behaved in a pro-cyclical manner by upgrading country/sovereign risk ratings during boom times and downgrading them during crises. Reisen and von Maltzan (1999) find ratings agencies exacerbated boom-bust cycles in financial markets and put emerging markets at greater risk.

Hooper and Heaney (2001) concluded that multi index models should be tested that incorporate a regional index, an economic development attribute, commodity factors and a political risk variable in order to more effectively price securities. Brooks et al. (2004) find equity market responses to country/sovereign risk ratings changes revealed significant responses following downgrades. Hooper et al. (2004) find ratings agencies provided stock markets and foreign exchange markets in the United States with new tradeable information. Ratings upgrades increased stock markets returns and decreased volatility significantly. Busse and Hefeker (2005) find government stability, the absence of internal conflicts and ethnic tensions, basic democratic rights and the ensuring of law and order are highly significant determinants of foreign investment flows. In Simpson (2007a, b) evidence of the direct adverse effects of extreme political acts on industries and economies is provided and cited.

Most evidence despite the inaccuracies in risk definition, indicate that country/sovereign risk (which includes pure political risk) has a significant relationship with stock market price changes. These price changes include those of the important oil and gas industry sector. It should be noted that some evidence is produced that indicates that financial crises reflected in reduced stock market price changes are the main influences on sovereign risk ratings. However, past studies differ in their definitions of these risk concepts and this makes the results unclear.

9.3 Data

The data for political will and social responsibility are extracted from the International Country Risk Guide (ICRG 2015). Political risk definitions are included in Appendix. The risk data are from Political Risk Services, which is part of the ICRG which is a long established and reputable risk ratings agency. The ICRG records end of month risk ratings ascribed by a survey of international credit experts. The higher the score out of 100 points the lower the level of political risk or the higher the level of political will and the higher the level of social responsibility. The price data are those extracted from DataStream at the end of each month in global oil and gas prices, global benchmark stock market prices and country stock market prices. These indices are measured in USD. The global oil and gas and stock prices control for global economic conditions and the country stock market prices control for country economic conditions. All data are extracted as at the end of each month. For the dynamic model testing all data are logarithmically transformed for standardisation and comparison purposes.

Thus, this research utilizes monthly political risk statistics for developed and developing countries, namely; Australia, Canada, UK, US, Kuwait, Nigeria, Qatar, Saudi Arabia, UAE, and Venezuela. The data also incorporate monthly historic stock prices of each country. All stock market indices are extracted from the DataStream data base. They are all deemed to be representative of industrial stocks and are all calculated in a similar way to reflect that representativeness.

The S&P500 is used as a proxy for a global benchmark index reflecting global economic conditions. The reasons for this are that numerous studies have examined and demonstrated the global power of the US stock market (For example, Simpson 2008). In some of these studies it is found that the US stock market is the driver of world stock markets. This is understandable as the US is the largest and most globally influential financial market and has a significant effect on global economic conditions. The Simpson (2008) study demonstrated quite clearly that the US stock market drives the DataStream World stock market index as well as all other major country indices on a 1–2 days time lag. It is the leading indicator and other markets are the lagging indicators in both bull and bear market conditions.

This study therefore treats the S and P 500 stock market index as the global benchmark index for the specified model. Monthly stock prices indices are used to avoid common distortions of daily and weekly series that arising from non-synchronous trading. The study uses monthly time series data from January 2000 to January 2015. As mentioned the countries have been selected on the basis that they collectively represent a significant amount of global energy exports and represent both OPEC and Non OPEC countries. Global oil and gas prices are included in the analysis. Monthly stock prices indices are used to avoid common distortions of daily and weekly series that arising from non-synchronous trading. The study uses monthly time series data from January 2000 to January 2015. The full sample period of this study is divided into two sub-periods for two reasons: First, to avoid possible structural shifts in data due to the global financial crisis (GFC) impact in mid-2008 and second, for testing the strength of cointegration relationships between variables before and after crisis. The first sub-period is from January 2000 to June 2008, and the second sub-period (post-crisis) covers the period from July 2008 to January 2015.

9.4 Model and Method

In its functional form the basic unlagged equation for testing is

$$S_t = f\left(E_t Sm_{w_t}, Sm_{c_{t)}}\right) \tag{9.1}$$

Where

S_t is the level of social responsibility and political will according to the end of month political risk rating for each country.
E_t is the end of month value of the global oil and gas stock market index.
Sm_{w_t} is the end of month value of the global benchmark stock market index.
Sm_{c_t} is the end of month value of the stock market index for each country.

In its dynamic form, the country model's dependent variable remains the unlagged political risk ratings for that country, but the independent variables become the unlagged and optimally lagged global oil and gas index, the global benchmark stock market index, the stock market index for that country and the optimally lagged political risk variable for that country.

The methodology involves a preliminary investigation of primarily the behaviour of the political risk data in level series. Descriptive statistics in means, standard deviations and tests of normality are computed. This initial analysis will identify those countries with higher political risk and thus lesser expected levels of political will and lower perceived social responsibility.

Some conclusions may be reached from this initial analysis but, it is recognised that the level series data are likely to be non-stationary (time dependent). Moreover few of the distributions are expected to be normal and on the basis of the likelihood of serial correlation in the error terms producing spurious level series regressions, the analysis immediately moves to analyse the data in a dynamic model that includes optimal lags to ascertain long-term equilibrium relationships and short-term dynamics.

Mere correlation evidence does not imply causality and the dynamic model investigates evidence of cointegration in vector auto regressions (VARs) and then a vector error correction model (VECM) for each country model in level series after ascribing an optimal lag using VAR based lag length criteria tests and the testing of the stability of the initial VAR models.

A structural break is incorporated into the study to take account of relationships pre and post GFC. Initially unit root tests applied to logarithmically transformed data will confirm the non-stationarity of level series and the stationarity of first differenced variables (including the stationarity of the errors in the first differenced relationships). Such proven stationarity in first differences also means that the level series are integrated non-stationary processes and cointegration tests are then undertaken. If cointegration is proven, tests of exogeneity are then undertaken. As mentioned, this will provide evidence of the significance of economic drivers of political will and social responsibility in each country.

9.5 Results

9.5.1 Preliminary Findings

The following are included in the preliminary analysis: Descriptive statistics of level series data in graphs of political risk (PR) and stock market data (SM), means and standard deviations of level series dependent variable in political risk ratings, tests of normality of the political risk ratings, unit root tests of level and first differenced data and results of structural break tests. Figure 9.1 shows the graphical representation of political risk ratings in level series for each country studied over the full period of the study.

It is evident that there is not a significant amount of volatility and movement in political risk in several of the countries investigated (See in particular the UAE, Saudi Arabia and Qatar). Whilst these countries are developing economies and may be described as religious autocracies, their systems of government, by the nature of strict religious law enforcement have also produced a degree of political stability, but at a higher risk level than that of developed countries. On the surface it is not evident that the global financial crisis has had a particular impact on risk ratings with any of the countries examined.

Figure 9.2 graphically shows the stock market price movements for each country and the price movements of the global benchmark stock market and global oil and gas in level series.

It is evident in each case except Venezuela that country stock markets, the global benchmark stock market and global oil and gas prices show a gradually improvement in prices up to the point of the global financial crisis in 2008, then they show a sudden fall in prices and then a partial recovery. In the case of Venezuela, as a dictatorship with thinly traded stock market, that global economic factors have had negligible effect on the domestic stock market. The high levels of political risk are likely to be primarily associated with political, social and human factors rather than economic factors from global and domestic stock market prices and global oil and gas prices.

Table 9.1 shows the descriptive statistics in level series for the political risk ratings for each country studied.

From Table 9.1 it can be seen that higher risk ratings (reflecting lower political risk and greater political will) apply to the developed countries of Australia, the UK, Canada and the US. Australia, Kuwait, the UK and the US have a variability in the ratings greater than two standard deviations perhaps reflecting a greater dependence on global economic and oil and gas data than Canada, and the developing countries in the sample. None of the countries' risk data, except Saudi Arabia, are normally distributed according to the Jarque Bera test statistic (Jarque and Bera 1987) reflecting in each case, problems with skewness and kurtosis.

The analysis needs to move on to examine both level series and first difference data using unit root tests (See Dickey and Fuller 1981; Phillips and Perron 1988). Table 9.2 shows the results of the unit root tests which test for stationarity of the data in first differences so that cointegration and exogeneity analysis in a VAR and

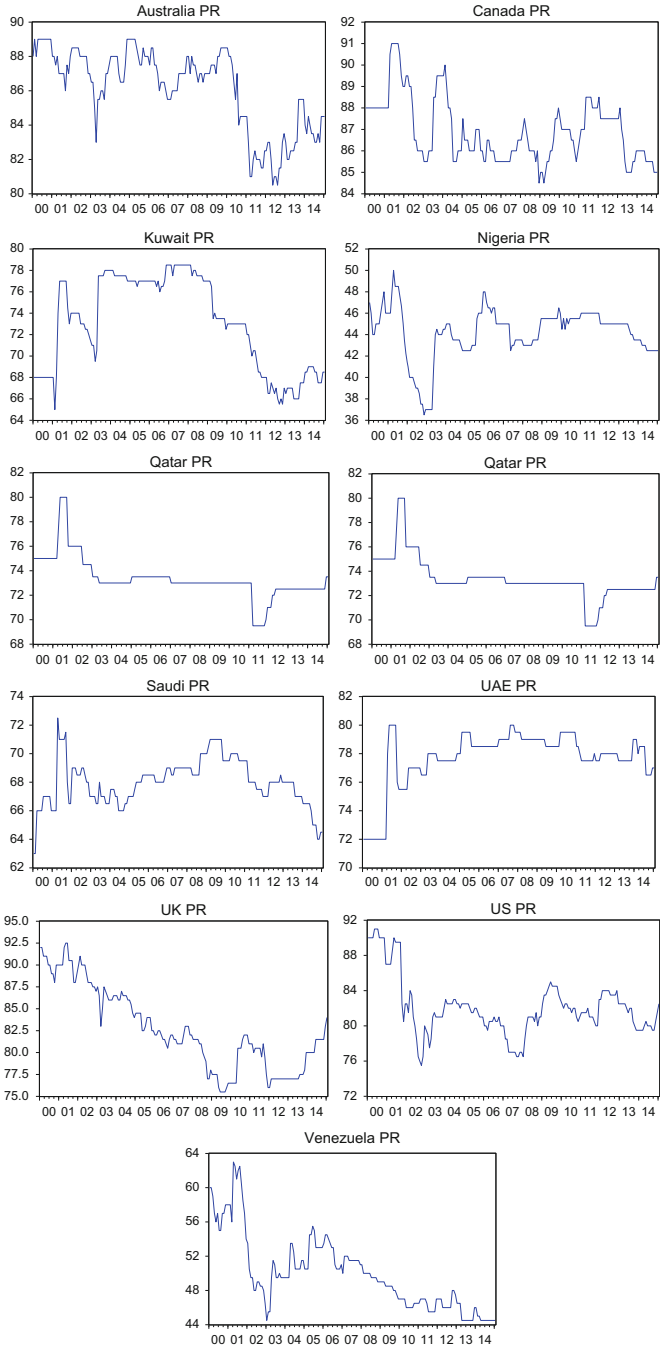


Fig. 9.1 Political risk (PR)

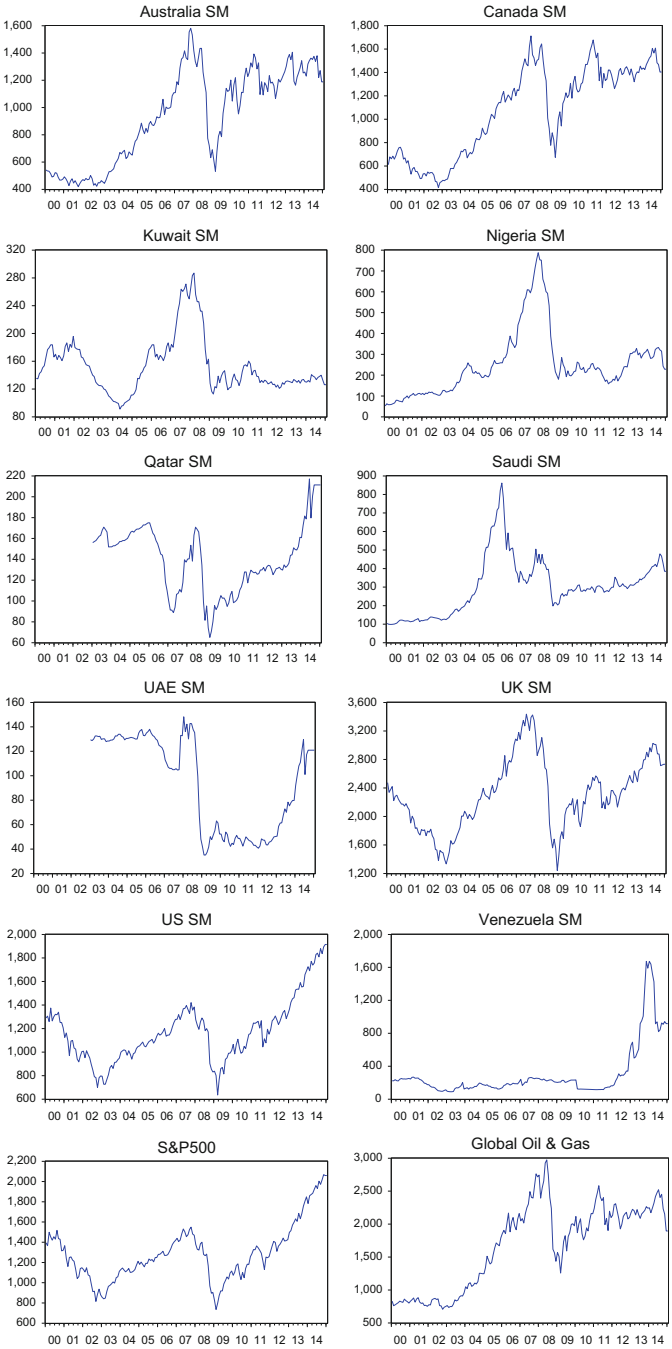


Fig. 9.2 Stock market price movement (SM)

Table 9.1 Descriptive statistics (levels)

	PRA	PRC	PRK	PRN	PRQ	PRS	PRUAE	PRUK	PRUS	PRV
Mean	86.1188	86.9309	73.0553	44.1961	73.3646	68.0028	77.6796	82.6575	82.0829	49.9696
Standard deviation	2.3484	1.4699	4.3547	2.3773	1.7191	1.6360	1.9845	4.6728	3.2963	4.3733
Skewness	−0.7500	0.8346	−0.2654	−1.1870	1.3188	−0.1471	−1.8067	0.3542	0.9507	0.9292
Kurtosis	2.3815	3.1877	1.5339	5.0812	8.0396	3.4471	5.8747	2.0737	4.0600	3.4093
Jarque-Bera normality test	19.8549	21.2795	18.3367	75.1717	244.0045	2.1604	160.7937	10.2562	35.7422	27.3118
Probability	0.0000	0.0000	0.0001	0.0000	0.0000	0.3395	0.0000	0.0059	0.0000	0.0000
Observations	181	181	181	181	181	181	181	181	181	181

Note: *PRA* political risk of Australia, *PRC* political risk of Canada, *PRK* political risk of Kuwait, *PRN* political risk of Nigeria, *PRQ* political risk of Qatar, *PRS* political risk of Saudi, *PRUAE* political risk of UAE, *PRUK* political risk of US, *PRV* political risk of Venezuela

Table 9.2 Unit root tests

Variables: political risk Panel 1 and stock markets Panel 2	Levels		First differences		Levels		First differences	
	Intercept only in the model				Intercept and trend in the model			
	ADF	PP	ADF	PP	ADF	PP	ADF	PP
Panel 1								
Australia	−2.069392	−1.958632	−15.03772***	−15.10980***	−2.977886	−2.888523	−14.99836***	−15.06980***
Canada	−2.324431	−2.780369	−12.30031***	−12.32918***	−2.692527	−3.247596	−12.26825***	−12.29787***
Kuwait	−1.849111	−1.669306	−11.03570***	−10.89434***	−2.517202	−2.318871	−9.869677***	−10.91093***
Nigeria	−2.729417	−2.823923	−10.41462***	−10.37862***	−2.747499	−2.866790	−10.38378***	−10.34712***
Qatar	−2.147381	−2.436597	−11.55922***	−11.55754***	−3.054572	−2.999109	−11.53794***	−11.53586***
Saudi Arabia	−3.609060	−3.590832	−14.19393***	−14.81547***	−3.545358	−3.466627	−14.34408***	−15.44536***
UAE	−3.607565	−3.360204	−11.18716***	−11.17792***	−3.491168	−3.192625	−8.359168***	−11.21272***
UK	−2.028517	−2.018989	−10.36689***	−12.16034***	−1.132006	−1.052783	−10.54782***	−12.35528***
US	−3.056167	−2.765987	−11.43727***	−11.36686***	−2.882256	−2.525177	−11.47663***	−11.38987***
Venezuela	−2.252725	−2.285957	−12.63760***	−12.64070***	−3.198288	−3.198288	−12.62284***	−12.62595***
Panel 2								
Australia	−1.480309	−1.567533	−13.46723***	−13.48111***	−2.318442	−2.654621	−13.43547***	−13.45079***
Canada	−1.360112	−1.479323	−13.64329***	−13.68848***	−2.193254	−2.566982	−13.60568***	−13.65511***
Kuwait	−1.768111	−1.871628	−10.92321***	−10.91525***	−1.871628	−2.166717	−10.91525***	−11.45308***
Nigeria	−2.225587	−1.988207	−8.612938***	−8.763869***	−2.134188	−1.848025	−8.628125***	−8.779169***
Qatar	−0.821641	−1.445173	−10.85689***	−11.11158***	−0.718934	−1.254361	−10.98583***	−11.17999***
Saudi Arabia	−1.629039	−1.944950	−11.39094***	−11.59925***	−1.572291	−1.974520	−11.37296***	−11.58133***
UAE	−1.739298	−1.494792	−5.553628***	−10.49905***	−1.535761	−1.076445	−5.617299***	−10.53750***
UK	−1.538373	−1.923307	−12.86166***	−13.04884***	−2.024525	−2.389998	−12.84121***	−13.02725***
US	−0.072467	−0.143891	−15.02014***	−14.92041***	−1.485965	−1.462519	−15.38212***	−15.26699***
Venezuela	−3.505919	−1.367745	−10.52527***	−10.56994***	−3.858497	−2.135210	−10.54763***	−10.59267***

(continued)

Table 9.2 (continued)

Variables: political risk Panel 1 and stock markets Panel 2	Levels		First differences		Levels		First differences	
	Intercept only in the model				Intercept and trend in the model			
	ADF	PP	ADF	PP	ADF	PP	ADF	PP
S&P500	0.276031	−0.146362	−12.21071***	−12.35218***	−1.009039	−1.223302	−12.47025***	−12.51794***
Global oil and gas	−1.604697	−1.659666	−12.93117***	−12.94401***	−1.854804	−2.096964	−12.93550***	−12.94771***

Note: ADF and PP denote the Augmented Dickey–Fuller test and Philips-Perron test for unit roots. The optimal number of lags was chosen according to the Schwarz Information Criterion (SIC), provided that the lags yield white-noise residuals

***Statistical significance of 1 % level. Note the S and P 500 and Global Oil and Gas are tested only over the full period

then a VECM may follow (assuming that the unit root tests indicate that the series are integrated and non-stationary processes).

Whilst there may be many structural breaks in a data series, for the purposes of this study it is acknowledged that the global financial crisis (GFC) has significance effect to the world financial markets in 2008. To avoid the contagion of GFC that may lead to spurious results, the Quandt-Andrews (Quandt 1988; Andrews 1993) unknown break-point test is conducted (applied to global economic and oil and gas relationships) to determine if the null hypothesis of no significant breaks in time series data can be rejected. The results of the structural break tests indicate that a break occurs at the time of the GFC in June 2008.

The results show that the processes are integrated and non-stationary (with the first differences and errors of the first difference relationships proven to be stationary) and steps may be now taken to test for cointegration and exogeneity. Johansen's cointegration test can be affected by the lag length used in the VAR. The stability of the VAR in each case is firstly tested using a VAR stability condition test. It is essential to select an optimal lag length prior to the estimation of VECM and cointegration test.

The three information criteria widely used to determine the optimal lag length are: Akaike Information Criterion (AIC), Schwarz's Bayesian Information Criterion (SBIC) and Hannah-Quinn Criterion (HQIC). The AIC is selected in this study for selecting an appropriate lag length to be included in the system for each sub-period. In addition, a lag exclusion Wald test is used to ensure that the research did not lose important information when selecting the lag length. The LM-autocorrelation test is also employed to confirm no serial correlation with the lag length selection.

9.5.2 Main Results

The results of testing for cointegration and exogeneity (Johansen 1988; Granger 1988) are shown in Table 9.3. In the long-term, the evidence provided in Table 9.3 indicates that in the pre-crisis period, there are cointegrating relationships in all countries except Venezuela. In other words in those countries other than Venezuela there are long-run equilibrium relationships between the variables in each country model meaning that the variables exhibit similar stochastic trends and together come to stability at least once during the period leading up to the GFC, particularly when the models are tested without a linear trend in the data. In the period after the GFC there is stronger evidence of cointegration when the assumptions also includes a linear trend in the data.

Venezuelan data also provides evidence of cointegration in the second period. Over the full period of the study there is evidence of cointegration only in Canada, Kuwait, UAE, UK and the US when both assumptions relating to linear trends in the data are considered. Cointegration theory (Johansen 1988; Granger 1988) implies that if there is no cointegration there are no issues in respect to Granger causality running from the independent variables or vice versa. This is the case for Australia,

Table 9.3 Johansen Cointegration and Granger Causality (exogeneity) tests

Country Model	Number of cointegrating relationships According to trace and/or Eigen-value tests		Optimal lag order in months According to AIC information criteria	Granger causality
	Model without linear trend	Model with linear trend		
Full period: Jan 2000–Jan 2015				
Australia	0	0	NA	Assumed no one way or dual causality
Canada	0	1	3	Causality not significant at 10 % level on a 3 month lag
Kuwait	0	1	2	Causality not significant at 10 % level on a 2 month lag
Nigeria	0	0	NA	Assumed no one way or dual causality
Qatar	0	0	NA	Assumed no one way or dual causality
Saudi Arabia	0	0	NA	Assumed no one way or dual causality
UAE	2	2	3	UAE stock market significantly Granger causes political risk with a Chi Square Value of 12.5434*** on a 3 month lag
UK	1	1	3	Causality not significant at 10 % level on a 3 month lag
US	1	1	1	Causality not significant at 10 % level on a 1 month lag
Venezuela	0	0	NA	Assumed no one way or dual causality
Pre-crisis: Jan 2000–Jun 2008				
Australia	1	0	2	Causality is not significant at the 10 % level on a 2 month lag
Canada	1	0	3	Causality is not significant at the 10 % level on a 3 month lag
Kuwait	1	0	1	Causality is not significant at the 10 % level on a 1 month lag
Nigeria	1	0	2	Significant Granger causality runs from the S and P 500 at political risk with Chi Square value of 6.2684** on a 2 month lag
Qatar	2	1	4	Significant Granger causality runs from the World Oil and gas variable to political risk with a Chi Square value of 8.7319* on a 4 month lag
Saudi Arabia	1	0	3	Causality is not significant at the 10 % level on a 3 month lag

(continued)

Table 9.3 (continued)

Country Model	Number of cointegrating relationships According to trace and/or Eigen-value tests		Optimal lag order in months According to AIC information criteria	Granger causality
	Model without linear trend	Model with linear trend		
UAE	1	0	4	Causality is not significant at the 10 % level on a 4 month lag
UK	1	1	1	Causality is not significant at the 10 % level on a 1 month lag
US	1	1	2	Causality is not significant at the 10 % level on a 2 month lag
Venezuela	0	0	NA	Assumed no one way or dual causality
Post-crisis: July 2008–Jan 2015				
Australia	1	1	2	Causality is not significant at the 10 % level on a 3 month lag
Canada	1	1	2	Causality is not significant at the 10 % level on a 2 month lag
Kuwait	4	2	2	Causality is not significant at the 10 % level on a 2 month lag
Nigeria	2	1	2	Causality is not significant at the 10 % level on a 2 month lag
Qatar	2	1	2	Causality is not significant at the 10 % level on a 2 month lag
Saudi Arabia	1	1	1	Causality is not significant at the 10 % level on a 2 month lag
UAE	2	1	2	Significant Granger causality runs from the UAE stock market and the World oil and gas market with Chi Square values of 9.008** and 7.1488* on a 2 month lag
UK	2	1	3	Causality is not significant at the 10 % level on a 3 month lag
US	2	2	1	Causality is not significant at the 10 % level on a 1 month lag
Venezuela	1	1	2	Causality is not significant at the 10 % level on a 2 month lag

Note: Significance levels for evidence of cointegration are all at the 5 % level. Where there is no cointegration an optimal lag is not applicable (NA) and it is assumed in those cases there exists no significant evidence of causality. Significance levels for significant Granger causality are based on Chi Square values

***1 %, **5 % and *10 % levels of significance

Nigeria, Qatar, Saudi Arabia and Venezuela over the full period. Also in the pre-crisis period there is assumed to be zero Granger causality for Venezuela. If cointegration exists there is assumed to be Granger causality either one way or two ways between one or more of the explanatory variables even though in most cases in this study over all periods Granger causality is not found to be significant at the 10 % level on the lag length indicated in the VECM. The exceptions are as follows; the UAE in the full period where the UAE significantly Granger causes UAE political risk; in the pre-crisis period where the S and P 500 significantly Granger causes the political risk in Nigeria and the World oil and gas prices significantly Granger causes political risk in Qatar; finally in the post-crisis period the UAE stock market and the World oil and gas market significantly Granger cause the political risk in the UAE.

9.6 Conclusion

Over the long-term the evidence shows that there are significant equilibrium relationships between political risk, domestic stock market prices, global benchmark stock market prices and global oil and gas prices, particularly in the period following the global financial crisis. When the full period is considered these relationships are strongest for Canada, Kuwait, the UAE, the UK and the US. It is clear that in the long-term and particularly after the onset of the GFC that domestic and global economic factors, as reflected in stock market prices and oil and gas prices, have much to do with levels of political risk and thus they have much to do with changes in the level of political will and areas that are affected by political will such as domestic and global perceptions of social responsibility.

This is contrary to theory, where political risk ratings are related only to political factors as assessed subjectively by international political risk ratings experts. Generally speaking there is no strong relationship in the long-term (over the full period and in the period leading up to the GFC) in Venezuela between risk ratings and economic data and it is therefore likely that political factors played an important part in ascribed risk ratings for that country (at levels that reflect higher political risk and lower levels of political will and social responsibility).

In the short-term Granger causality tests do not, in most cases, identify significant and specific exogenous variables, however, it may be assumed, in the cases where cointegration exists, that collectively there is a degree of either one way or dual Granger causality as the variables all interact in a single model and they together come to equilibrium at least once over the periods studied.

It is clear from cointegration evidence, rather than evidence of exogeneity, that in most cases over the pre-and post-crisis period, domestic and international economic factors have a degree of influence on political risk. In developing countries generally these economic factors influence higher levels of political risk and therefore lower levels of political will for socially responsible energy policies. In general in developed countries these same factors influence lower levels of

political risk and perhaps show greater political will to implement socially responsible energy policies.

Over the long-term, in higher political risk countries, it is expected that there is a possibility that there is less political will to implement policies for social responsibility in fossil fuel exports and that economic factors are important purely as drivers of wealth in export and GDP growth. In developed countries there is less political risk and economic factors are expected to be important as drivers of wealth so that socially responsible policies (such as those relating to the use of renewable energy sources) can become affordable and can be placed on government policy agendas with some degree of certainty that they will be implemented in due course (for example, the joining of international agreements to reduce greenhouse gas emissions over a time span to a certain level).

Appendix: Definitions and Explanations of Pure Political Risk Components (ICRG 2015)

Government stability ratings are an assessment of a government's ability to remain in office by carrying out declared policy plans. The subcomponents of this factor are government unity, legislative strength and popular support. **According to the ICRG ratings, socio-economic conditions relate to pressures that conspire to constrain government action** or to fuel social dissatisfaction. The subcomponents in this category are the level of unemployment, the degree of consumer confidence and the level of poverty.

The investment profile factor affects the risk to investment not covered by other political, economic and financial components and is made up of contract viability and expropriation, profit repatriation, and payment delays.

Internal conflict is an assessment of political violence in a country and its impact on governance. The highest rating means that there is no armed or civil opposition to the government and the government does not engage in arbitrary violence (either direct or indirect) against its own people. Under this rationale the lowest scores would apply to those countries where there is ongoing civil war. The subcomponents of this risk factor are thus, civil war or coups threat, terrorism or political violence, and civil disorder.

External conflict measures are an assessment of the risk to the incumbent government from foreign action, which includes non-violent external pressure (for example, diplomatic pressure, withholding of aid, trade restrictions, territorial disputes, and sanctions) to violent external pressure (such as, cross-border disputes and all-out war). The subcomponents of this category of pure political risk are cross-border conflict, and foreign pressures.

Corruption is an internal assessment of the political system. Corruption distorts the economic and financial environment and reduces the efficiency of government and business in the way the foreign direct investment is handled. Corrupt practices enable people to assume positions of power through patronage rather than ability. By so doing, an inherent instability is introduced into the political process.

Examples of corruption include special financial payments and bribes, which ultimately may force the withdrawal of or withholding of a foreign investment. However, excessive patronage, nepotism, job reservations, "favour for favours", secret party funding, and suspiciously close ties between government and business have a lot to do with corruption. A black market can be encouraged with these forms of corruption. The potential downside is that popular backlash may lead to the rendering of the country ungovernable.

Military in politics is a problem because the military are not democratically elected. Their involvement in politics is thus a diminution of accountability. Other substantial ramifications are that the military becomes involved in government because of an actual or created internal or external threat. Government policy is then distorted (for example, defence budgets are increased at the expense of other pressing budgetary needs). Inappropriate policy changes may be a result of military blackmail. A full-scale military regime poses the greatest risk. Business risks may be reduced in the short-term but in the longer-term the risk will rise because the system of governance is susceptible to corruption and because armed opposition in the future is likely. In some cases, military participation will represent a symptom rather than a cause of higher political risk.

Religious tensions emanate from the domination of society and or governance by a single religious group that seeks to replace civil law and order by religious law. Other religions are excluded from the political and social process. The risk involved in such scenarios involves inexperienced people dictating inappropriate policies through civil dissent to outright civil war.

The law and order components are assessments of the strength and impartiality of the legal system and popular observance of the law respectively.

Ethnic tensions relate to racial, nationality or language divisions where opposing groups are intolerant and unwilling to compromise.

The democratic accountability component is a measure of how responsive government is to its people. The less responsive it is the greater the chance that the government will fall. This fall will be peaceful in a democratic country but possible violent in a non-democratic country. The institutional strength and the quality of the bureaucracy is a measure that reflects the revisions of policy when governments change. Low risk in this area applies to countries where the bureaucracy has the strength and expertise to govern without major changes in policy or interruptions in government services. That is, bureaucracies have a degree of autonomy from political pressure with an established independent mechanism for recruitment and training.

References

Andrews DWK (1993) Tests for parameter instability with unknown change points. Econometrica 61(4):821–856

Brooks R, Faff R, Hillier D, Hillier J (2004) The national market impact of sovereign rating changes. J Energy Financ 28(1):233–250

Busse M, Hefeker C (2005) Political risk, institutions and foreign direct investment. HWWA Discussion Paper 315
Cantor R, Packer F (1996) Determinants and impact of sovereign credit ratings. FRBNY Econ Policy Rev 2(2):37–54
Diamonte R, Liew JM, Stevens RL (1996) Political risk in emerging and developed markets. Financ Anal J 52(3):71–76
Dickey DA, Fuller WA (1981) Likelihood ratio statistics for autoregressive time series within a unit root. Econometrica 49:1022–1057
Erb CB, Harvey CR, Viskanta TE (1996) Political risk, economic risk and financial risk. Fuqua School of Business Working Paper: 9606
Ferri G, Liu L, Stiglitz J (1999) The procyclical role of rating agencies: evidence from the East Asian crisis. Econ Notes 28(1):335–355
Granger CWJ (1988) Some recent developments in a concept of causality. J Econ 39:199–211
Hand J, Holthausen R, Leftwich R (1992) The effect of bond rating agency announcements on bond and stock prices. J Financ 47(2):733–752
Hill CA (1998) How investors react to political risk. Duke J Comp Int Law 8(2):283–314
Holthausen R, Leftwich R (1986) The effect of bond rating changes on common stock prices. J Financ Econ 17(1):57–89
Hooper V, Heaney R (2001) Regionalism, political risk and capital market segmentation in international asset pricing. AFA New Orleans Meetings
Hooper V, Hume T, Kim S-T (2004) Sovereign rating changes-do they provide new information for stock markets? Working Paper University of New South Wales
ICRG (2015) International country risk guide. Political risk services group. http://www.icrgonline.com?page.aspx?=icrgmethods
Jarque CM, Bera AK (1987) A test for normality of observations and regression residuals. Int Stat Rev 55:163–172
Johansen S (1988) Statistical Analysis of cointegration vectors. J Econ Dyn Control 12:231–254
Maltosky Z, Lianto T (1995) The incremental information content of bond rating revisions: the Australian evidence. J Energy Financ 19(5):891–902
Phillips PCB, Perron P (1988) Testing for a unit root in a times series regression. Biometrika 75:335–346
Quandt RE (1988) The econometrics of disequilibrium. Blackwell Press, Oxford
Radelet S, Sachs J (1998) The onset of the East Asian financial crisis. NBER Working Paper, 6680
Reisen H, von Maltzan J (1999) Boom and bust sovereign ratings. OECD Development Centre Technical Paper, 148
Simpson JL (2007a) Expert political risk opinions and banking system returns: a revised banking market model. Am Rev Polit Econ 5(1):14–28
Simpson JL (2007b) The effects of extreme political acts and political risk on international banking systems. Int J Bus Manage 2(5):3–19
Simpson JL (2008) Cointegration and exogeneity in Euro Banking and Latin American Banking: does systemic risk linger? Financ Rev 43:439–460, Iowa State University, Eastern Finance Association
Simpson JL, Buyukkara G (2013) Towards a replicating market model for the USA oil and gas sector. In: Wehn CS, Hoppe C, Gregoriou GN (eds) Rethinking valuation and pricing models. Elsevier/Academic, Oxford, pp 207–218

Part III

Islamic Finance

Green *Sukuk*: An Innovation in Islamic Capital Markets

10

Nafis Alam, Meryem Duygun, and Rima Turk Ariss

Abstract

Green *sukuk* are *Shariah* compliant investment vehicles that fund environmentally friendly projects such as solar parks, bio-gas plants and wind farms. The main objective behind the development of green *sukuk* is to address *Shariah* concerns for protecting the environment. For *Shariah*-compliant investors notably in South East Asia and the Gulf Cooperation Council region, green *sukuk* represent an ideal investment that benefits the environment and promotes Corporate Social Responsibility. This chapter looks into the potential for Green *sukuk* in major Islamic finance markets. It maps the differences between more conventional types of socially responsible investments (SRI) and those funds that are guided by the morals promoted through Islam. The chapter also presents a case study of the French Orasis *Sukuk*, the first green *sukuk* in existence.

The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy.

N. Alam (✉)
The University of Nottingham, Business School, Malaysia Campus, Malaysia
e-mail: nafis.alam@nottingham.edu.my

M. Duygun
Hull University, Business School, Yorkshire, UK
e-mail: m.duygun@hull.ac.uk

R.T. Ariss
European Department, International Monetary Fund, Washington, DC, USA
e-mail: RTurk@imf.org

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_10

10.1 Introduction

Green *sukuk* represent a new asset class that lies at the intersection of three investment trends: Islamic mutual funds, socially responsible investments (SRI), and *sukuk*. Since the turn of the century, the development of Islamic mutual funds has opened up new investment opportunities for Islamic investors across a number of stock markets. Drawing upon similar to screening standards as those used for SRI, the components of Islamic mutual funds are selected following a vetting process that uses qualitative and quantitative filters. However, unlike the selection criteria for SRI, these filters do not pertain to areas such as ensuring human rights or safeguarding the environment. In parallel, the *sukuk* market has witnessed remarkable growth, as governments and corporations across the globe have sought this *Shariah*-compliant instrument to finance investments. Driven by demographic factors and the need to create jobs, *sukuk* instruments can support the funding requirements of renewables and other sustainable investments with this new asset class known in Islamic finance parlance as green *sukuk*.

Islamic finance has only recently begun to support green technology. In 2010, the Malaysian government established a $1 billion fund for loans specifically dedicated to green technology projects. A significant portion of this money was channeled through Islamic financial institutions, which are dominant in the country. In 2014, the securities commission in Malaysia pioneered a SRI *sukuk* framework to expand green *sukuk* as a reliable investment vehicle for environmentally-conscious Islamic investors. The state of Dubai in the UAE has also signed a partnership agreement in 2014 with the World Bank to launch and promote green *sukuk* for the financing of clean energy and infrastructure projects. With Gulf States beginning to set targets for sustainability and clean energy, there is a growing potential for green *sukuk* to play its part.

The focus of this chapter is on green *sukuk* as a new asset class in Islamic capital markets. We begin by reviewing the literature on Islamic mutual funds, and socially responsible investments, with an emphasis on how the current structure of Islamic mutual funds can be modified to apply standards similar to those for SRI. Following this, we explore the evolution of *sukuk* and the potential for the further development of green *sukuk*. The chapter ends with a case study of an illustrative example of the green *sukuk* concept, which is the Orasis *sukuk*.

10.2 Islamic Mutual Funds and Socially Responsible Investments (SRI)

Islamic mutual funds are one of the fastest developing segments within global Islamic financial markets. The number of these has grown from 285 in 2004 to 1029 in 2012. Assets under management for Islamic funds showed an enormous increase over recent years, from USD29.2 billion in 2004 to USD60 billion in 2011 (IFSB 2013). This form of Islamic equity investment is a relatively new phenomenon, its inception dates back to 1994 when a decree issued by International Fiqh Academy

permitted Muslim investors to trade in international stocks with particular parameters (Hayat and Kraeussl 2011). From that time, a massive increase in investments was observed within the Islamic investment industry and numerous mainstream international players have since developed their Islamic investing divisions. The rapidity of the development of this mode of investment is such that now there are hundreds of Islamic equity indices created by Dow Jones, FTSE, MSCI and S&P; and by 2010 there were over 800 managed Islamic mutual funds in existence (Ernst and Young 2011).

Islamic finance has five key tenets that form its foundation; this comprises of the prohibition of usury (Riba), speculation (Maysir), excessive uncertainty (Gharar), and investing in forbidden operations, while the fifth tenet promotes the sharing of both risk and return (Hayat and Kraeussl 2011). A *Shariah* Supervisory Board (SSB) oversees the observance of these rules and, in the case of mutual funds, compliance is supervised by a panel of *Shariah* academics. Within Islam, fixing a set interest rate on an investment loan is not viewed as fair, because it is regarded as prejudiced (Hussain et al. 2015). The entrepreneur (borrower) alone bears the entire risk, and the investor (lender) is given the fixed income regardless of whether or not the enterprise is a success. In comparison, if profit is considerably higher, the entrepreneur will acquire a greater share of the revenue, whilst the share owing to the investor (lender) is relatively smaller. This signifies inequality from the uneven allocation of risk and profit is implemented (Novethic 2009).

Islamic mutual funds are mandated to bear in their investment composition with no elements of speculation or debt that is serviced with interest (Forte and Miglietta 2007). A comprehensive screening procedure is imposed on potential investments in order to filter suitable assets through portfolios that meet the standards enforced by *Shariah* rules. Qualitative screens are employed to sort firms on the basis of the type of enterprise they represent, the type of commercial procedures involved and the type of capital market instruments that are traded, ensuring that none of these are forbidden under *Shariah* rules. Firms, whose trade is prohibited by *Shariah* (for instance alcoholic beverage producers) or which carry out unethical commercial procedures (such as those involved in human cloning biotechnology), are precluded from the filtering procedure. Investment in instruments with fixed revenues such as warrants, preferred stocks, some derivatives (such as options) and CDs (certificates of deposits) are also precluded from inclusion in the Islamic mutual fund. Following implementation of these initial qualitative filters, the remaining investment opportunities require analysis on the basis of quantitative screening pertinent to cash and receivables, interest-bearing securities, and debt.[1]

Having investment screening procedures that conform to morals and beliefs is common to both Islamic and SRI funds. However, the Islamic investment vetting procedure does not necessarily cover concerns of social or environmental nature, investment in the community, or human rights. This is in contrast to the standards

[1] No consensus prevails concerning the standards that are presently employed to vet Shariah-compatible stocks (Derigs and Marzban 2008).

that are applied to SRI's. Another difference between Islamic mutual funds and SRI's are that the latter are at liberty to select from profit-bearing or debt-bearing investments for inclusion in their portfolio, provided that the financial assets in question observe the prescribed ecological, ethical or social convictions closely. This necessitates that firms carry out a comprehensive screening procedure of the instruments that is born out of the principles underpinning the socially responsible funds.[2] Since *Shariah* Law can provide structural direction on the control and administrative structure of Islamic mutual funds, it is conceivable that Islamic funds can mirror broader investment pools that are also socially responsible.

The practice of investing in a socially responsible manner essentially involves the application of "ethical screens" to an array of potential investing opportunities, ensuring that companies with poor corporate social responsibility records or other ethically defined criteria are not selected (Brammer et al. 2006). The terms "ethical" and "socially responsible" are often used interchangeably in the literature when referring to SRI. The first moves towards an identifiable socially responsible investment were made by religious factions such as the Society of Friends (commonly known as the Quakers) in the mid nineteenth century in the US, where investments in "sin industries" like tobacco and alcohol were prohibited (Schepers 2003). Moving on from the efforts of religious institutions, the PAX World Fund was initiated in 1971 as the first secularly motivated SRI mutual fund; its key motivation was to avoid investments in stocks associated with the military during the Vietnam War (Forte and Miglietta 2007). Several alternative funds have since been associated with comparable peace-driven or alternative social objectives.

In recent years, the SRI industry has become an important segment of international capital markets. According to the Global Sustainable Investment Review (2012), there are more than 13.6 trillion USD professionally managed assets that incorporate environmental, social, and governance factors into their selection and management process. It is significant for investors to know if these funds are consistent with their objectives. SRI assets under management in Europe are the largest, representing 65 % of the total with 8.8 trillion USD (Nitsche and Schröder 2015).

10.2.1 Do investments with Vetting Standards Perform Worse than Other Instruments?

For both Islamic finance and SRI investors, the main objective is to maximize risk-adjusted returns whilst promoting social welfare and ethical causes. Another commonality is that the focus of both types of investors appears to be on equity rather than fixed income investments. Thus, Islamic finance investors can be viewed as a unique subset of the SRI community.

[2] By construction, a great amount of investment from such funds is oriented towards smaller firms with reduced dividend yields (Fowler and Hope 2007).

Two assertions are put forward by ethical fund administrators; that companies will be persuaded to alter their activities by the presence of a fund representing socially conscious investors, and that in the immediate term the returns on SRI funds do not vary from those normally expected from mainstream investments (Haigh and Hazelton 2004). A range of ethical investments options is in existence. First, there are community or cause-associated investments mirroring savings accounts maintained at organization with a social orientation. Second, there is the practice of acquiring units in socially accountable mutual funds. Third, there is direct investment in companies so as to become involved in dialogue with the objective of altering the firm's ethics (Haigh and Hazelton 2004).

Previous research findings contrasting returns to traditional funds and SRI to uncover whether doing good equates to doing well are inconclusive. Since SRI's are subject to the moral and ethical vetting of firms, the imposition of an extra set of limitations to the wealth-maximizing investor by such screening procedures may affect returns. Rudd (1981) contends that, if the portfolio is limited, then its performance is reduced. He records that socially accountable investments within a portfolio may induce a bias regarding size in addition to other elements, and this may result in a decline in performance over extended terms. In contrast, Statman (2000), states that the implementation of social screens do not have a considerable impact on investment profitability. Overall, there is no considerable variation between the performance of SRI's and conventional funds (Abdelsalam et al. 2014).

The assertion by Perks et al. (1992) is that if "good" social performance is related to unsatisfactory financial performance, investors would not be motivated to invest in these socially accountable firms. Rather weak proof is offered by Luther et al. (1992) who state that, within the UK, ethical fund performance surpasses the two major market indexes. Hamilton et al. (1993) contrast the functioning of a sample of 32 US SRI funds against that of 170 regular funds over the assigned time frame beginning in 1981 and ending in 1990. Their findings show that, by investing in similar ethical funds, investors do not make any losses. A matched pair evaluation was employed by Mallin et al. (1995) to investigate revenues gained by 29 UK ethical funds and 29 UK non-ethical funds, using the foundation of magnitude and age, between 1986 and 1993. The evidence is insubstantial, even though ethical funds are inclined to surpass their matched non-ethical pairs.

A matched pair technique was also applied by Gregory et al. (1997), with a size altered performance measure: no considerable variation is established in returns. The performance of the DSI 400 (Domini Social Index) was contrasted with that of the S&P 500 as well as the Center for Research in Security Prices (CRSP) value-weighted index, over the time-frame of 1986–1994: the use of social responsibility screens neither raises nor reduces investment performance comparative on a risk adjusted basis to the CRSP value-weighted index or the S&P 500. This research additionally determined that SRI does not cause increased risk for investors, quantified as the variability of monthly revenues. Goldreyer et al. (1999) contrast 49 socially accountable mutual funds with a random specimen of mainstream funds from 1981 to 1997, and observe that no remarkable variations occur. Comparatively minor variations are reported by Guerard (1997b) when the performances of

socially vetted and non-vetted investments are analyzed. Comprehensive research carried out by Guerard (1997a) highlights that investing screens which exclude gambling/tobacco/alcohol, environmental or nuclear stocks produce greater average revenues than non-vetted though similar enterprises.

Empirical studies to compare the performance between SRI funds and Islamic funds conclude that the average efficiency of SRI funds is slightly higher than that of Islamic funds. Second stage analysis however, shows that this difference is not statistically significant. It is also reported that the existence of various screening criteria does not affect efficiency if managers can add value to the fund (Abdelsalam et al. 2014).

10.2.2 Evolution of *Sukuk*

Another prominent development in Islamic finance since the turn of the century is the *Sukuk* market. The origins of *Sukuk* can be traced back to the classical Islamic period (700–1300 AD) during which papers representing financial obligations originating from trade and other commercial activities were issued to be in conformity with verse 2:282 of the Holy Qur'an, which encourages fixing contracts in writing:

> When ye deal with each other, in transactions involving future obligations in a fixed period of time, reduce them to writing…It is more just in the sight of God, more suitable as evidence and more convenient to prevent doubts among yourselves.

During the classical Islamic period, a *sakk* (singular of *sukuk* and literally meaning 'deed' or 'instrument') was used to describe any document representing financial liability. The Organisation of the Islamic Conference International Islamic Fiqh Academy (the Fiqh Academy), an institute for the advanced study of Islam based in Jeddah, Saudi Arabia, laid the basis for the development of the *sukuk* market through the issuance of a statement in 1988, holding that "[A] ny combination of assets (or the usufruct of such assets) can be represented in the form of written financial instruments which can be sold at a market price provided that the composition of the groups of assets represented by the *sukuk* consisted of a majority of tangible assets".

The first *sukuk* followed shortly after the Fiqh Academy issued the statement referred to above, in the form a 'Shell MDS Sdn Bhd MYR 125 million Bai Bithaman Ajil' *Sukuk* issued in 1990. Eleven years later the first international US dollar *sukuk* was issued by the Malaysian plantation company Kumpulan Guthrie Bhd's US$150 million *sukuk* in 2001. The Bahrain Monetary Authority (now the Central Bank of Bahrain) was first to issue a Government Related Entity (GRE) *sukuk* in 2001. Several sovereign nations Malaysia in issuing *sukuk* (s), including Qatar, Pakistan and UAE, together this garnered international attention for *sukuk* and set the stage for unprecedented international growth in this market.

The *sukuk* market faltered slightly between late 2007 and early 2009, mainly as a result of two distinct events: the debate surrounding the *Shariah*-compliance of some *sukuk* structures and the global financial crisis, the latter of which resulted in increased borrowing costs and a lack of investor confidence in capital market securities in general.

In the intervening years, the global *sukuk* market has recovered, growing rapidly with global *sukuk* issuances reaching US$116.4 billion in 2014. The *sukuk* market is now a significant source of financing for many companies, sovereigns, and GREs in Southeast Asia and the Middle East and North Africa—regions that are home to fast-growing Muslim populations. Malaysia currently continues to dominate the *sukuk* issuance market, accounting for approximately 60 % of *sukuk* issuances globally. The global outstanding *sukuk* market was estimated at US$300 billion as of November 2014, an 11.4 % rise from US$269.4 at the end of 2013.[3] The *sukuk* market has also been the second fastest growing segment of Islamic finance, with an annual growth rate of 41.6 % on average between 2005 and 2012.[4]

In the past, the difficulties of structuring *sukuk* transactions caused many entities that might have otherwise been *sukuk* issuers to continue raising funds either through the bond market or through conventional bank loans provided by the European and US banks. In addition, *sukuk* pricing was generally less favourable than that available through the conventional loan and bond markets. However, the credit crunch in Europe and the US, along with the Eurozone crisis, changed the landscape and caused many companies to increasingly turn to the *sukuk* market.

Continued demand from the overall Islamic investor base (in particular from Islamic banks), both in the Middle East and Asia, will likely be a key driver of global *sukuk* issuances. *Sukuk* has also typically been purchased by investors intending to hold the investment certificates to maturity, resulting in low variability in their secondary market performance, despite wider global economic instability. As the *sukuk* market develops, prospective issuers of *sukuk* are able to achieve more favourable pricing in this market compared to an equivalent issue in the conventional bond market (Norton Rose Fulbright 2015). These factors, amongst others, have led to a number of market participants predicting that the global issuances of *sukuk* will reach over US$250 billion by 2020 (Thomson Reuters 2014).

More importantly, *sukuk* instruments are well-suited to infrastructure financing because of their risk-sharing features, thereby helping to fill financing gaps in developing countries (International Monetary Fund 2015). Despite the strong and growing demand for *sukuk*, supply has yet to increase and secondary market liquidity has yet to improve. *Sukuk* represents 0.25 % of the global bond market, but a shortage of *Shariah*-compliant instruments makes *sukuk* oversubscribed and less liquid as investors prefer these as "buy and hold" instruments (IMF 2015). Whereas there is little systematic global evidence on *sukuk* characteristics tenor and

[3] http://wief.org/wp-content/uploads/2014/12/The-Growth-of-Islamic-Finance-by-Dr-Osman-Babiker-Ahmed.pdf

[4] Islamic Financial Services Board, Islamic Financial Services Industry Stability Report.

yields, recent *sukuk* defaults have exposed gaps in understanding the nature of risks associated with *sukuk* investing. This was accentuated by prominent *sukuk* defaults and restructurings during the global financial crisis and they have resulted in unexpected outcomes for investors (Lukonga 2015).[5]

10.3 Potential for Green *Sukuk*

The fast-growing global *sukuk* market is well suited to channel capital in developed Islamic finance territories as well as on western shores to fund renewable energy and environmentally friendly projects. *Sukuk* are tradable Islamic finance instruments that can be issued both by sovereigns and corporations in order to raise funds for financing large infrastructural development projects. *Sukuk* are similar to conventional bonds but carry features that are consistent with *Shariah* principles relating to Islamic banking and finance. One striking feature of *sukuk* is that they grant holders ownership rights in underlying assets or earnings from those assets. *Sukuk* issuances, for example, have charted a compound annual growth rate of 44.0 % between 2004 and 2011 (IFSB 2013).

Growing global concerns for environment-friendly and sustainable development has led to a strident interest in projects that carry the term "Green projects". The likes of the World Bank, United Nations environmental initiatives and other international agencies have all championed the cause for achieving a cleaner and more sustainable world ecosystem. Along with this, there was an increase in the need for greater access to financing to fund such green projects. In 2008, the World Bank pioneered the concept of 'green bonds', which gave investors an innovative way of supporting clean energy and other low-carbon projects. Since then, financial instruments supporting green projects have witnessed increased interest from both issuers and investors. Islamic finance therefore presents a tremendous opportunity to develop instruments that can support the global surge in demand to initiate green projects. Islamic finance also presents synergies with the sustainable environment concept and fits in well with the ethical requirements of these. Therefore, environmental protection fits well in the overall aspirations of Islamic finance that seek to enhance the general welfare of society.

Green *sukuk* are a *Shariah* compliant investment in renewable energy and other environmental assets and they address *Shariah* concern for protecting the environment. Proceeds from green *sukuk* can be used to finance construction or the payment of a government-granted green subsidy. The structure of green *sukuk* involves securitizing future income cash flows from ring-fenced projects or assets with specific criteria attached as shown in Fig. 10.1. The funds raised from the *sukuk* issuances are utilized mainly for green *Shariah* compliant projects. Profits

[5] Whereas sukuk investors believed that they had recourse on the underlying sukuk assets, their rights actually depend on local laws and their strength in the country where the collateral is contested.

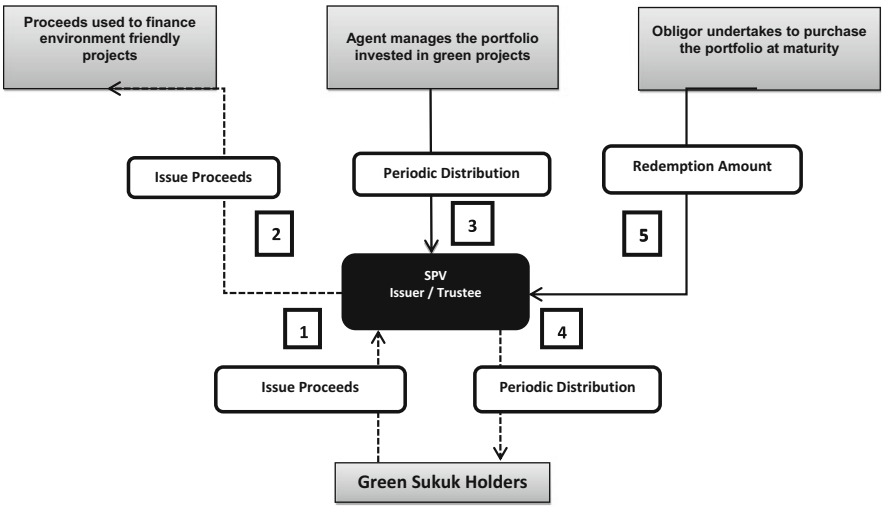


Fig. 10.1 Green *Sukuk* structure

from the portfolio after deducting the expenses of the Special Purpose Vehicle (SPV) are passed on to the *sukuk* holders. The Obligor also commits to purchasing the portfolio at maturity from the SPV. The purchase price is to be determined as the sum of aggregate nominal amount of trust certificate and accrued unpaid periodic distribution.

Assets that can be utilized for green *sukuk*, as defined by Climate Bond Standards certification,[6] include solar parks, biogas plants, windfarms, ambitious plans to promote energy efficiency, renewable transmission and infrastructure, electric vehicles and light rail, among others.

10.3.1 Value Proposition of Green *Sukuk*

In an effort to facilitate the green bond concept, a Green *Sukuk* Working Group was established in 2012 by the Climate Bonds Initiative, the Clean Energy Business Council (CEBC) of the Middle East and North Africa,[7] and the Gulf Bond and *Sukuk* Association.[8] The mandate of this working group was to identify green energy projects that fall under the *Shariah*-compliant categories for potential investors. In late 2012, two Australian solar companies, Solar Guys International and Mitabu Australia, initiated a 50 MW photovoltaic project in Indonesia by way of a green *sukuk* structured in Malaysia. The project, which is fully funded under a

[6] http://standards.climatebonds.net/

[7] http://www.cleanenergybusinesscouncil.com/

[8] http://www.gulfbondsukuk.com/

Power Purchase Agreement (PPA) model, is the first phase of the 'One Solar Watt per Person' program in Indonesia.[9] The solar project commenced in July 2015 and will require up to a $550 million of financing, and the first phase of the project will be funded through an offer of a $150 million of green *sukuk*.

Most recently, efforts for developing the green *sukuk* sector are being spearheaded by authorities in Malaysia and Dubai in the United Arab Emirates. The Dubai Supreme Council of Energy (DSCE)[10] and the World Bank have joined together to design a funding strategy for Dubai's green investment programme using both green bonds and *sukuk*. The DSCE has a green investment programme in place since 2010 as part of the Dubai Integrated Energy Strategy (DIES) 2030 that aims to secure a sustainable supply of energy for the Emirate. Dubai has a target of drawing 1 % of its energy needs through solar means by 2020 and green *sukuk* would play a crucial role in arranging the necessary financing required to implement the various green projects.

In Malaysia however, the involvement of the Islamic financial sector in the Green economy had already begun a number of years before. Green technology has been identified as a major growth area by the Malaysian government under the National Green Technology Policy in 2009. Following this, a number of government-led initiatives have been implemented with a view to position the country as a hub for green technology by 2020.[11] Recently, Khazanah Nasional Bhd, a government investment arm, is considering issuing a benchmark sized ringgit-denominated *Sukuk* to finance expansion in its education or renewable energy businesses.[12]

Green *sukuk* instruments have several advantages over other private funding sources. Firstly, they represent a tradable capital market instrument, which has the potential to allow for transferability and ease of exit. Secondly, green *sukuk* can be based on a pool of portfolio projects, which allows for risk diversification. This could be a way to address the current economic feasibility challenges in renewable energy positioning.

10.3.2 Green *Sukuk* Financing

Investing through green *sukuk* represents an untapped financing means for MENA countries which are at the forefront of Islamic finance. As green *sukuk* signifies a good mix between the positive features of green bonds (with their ethical environment-friendly orientation) and the attractive features of Islamic finance (with its asset-backed attributes), they ought to have growing demand in the near

[9] http://www.thestar.com.my/Story/?file=%2F2012%2F12%2F21%2Fbusiness%2F12487431

[10] http://www.dubaisce.gov.ae/default.aspx

[11] http://www.greentechmalaysia.my/

[12] http://www.bloomberg.com/news/articles/2014-11-25/malaysia-green-sukuk-gets-khazanah-debut-boost-islamic-finance

future. Green *sukuk* are a great opportunity to fund climate-friendly projects particularly in the field of renewable energy generation. In various Arab countries, power demand has risen by about 6 % annually over the last 10 years. In 2020, electricity demand is expected to be 84 % higher than 2010 levels, which would require the installation of an additional 135 GWh of generation capacity, costing approximately $450 billion.[13] At the same time, with increasingly scarce fossil fuels and the availability of climatic comparative advantages favoring wind and solar power generation,[14] Arab countries are aiming to increase renewable energy generation from 12 GWh in 2013 (representing only 6 % of power generation) to about 75 GWh by 2030 to meet the energy gap that exists in these economies.

Given the huge potential of the *sukuk* market, green *sukuk* are well positioned to tap the under-exploited environment-friendly sector. Considering the breadth of projects and assets that can be financed by *sukuk* and the scope of both conventional and Islamic buyers, a green *sukuk* issuance presents itself as an important vehicle to also support environmentally conscious efforts. Evidently, the support of green projects by Islamic real estate and private equity investors can be encouraged.

Another area where green *sukuk* can tap in is to provide funding for renewable energy generation or to implement large-scale energy efficiency measures in cities and industries. Issuing climate *sukuk*, which are long-term securities that are specifically issued to finance climate mitigation and adaptation projects, could create stable returns for long-term investors. The issuer guarantees repayment of the debt plus a rate of return after a certain period of time. The Abu Dhabi English-language publication, the National, reports that "green *sukuk* could provide as much as $300 billion for projects to combat climate change."[15]

Climate *sukuk,* as a proponent of green *sukuk,* will provide new avenue for governments and corporate entities in the MENA region to raise capital for a low carbon economy which will allow them to rely on renewable energy sources, such as solar and wind, to meet local electricity demand. Green *sukuk* would provide the necessary financing for investments in renewable energy generation and higher efficiency buildings and factories. Even climate change adaptation measures may qualify for funding through a green *sukuk* by virtue of stable, long-term returns.

Promoting climate *sukuk* is designed to attract Islamic funds under management to investments in low carbon transitions in the MENA region. Such funds are becoming attractive at a time when alternative financing scenarios have so far not materialized sufficiently to provide the kind of sustained funding needed to invest in carbon emission reduction or climate adaptation at a pace and at a scale large enough to make a strong impact in combating climate change.

It is anticipated that the presence of tangible assets and sovereign backed revenue streams like the power purchase agreement model, would be attractive to

[13] International Renewable Energy Agency and League of Arab States, Pan-Arab Renewable Energy Strategy 2030: Roadmap of Actions for Implementation (Abu Dhabi 2014).

[14] Pan-Arab Renewable Energy Strategy 2030: Roadmap of Actions for Implementation.

[15] http://www.thenational.ae/business/industry-insights/finance/dubai-targets-a-green-sukuk

investors generally and facilitate the Islamic structuring. The concept of a green *Sukuk* has the potential to build a pioneering bridge between the traditional socially responsible markets and those of Islamic finance. Additionally, green *sukuk* can provide an opportunity for Islamic finance to demonstrate its tangible impact and authenticity both within and beyond Muslim markets and the global socially responsible investment community. Given the recent announcement for a UK sovereign *sukuk* and the pre-existing investment relationship between the UK Green Investment Bank and Masdar,[16] it will be interesting to see whether the proposed sovereign *sukuk* addresses the move towards a 'low carbon economy' through environmentally friendly projects. The UAE is expected to issue the world's first *Shariah*-compliant bond aimed at financing green energy projects in 2015.[17]

10.4 Case Study of Green *Sukuk*: Orasis *Sukuk* (France)

The production of nonpolluting energy is essential for sustainable development and represents an ecological, economic socially responsible investment. With rising electricity prices and falling technology costs, investment in renewable energy is also becoming more profitable. The first green *sukuk* was issued in France in August 2012 by Legendre Patrimoine (an investment company specialized in solar energy and real estate investments) and Anouar Hassoune Conseil (an Islamic finance consultancy firm offering financial, brokerage, project management, and training advisory services). The *sukuk* termed "Orasis Green *Sukuk*" is backed by renewable energy assets and is the first structure in France where Islamic certificates are open for investment to private individuals as well as institutional investors.[18]

In France, the first issued *sukuk* was issued in the same year as the financing of a 500,000 € sharia-compliant catering SME (Zawya, Thomson Reuters).[19] The gradual progress of Islamic finance in France is derived from the strong support of regulatory environment conducive to this type of activity (Paris Europlace 2011). In 2011, a series of legal and tax adjustments were introduced into the financial system that was designed to integrate Islamic finance transactions and ensure tax neutrality with respect to conventional finance. Furthermore, investment in the renewable energy sector accrued tax exemption benefits for the *sharia*-compliant Orasis *sukuk* under the Industrial Law Girardin, which allows a direct reduction of

[16] http://www.greeninvestmentbank.com/news-and-insight/2013/green-investment-bank-and-masdar-to-form-new-investment-alliance/

[17] http://www.thenational.ae/business/economy/uae-set-to-be-the-first-to-offer-green-energy-sukuk

[18] "Orasis" is a Greek word for "vision", and the Orasis *sukuk* literally translates to visionary green sukuk.

[19] This *sukuk* had a 5-year maturity offering an expected annual return of 8 % and was structured as an asset-backed hybrid instrument through a private placement *Mudaraba* contract.

payable tax spread over a number of years.[20] Under this law, Orasis investors would benefit from the maximum tax reduction if they hold the investment for 10 years, albeit an earlier exit is also possible but with a less competitive tax treatment (Hassoune 2014).

The law was promulgated to encourage green investments in France, which lags behind other European countries in terms of meeting quotas for clean energy production.[21] The Directive 2009/28/EC on renewable energy had set 2020 targets for European Union countries to reach a 20 % share of total energy consumption from renewable sources (Intelligent Energy Europe 2011; The Guardian 19 June 2012), but only three EU member states (Bulgaria, Estonia, and Sweden) have so far met their 2020 targets (KPMG International 2014).[22] France even scaled up its target from 23 % by 2020 under the Directive 2009/28/EC to 32 % by 2030 under a recent energy transition law (Renewable Energy, November 18, 2014). Thus, more investment in renewable energy may be expected by EU countries in the years to come, especially that government incentives to invest in renewable have increased globally by 11 % in 2012 to reach $101 billion (KPMG International 2014).

Additional legislative support for solar energy production in particular came from the Ministry of the Environment and the Ministry of the Economy in France by bringing major changes to the tariff structure in 2011 for all sizes of installation (Intelligent Energy Europe 2011). Tariffs for this were lowered by 20 % and an automatically recurring digression was introduced to potentially decrease tariffs by 33 % annually. Against this background, the Orasis *sukuk* invested in photovoltaics to convert solar energy into electricity, employing solar panels to supply power. The financial instrument is certified by the *sharia* board of the European Independent Committee of Islamic Finance [Comité Indépendant de Finance Islamique en Europe (CIFIE)] and is subject to a biannual *sharia* audit by CIFIE to ensure permanent compliance (CIFIE 2012).[23]

Figure 10.2 depicts the Orasis *sukuk* structure and Fig. 10.3 provides a summary diagram for it.

From Fig. 10.2 point A, it can be seen that investors purchase Islamic certificates that are issued by a Joint Venture ("Société En Participation") and Limited Liability Companies ("Société à Responsabilité Limitée") in the form of a *musharaka*-cum-*ijara* (equity and leasing) structure (Hassoune 2014). These share subscriptions by investors represent ownership rights green renewable energy investments, including a solar panel manufacturing plant.

[20] Other support schemes for renewable investments include allowing a declining tax depreciation method on the assets' expected life (KPMG International 2014).

[21] The share of total energy consumption from renewable sources in France was 12.4 % in 2009 (Intelligent Energy Europe 2011).

[22] The EU increased its share in renewable energy in total consumption from 9 % in 2006 to 12.4 % in 2010.

[23] Based in Paris and in the context of the efforts of the French government to create a legal framework to accommodate the industry, the CIFIE bring answers and solutions to integrating Islamic Finance in France and Europe.

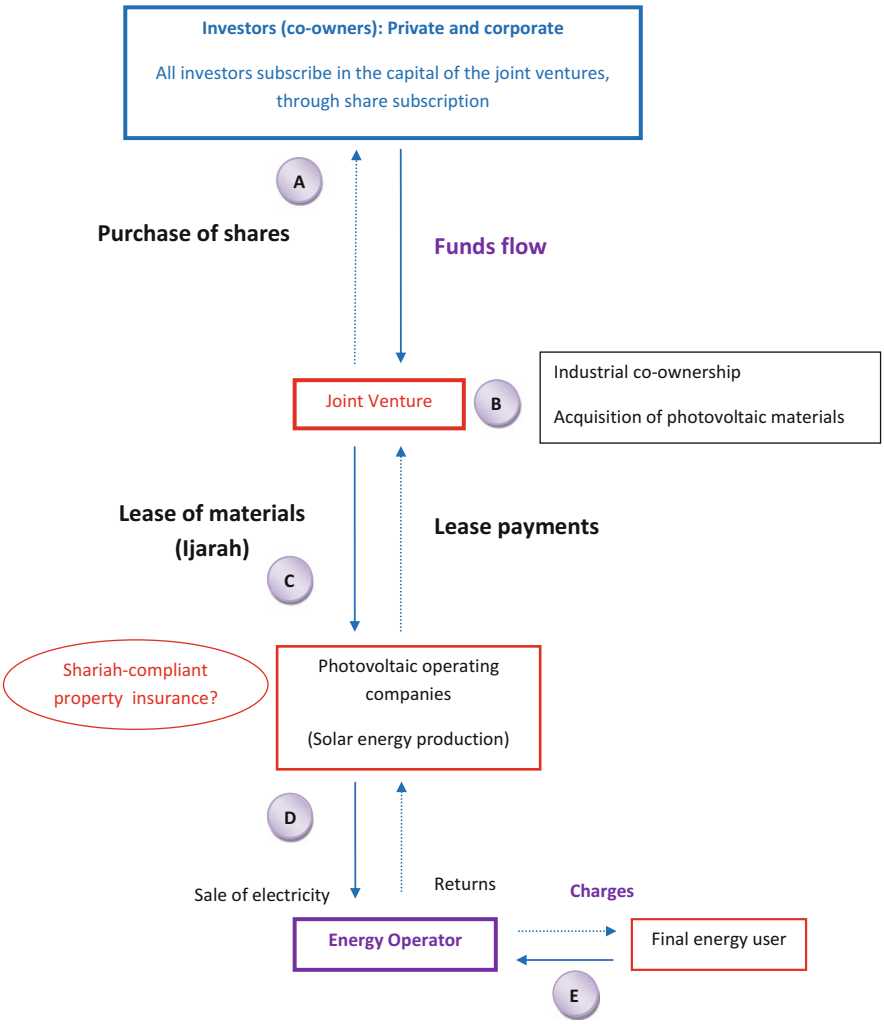


Fig. 10.2 Outline of the Orasis *Sukuk*, adapted from CIFIE (2012)

The price of each ordinary share was set at 5890 € in Metropolitan France and 5425 € in the overseas territories of France (DOM-TOM), these figures are inclusive of tax. Therefore, the *sukuk* offering becomes available to both individual and institutional investors. Depending on the number of shares bought, investors became part owners of a number of solar farms, each varying in cost between 60,000 € and 2,000,000 € based on the size of the solar panels (Hassoune 2014). The ethical and green *sukuk* investment was very well received by investors because it invested in the domestic economy and not abroad or in highly speculative and complex derivatives.

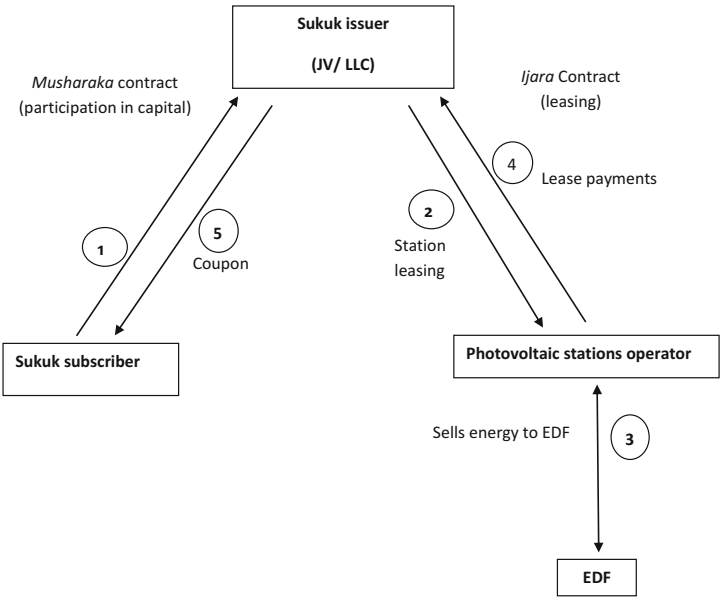


Fig. 10.3 Summary of the flow of funds in the Orasis *Sukuk* structure

Using the *sukuk* financing raised from investors, the Joint Venture company acquired the photovoltaic materials (Fig. 10.2 point B). These solar panels funded through the *sukuk* were then leased to three green energy operating companies (France Energies Finance, Solstice, and P. Volteus[24]) through an *ijara* contract that provides the investment vehicle with periodic rental payments (Fig. 10.2 point C). These cash flows allow for a semi-annual distribution of returns or dividends to *sukukholders* that are set at 7 % per annum and maximized from a tax perspective (Hassoune 2014).[25] The duration of the lease is for 15 years after the photovoltaics material is provided.

In turn, the clean energy operating companies contracted a 20-year agreement to sell the green energy (Fig. 10.2 point D) produced to Electricité de France (EDF), the French energy company, at a pre-agreed rate (World Economic Islamic Forum 2013). Finally, EDF can sell the energy produced to the final user through its existing distributional network (Fig. 10.2 point E).

Figure 10.3 illustrates the flow of financing from the *sukuk* investor (point 1) to the energy operating companies (point 2) through the *sukuk* issuer in the form of *musharaka* or participation in capital, and then from the EDF back to the energy

[24] France Energies Finance integrates a wide array of innovative renewable energy solutions (solar, wind, geothermal, hydro-electric, and biomass); Solstice engineers and develops green energy investment and ethical investment solutions; and the engineering company P. Volteus is committed to green energy production in partnership with energy producers.

[25] Returns are tax free for the first 10 years beyond which a 71 % tax cut is applicable.

operating companies through a sale contract (point 3). This uses the funds received to make lease payments (point 4) to the *sukuk* issuer for final coupon payment to be received by *sukuk* investors (point 5). The returns are passed on to *sukuk* investors on a pro rata basis based on the shares they own in the joint venture or the percentage of joint ownership of the photovoltaics.

Thus, the energy operating companies as lessors of solar panels operate the photovoltaics material, sell green energy, and capture the residual margin. In this structure, the EDF energy sale contract represents a guarantee of contractual returns to *sukuk* holders. Its obligation to buy any quantity of green energy produced at a guaranteed tariff over a long period of time is a security for *sukuk* investors.

Finally, the capital is partially guaranteed by a purchase promise after 10 years at 87 % of principal (Hassoune 2014), but an investor who is concerned with *sharia* compliance can alternatively sell his or her *sukuk* shares at the market or negotiated price upon exit. The *Sharia* board CIFIE had made it clear that the option to sell shares cannot be exercised at a pre-agreed price but rather at the market price or another agreed price at the end of the holding period. The originality of the Orasis *sukuk* is that through its twin social responsibilities, it meets the requirements set out through *sharia* compliance and while at the same time committing to an ecological and sustainable green energy investment.

Despite its appeal, however, the investment was not deemed successful 2 years into its issuance (Hassoune 2014). From an expected issue amount of around 40 million euros (Islamic Financial Times, August 9, 2012), only 14,000 € was sold to investors (Rassameel Structured Finance 2014). A number of factors could explain the green *sukuk* performance, including issuance timing, liquidity, redemption value, and certification of compliance. In addition to this, the Orasis *sukuk* was issued at a time where Europe was still struggling with the aftermath of the global financial crisis. Retail investment became scarcer in a deflationary and low-growth environment in Europe. Other contributing factors include the relative illiquidity of the product, the below par redemption value at best (Hassoune 2014),[26] and a failure to re-certify the *sharia* compliance of the investment on a regular basis (Islamic Financial Times, December 17, 2014). Notwithstanding these setbacks, the features of this green *sukuk* were a first of their kind. The positive and negative lessons of this initial French experience may well provide the basis for developing broader *Sharia*-compliant solutions to green investments.

10.5 The Way Forward

This chapter introduces a means by which environmentally conscious investors can bring personally held Islamic values into their investing practices. The first of its kind, the green *sukuk* is an investing instrument that promotes large-scale

[26] The structure carried a buy-back promise after 10 years of 87 % of the principal, with some Shariah questions surrounding such a promise.

involvement along environmentally friendly grounds in countries and markets, which hitherto have primarily been focused on capital allocation that abides by traditional Islamic principles. As the need to finance sustainable energy projects at an acceptable cost grows, capital market options such as green *sukuk* offer a plausible investing solution. In this chapter, we propose that green *sukuk* can follow a trail that is well worn by conventional socially responsible investments securities but yet has the capacity to penetrate economies which are traditionally not associated with these types of investing practices such as the Gulf States and Malaysia. As *Sukuk* is a preferred instrument choice amongst GCC sovereign-related entities and corporates, it can be used as a vehicle to finance the region's current ambitious renewable energy and infrastructure projects. Conversely, the presence of the green *sukuk* also allows the focus to shift outward to western economies, as explored in the case of the Orasis *sukuk*. This offers the possibility for investors from the Islamic world to pursue their environmental investing goals in areas outside of the Islamic sphere of influence. By definition, the climate crisis is a global phenomenon, and its resolution can only be achieved through efforts on that scale. Green *sukuk* have the potential to allow the *Shariah*-compliant investor to fully participate in this endeavor.

References

9th World Economic Islamic Forum (2013) Changing world, new relationships, world economic Islamic forum foundation, ExCeL London. http://www.newsdeskmedia.com/Images/Upload/PDFs/9th-WIEF-2013.pdf. Accessed 1 Feb 2015

Abdelsalam O, Duygun Fethi M, Matallín Sáez JC, Tortosa-Ausina E (2014) On the comparative performance of socially responsible and islamic mutual funds. J Econ Behav Org 103:S108–S128

Brammer S, Brooks C, Pavelin S (2006) Corporate social performance and stock returns: UK evidence from disaggregate measures. Financ Manage 35:97–116

Comité Indépendent de Finance Islamique en Europe (CIFIE) (2012) Shariah Compliant Sukuk scope: renewable energy Sukuk for Legendre Patrimoine. www.cifie.fr. Accessed 30 Jan 2015

Derigs U, Marzban S (2008) Review and analysis of current *Shariah*-compliant equity screening practices. Int J Islam MiddleEastern Financ Manage 1(4):285–303

Dubai Supreme Council of Energy (2015) http://www.dubaisce.gov.ae. Accessed 10 June 2015

Ernst and Young (2011) Islamic funds and investments report 2011: achieving growth in challenging times

Forte G, Miglietta F (2007) Islamic mutual funds as faith-based funds in a socially responsible context. Technical Report, Social Science Research Network. doi:10.2139/ssrn.1012813. Available at SSRN: http://ssrn.com/abstract=1012813

Fowler SJ, Hope C (2007) A critical review of sustainable business indices and their impact. J Bus Ethics 76(3):243–252

GIB (2015) Green Investment Bank—GIB and Masdar to form new investment alliance. http://www.greeninvestmentbank.com/news-and-insight/2013/green-investment-bank-and-masdar-to-form-new-investment-alliance/. Accessed 10 June 2015

Global Sustainable Investment Review (2012) Global sustainable investment alliance (GSIA). http://gsiareview2012.gsialliance.org/pubData/source/Global%20Sustainable%20Investement%20Alliance.pdf

Goldreyer EF, Ahmed P, Diltz JD (1999) The performance of socially responsible mutual funds: incorporating sociopolitical information in portfolio selection. Manage Financ 25(1):23–36
Gregory A, Matatko J, Luther R (1997) Ethical unit trust financial performance: small company effects and fund size effects. J Bus Financ Account 24(5):705–725
Guerard JB (1997a) Additional evidence on the cost of being socially responsible in investing. J Invest 6(4):31–35
Guerard JB (1997b) Is there a cost to being socially responsible? J Invest 6(2):11–18
Haigh M, Hazelton J (2004) Financial markets: a tool for social responsibility? J Bus Ethics 52 (1):59–71
Hamilton S, Jo H, Statman M (1993) Doing well while doing good? The investment performance of socially responsible mutual funds. Financ Anal J 49:62–66
Hassoune A (2014) Green *Sukuk*: from the initial French experience to broader *Shari'a*-compliant solutions. In: World Islamic banking conference 2014, Proceedings, Bahrain
Hayat R, Kraeussl R (2011) Risk and return characteristics of Islamic equity funds. Emerg Mark Rev 12(2):189–203
Hussain M, Shahmoradi A, Turk R (2015) An overview of Islamic finance. IMF Working Paper WP/15/120. International Monetary Fund, Washington, DC
IFSB (2013) Islamic financial services industry stability report. IFSB, Kuala Lumpur
Intelligent Energy Europe (2011) Renewable energy policy country profiles. http://www.reshaping-res-policy.eu/downloads/RE-Shaping_CP_final_18JAN2012.pdf. Accessed 31 Jan 2015
International Monetary Fund (2015) Islamic finance: opportunities, challenges, and policy options. IMF staff discussion note SDN/15/05. International Monetary Fund, Washington, DC
IRENA (2014) Pan-Arab renewable energy strategy 2030: roadmap of actions for Implementation. IRENA, Abu Dhabi
Islamic Financial Times (2012) Les premiers *sukuk* en France. Interview with Anouar Hassoune, 9 Aug 2012. http://www.islamicfinancialtimes.net/article-les-premiers-*sukuk*-en-france-anouar-hassoune-pour-l-islamic-financial-times-108959835.html. Accessed 7 Feb 2015
Islamic Financial Times (2014) Finance Islamique France: *Sukuk* Orasis, Islamic Financial Times invite à la VIGILANCE. http://www.islamicfinancialtimes.net/finance-islamique-france-*sukuk*-orasis-islamic-financial-times-invite-a-la-vigilance. Accessed 8 Feb 2015
KPMG International (2014) Taxes and incentives for renewable energy. KPMG International Cooperative, Switzerland
Lukonga I (2015) Islamic finance, consumer protection, and financial stability. IMF Working Paper WP/15/107. International Monetary Fund, Washington, DC
Luther RG, Matatko J, Corner DC (1992) The investment performance of UK ethical unit trusts. Account Audit Account J 5:57–70
Malaysia Green *Sukuk* Gets Khazanah Debut Boost: Islamic Finance—Bloomberg Business. 2015. http://www.bloomberg.com/news/articles/2014-11-25/malaysia-green-*sukuk*-gets-khazanah-debut-boost-islamic-finance. Accessed 10 June 2015
Mallin C, Saadouni B, Briston R (1995) The financial performance of ethical investment trusts. J Bus Financ Account 22(4):483–496
Nitsche C, Schröder M (2015) Are SRI funds conventional funds in disguise or do they live up to their name? ZEW Centre for European Economic Research Discussion Paper No. 15-027
Norton Rose Fulbright (2015) Capital markets: an alternative financing avenue for the shipping industry/Norton Rose Fulbright. http://www.nortonrosefulbright.com/knowledge/publications/63569/capital-markets-an-alternative-financing-avenue-for-the-shipping-industry. Accessed 10 June 2015
Novethic (2009) Islamic finance and SRI: any crossover? https://www.responsibleinvestor.com/images/uploads/resources/research/11248094270Working_paper_on_islamic_finance_and_SRI.pdf
Paris Europlace (2011) Issuing and listing *Sukuk* in France how to take advantage of the attractive french legal and tax environment (November), French *Sukuk* Guidebook, Paris EUROPLACE

Islamic Finance Law Committee. http://www.paris-europlace.net/files/French_*Sukuk*_Guidebook_Nov_2011.pdf

Perks RW, Rawlinson DH, Ingram L (1992) British accounting review. Br Account Rev 24 (1):43–65

Rassameel Structured Finance (2014) 2013 Annual Global *Sukuk* Report, Rasameel Investment Bank Limited. http://www.rasameel.com/downloads/RSFGlobal*Sukuk*MarketAnnual2013.pdf. Accessed 7 Feb 2015

Renewable Energy (2014) France ploughs ahead with renewable energy while Australia scales back clean energy policies. In: Renewable Energy World (eds), 18 Nov 2014. http://www.renewableenergyworld.com/rea/news/article/2014/11/france-ploughs-ahead-with-renewable-energy-while-australia-scales-back-clean-energy-policies. Accessed 1 Feb 2015

Rudd A (1981) Social responsibility and portfolio performance. Calif Manage Rev 23(4):55–61

Schepers DH (2003) A critique of social investing's diversity measures. Bus Soc Rev 108 (4):487–508

Statman M (2000) Socially responsible mutual funds. Financ Anal J 56:30–39

The Guardian (2012) Renewable energy in the EU: which countries are set to reach their targets? by Ami Sedghi, June 19, 2012. http://www.theguardian.com/news/datablog/2012/jun/19/renewable-energy-consumption-eu-targets. Accessed 3 Feb 2015

The National (2015) UAE set to be the first to offer green-energy *Sukuk*. http://www.thenational.ae/business/economy/uae-set-to-be-the-first-to-offer-green-energy-*sukuk*. Accessed 10 June 2015

The Star Online (2015) www.thestar.com.my/Story/?file=%2F2012%2F12%2F21%2Fbusiness%2F12487431. Accessed 10 June 2015

Thomson Reuters (2014) Thomson Reuters Sukuk perceptions and forecast 2015. Islamic Finance Gateway

WIEF (2015) http://wief.org/wp-content/uploads/2014/12/The-Growth-of-Islamic-Finance-by-Dr-Osman-Babiker-Ahmed.pdf. Accessed 10 June 2015

Islamic Finance Versus Conventional Finance

11

Özgür Arslan-Ayaydin, Mohamed Bejaoui, André B. Dorsman, and Khurram Shahzad

Abstract

Transactions in Islamic Finance (IF) are guided by ethical, moral, and social considerations. Moreover, according to IF money should be used to create social value. With regard to these point of views, IF aligns with Socially Responsible Investing (SRI), which refers to the combination of social, environmental and ethical requirements when making financial investment decisions. In contrast to conventional finance (CF) where the investments are solely focused on risk and return, SRI and IF have also a social value component. The main question in this chapter is; when one decides to invest in or issue bonds following the rules of, does such a decision influence the financial risk-return window? In this study we compare Sukuk (Islamic bonds) and conventional bonds and find that, after correcting for risk, the returns on Sukuk are significantly higher than those of conventional bonds. Our conclusion is that investors are not paying for being ethical, but issuers of Sukuk bear a higher cost of debt compared to issuers of conventional bonds.

Ö. Arslan-Ayaydin (✉)
University of Illinois at Chicago, Chicago, IL 60607, USA
e-mail: orslan@uic.edu

M. Bejaoui
1040 AV, Amsterdam, The Netherlands
e-mail: m.bejaoui@hotmail.nl

A.B. Dorsman
Department of Finance, VU University Amsterdam, 1081 HV, Amsterdam, The Netherlands
e-mail: a.b.dorsman@vu.nl

K. Shahzad
VU University Amsterdam, HA7-75, 1081 HV, Amsterdam, The Netherlands
e-mail: k.shahzad@vu.nl

A. Dorsman et al. (eds.), *Energy and Finance*, DOI 10.1007/978-3-319-32268-1_11

Keywords
Islamic finance • Sukuk • Sustainability

11.1 Introduction

In the conventional finance world the risk free rate is a compensation for time, hence a dollar now has a higher value than the dollar over a year. On top of that, investors require additional return for any additional risk. In the Christian society interest (risk free rate) was not always accepted. For example bible mentions about charging interest as: "If you lend money to one of my people among you who is needy, do not treat it like a business deal; charge no interest" (Exodus 22:25). In the sixteenth century Maarten Luther[1] was a strong opponent of charging interest, while the Roman Catholic church accepted the idea that interest was paid as compensation for the time.[2] In Islamic Finance (IF) interest is called as "riba" and it is also forbidden according to the Islamic principles. However, the risk free rate is a financial reality and any potential prohibition on charging interest is likely to have serious consequences on the (financial) operations. Therefore, prohibition of interest forced financial institutions to look for alternative solutions.

The research question of this chapter is whether the prohibition of a risk free rate leads to another expected return—risk schedule. We can look this comparison from two sides, namely from the perspective of the investor as well as from the perspective of the issuer. From the investors' point of view the question is: Do investors have a higher expected return on a Sukuk compared to conventional bonds? In that case the difference between the return on Sukuk and on the conventional bonds is the "price for being ethical".

Looking from the issuers' side the question is: Do issuers accept a higher cost of debt on Sukuk compared to a conventional bond? If so, the return on a Sukuk will be higher than on a conventional bond.

A potential problem is that Sukuk are presented as Islamic certificates, which is equity. The cost of equity is higher than the cost of debt which means that the expected return on Sukuk will also be higher than the expected return on conventional bonds. In Sect. 11.2 we discuss this point and show that the Sukuk are a special type of bonds, specifically income bonds, and not equity. An income bond is a bond with coupon payments that depend on the earnings of the issuing company. The risk of an income bond is higher than that of a bond with fixed coupon payments. Sukuk are used for low risk investments and therefore the coupon payments on Sukuk are—nearly—fixed and the additional risk for the dependency of the coupon payment from the earnings of the company is very low. In this study, we assume that this additional risk is zero.

[1] Maarten Luther was a protestant church father from the sixteenth century who turned against the Roman Catholic church.

[2] Visser (2008) gives an historical overview of interest rate free financing.

In Sect. 11.3 we provide an overview of the literature on Sukuk and show that Sukuk are a form of financing instruments that fits with the ideas of sustainability. In Sect. 11.4 we formulate our hypothesis and elaborate the methodology to test our hypothesis. Section 11.5 describes the data collection process. The results of our empirical research are presented in Sect. 11.6. Section 11.7 contains a brief summary and our conclusions.

11.2 Sukuk: Equity or Bond

Hassoune (2014) describes a Sukuk as follows:

> Sukuk are often considered to be close to "Islamic bonds". The concept of Sukuk is however broader than that of bonds. Sukuk are trust and/or investments certificates, themselves representing shares of an investment vehicle, which in turn invests in tangible assets (like real estate, land, industrial assets or projects), generating revenues. Such revenues are then served, in the form of periodic distribution amounts, to the owners of the shares, i.e. to Sukuk holders. Such returns are not interest (riba), as they do not compensate investors for the only fact that time is passing; on the contrary, returns compensate investors for the economic ownership of the tangible assets serving in the real economy.

Here we see the struggle surrounding this concept. From religious reasons it is not correct to label Sukuk as an Islamic bond, because of the prohibition of the riba and given that bond represents a debt security. However, in all means one can view Sukuk as a debt and not equity. A debt is a right on cash flows. The issuer of a debt has the obligation to make regular payments to the debtholder. Such an obligation does not exist for equity. The issuer of a Sukuk has—when the investment generates adequate cash flows—the obligation to pay the Sukuk holders. Due to this liability the Sukuk resembles a debt.

The yield to maturity of a bond issued by a company is not only the risk free rate but also a compensation for risk and the maturity of the issue. When the special requirements for Sukuk are regarded, Sukuk can be viewed as an income bond. Income bonds are the ones on which the borrower will only pay interest if profit levels in a specific year are sufficient. The actual definition of sufficient is described in the indenture. Repayment of the principal is independent of company results. The larger the fluctuation in company results, the greater the risks for the (income) bondholder. The cost of debt of an income bond will be higher than the cost of debt of an ordinary bond issued by the same company. The difference in interest is a compensation for the higher risk. Due to the absence of a risk free rate issuers of Sukuk want to reduce the risk of Sukuk to create an instrument that is (nearly) risk free. Therefore the risk levels of Sukuk are mostly very low, the additional compensation (for the higher risk) is very small. The cash flow from a Sukuk is therefore not substantially higher than an ordinary bond from the same issuer. In other words, due to the low risk levels of Sukuk they are technically income bonds, but in practice plain-vanilla bonds, with a fixed coupon rate and fixed maturity.

Deloitte (2012) writes in a document that Sukuk is an Arabic word that means "certificates". The document refers to the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) that defines Sukuk as being:

> Certificates of equal value representing after closing subscription, receipt of the value of the certificates and putting it to use as planned, common title to shares and rights in tangible assets, usufructs and services, or equity of a given project or equity of a special investment activity.

This statement is followed in the Deloitte document by the sentence:

> Sukuk are Islamic 'debt' instruments, which can be issued by governments, local authorities or public companies.

We believe that for commercial reasons Deloitte accepts the definition of Sukuk as given by the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) although it is in violation with the general accepted IFRS rules about debt and equity.

From a finance perspective a Sukuk is a bond with special conditions. The desire to avoid any reference to interest is the reason to call a Sukuk a certificate. A certificate, however, is a share without voting rights and it is equity. As it is already mentioned, Sukuk are not viewed as an equity, but debt. Although the label of debt or equity is not significant, it is just a subtle example to demonstrate the struggle surrending this concept. Bonds are associated with interest payments; therefore Sukuk cannot be a regarded as a bond.

Sukuk should be able to link the returns and cash flows of the financing to the assets purchased, or the returns generated from an asset purchased. This is because trading in debt is prohibited under Shariah. As such, financing must only be raised for identifiable assets. Moreover, the conventional interest paying bond structure is not permissible, the issuer of a Sukuk sells an investor group the certificate, who then rents it back to the issuer for a predetermined rental fee. Investors who purchase Sukuk are rewarded with a share of the profits derived from the underlying asset. Additionally, the issuer also makes a contractual promise to buy back the bonds at a future date at par value.

Miller et al. (2007), argues that Sukuk are structured to generate an equal return as a conventional bond, raised from an underlying asset, rather from the obligation to pay interest. Conventional bonds are securities where borrowed money has to be repaid with interest at a fixed rate. Sukuk controversially, are fixed income securities that are permitted within the provisions of Islamic Shariah law as they are raised, as mentioned above, on trading in, or construction of, specific and identifiable assets. Tahmoures (2013) believes that a fundamental difference between the two securities is that bonds are a proof of debt, whereas Sukuk are proof of ownership. However despite the aforementioned differences between Sukuk and conventional bonds, Miller et al. (2007) believe that Sukuk and their returns mimic features of conventional bonds. We agree with Miller et al. and therefore in this study we will compare the Sukuk with conventional bonds.

11.3 Literature

Recently many authors looked at the differences in the performance between Islamic and conventional stocks and bonds; before, during and after the Global Financial Crisis started in the summer of 2007.[3] The main conclusions of these studies are that before and after the financial crisis the conventional stocks outperform the Islamic stocks, while during the financial crisis it was the other way around. Akhtar and Jahromi (2015) give as explanation that Islamic investors are forbidden to invest in so-called sub-prime mortgages and also in derivatives. The financial crisis of 2007/2008 started with a crisis in the sub-prime mortgages and was followed by a bank crisis. Also the derivatives market was very hardly hit. Therefore it is not surprising that the financial product that was forbidden to use as a tool for shifting of risk by derivatives did it better than financial products that were used in these areas. In contrast with these studies Sukmana and Kholdi (2010) found for Indonesia that the financial crisis of 2007 does not affect the mean returns of either stock index (conventional and Islamic) but the crisis affected the volatility of both indices and this effect is about 40 times stronger for the conventional stock index.

Akhtar and Jahromi (2015) studied stocks and bonds. In line with the other studies they find that the impact of the financial crisis on Islamic stocks was smaller than the impact on conventional stocks. However, between conventional bonds and Sukuk they could not detect a difference. A reason can be that—in line with the other studies—the authors are using conventional and Islamic indices (for stocks and/or bonds). The disadvantage of using indices is that the research takes place on an aggregate level. In this study we look at firm level, which gives us a better perspective on individual bonds.

However, we can also look at this topic from the issuer's point of view. A company that wants to follow the rules of the Shariah will issue a Sukuk although the conditions for conventional bonds are more attractive from a financial perspective. Ibrahim and Minai (2009) find for the Malaysian stock Exchange that the expected return on Sukuk is higher than that on conventional bonds. They also show that the abnormal return on the Sukuk is significantly influenced by the amount raised and the size of the issue.

Godlewski et al. (2011) find that on the Malaysian stock exchange the stock prices of the issuing companies react differently on the announcement date of conventional bonds and on Sukuk. There is no reaction in the stock prices on the announcement date of the conventional bond, but they show a negative reaction on the announcement of a Sukuk. The authors provide two explanations. The first explanation is based on adverse selection. Only less healthy firms prefer to issue Sukuk above a conventional loan. A weak company that does no longer have access to the conventional bond market, can always issue Sukuk. The second explanation

[3] See for example Akhtar and Jahromi (2015).

of Godlewski et al. is the excess demand for Sukuk from Islamic banks. In the Western economies banks are participating in the interbank market. However, because in the interbank markets you are paying or receiving interest on your positions, Islamic banks cannot participate in the interbank market. For the same reason, not allowed to pay interest, Islamic banks cannot borrow from the central banks in case of a temporary liquidity shortage. Islamic banks are using the Sukuk market as an alternative to the conventional interbank market and the access to Central banks. Therefore the vast majority of the Sukuk are held by Islamic banks. Due to the excess demand for Sukuk (by Islamic Banks), companies that no longer have access to the conventional markets can issue Sukuk. In other words, the additional return on Sukuk compared to conventional bonds can be a compensation for additional risk.[4]

Based on this discussion the returns on Sukuk can be lower, equal or higher than the returns on the conventional bonds. If Sukuk investors are setting the prices, the returns on Sukuk will be lower. If Sukuk issuers set the prices then the returns on Sukuk will be higher than that on conventional bonds. Furthermore, in case the market for Sukuk is not different form the conventional bond market, the returns on both markets will be the same. Theory does not give an indication. Empirical research has to disclose the answer whether the returns on Sukuk comparing with the returns on conventional both are lower, equal or higher.

11.4 Methodology

In this Sect. 11.4 we construct the hypothesis that the expected return on the Sukuk does not differ from the expected return on a conventional bond. The market is inefficient when the expected return on Sukuk deviates from the expected return of a conventional bond. Investors and issuers of bonds that decide only on expected return.

Although there is dispute amongst scholars on whether a Sukuk really differs from conventional bonds, it is generally acknowledged that one clear difference between conventional bonds and Islamic bonds is that the capital raised by the issuance of the latter is allowed to be invested in any type of investment. On the contrary, capital raised through Islamic bonds is restricted to ethical or Shariah compliant investments. This restriction might affect the return on the Islamic bond and therefore the wealth of the investors. This restriction is expected to have an impact on the required rates of returns. On the other hand the bond issuers can also follow the Shariah rules and accept a higher cost of debt on Sukuk compared to Conventional bonds. In order to investigate this issue we treat the difference between the return of conventional bonds and the return on Sukuk issued by firms who abide by the Shariah rules as a proxy for being an ethical investor.

[4] In our model we control for firm characteristics. However, it is still possible that our control variables do not cover the full set of firm specific risk factors.

We will test the following hypothesis:

H_0: *The expected returns on Sukuk do not differ from expected returns on conventional bonds.*

This is a two-side test. In other words, given the same default risk an expected return on sukuk must not be different than that on a conventional bond. Therefore we test the following equation:

$$\begin{aligned}\text{Spread}_i = {} & \beta_0 + \beta_1 \text{ISB}_i + \beta_2 \text{LnProceeds}_{i,t} + \beta_3 \text{Maturity}_{i,t} + \beta_4 \text{Debtr}_{i,t-1} \\ & + \beta_5 \text{MB}_{i,t-1} + \beta_6 \text{LnTA}_{i,t-1} + \beta_7 \text{Senior}_i \text{CountryDummies} \\ & + \text{YearDummies} + e_{i,t}\end{aligned}$$

In the equation t is the day of issuing and $t-1$ is the end of the latest financial year.

The dependent variable of this model is *Spread*, defined as the yield to maturity on a bond at its issue less the yield to maturity on the treasury security of the similar maturity.[5] ISB, our variable of interest, is a dummy variable that indicates whether a bond is a Sukuk or a conventional bond. As we hypothesize that investors pay for being ethical when they invest in Sukuk, we predict the coefficient on ISB to be negative.

Consistent with Jiang (2008) and Sengupta (1998), we also control for following variables that are identified in the literature to have effect on the spread of a bond.

LnProceeds

This variable represents the natural log of the total amount of issue of a bond. Larger bonds are generally more liquid, therefore investors require lower yield on these bonds (Jewell and Livingston 1998). We expect a negative coefficient of *LnProceeds*.

Maturity

We use this variable to control for the length of the maturity of a bond. Literature shows that the maturity of the bond positively correlates with its risk premium. Put differently, while calculating the yield to maturity (YTM) of a bond, one must add the maturity premium to risk free rate and default premium. Therefore longer is the maturity of a bond higher is the YTM. This assumption lies under the fact that a bond with a long expiration date leads to more exposure to price and interest fluctuations. We expect a positive coefficient of Maturity.

[5] We could not find the yield to maturity on treasury (YTM) securities issued in the countries included in our sample. Therefore, we deduct the YTM of US treasury securities from the YTM of bonds included in our sample to compute Spread.

Debtr

Toy et al. (1974) show that firms with higher variability in earnings have a relatively lower debt ratio. In their study the variability reflects both business and financial risk. Thus the higher the debt ratio, the more leveraged the company is and the greater is the financial risk and thus a higher default risk (Becker and Milbourn 2011). The leverage is measured as long-term debt divided by the market value of equity. We expect a positive effect of *Debtr*.

MB

Our next control variable is the market to book ratio of a firm. This ratio represents the growth opportunities of the issuing firm. Firms with greater growth opportunities are considered to be more risky and therefore have higher yield on their issued bonds (Bhoraj and Sengupta 2003). Therefore, we expect a positive coefficient on *MB*.

LnTA

The log of total assets of the issuing firm is the measure of the company size. Larger firm are considered to be less risky and therefore likely to be associated with lower yields. Accordingly, the coefficient on *LnTA* is predicted to the negative.

Senior

The seniority of a loan is an indication of the right on the assets of the company in case of bankruptcy. A senior bond has a priority in having a claim on issuer's assets than the other (junior) bonds issued by the same company. So the senior bonds are less likely to default compared to junior bonds (Bhoraj and Sengupta 2003). We expect a negative coefficient of Senior.

In Table 11.1 we summarize the definitions of the variables.

Some other control variables are mentioned in the literature as well. For example, Wenxia and Jeong-Bon (2014) show that a coverage ratio and a profitability ratio are negatively associated with the risk premiums due to the fact that higher ratios lower the financial risk and therefore the default risk for bonds. Hand et al. (1992) show that the higher the bond rating the lower the default risk of a bond and consequently the lower the required rate of return. However, hardly any Islamic bond received a rating from S&P or Moody's so we cannot control for the risk of a bond as proxy of its credit rating.

All accounting ratios are based on the latest financial years that ended before the date of issue of a bond.

Another point is that, we look at the *Spread* on maturity, including the returns on issuing days. There is a variety of literature about underpricing in case of an IPO of stocks (see for example Ritter and Welch 2002; Dorsman and Gounopoulos 2014). There has been a less interest on the underpricing on the moment of issuing corporate bonds. Cai et al. (2007) compared IPOs (first time offerings on the bond market) and "seasoned" bond offerings (SBOs). In case of an SBO the issuer has also other bonds listed on the bond market. Cai et al. (2007) find that the

Table 11.1 Variable definitions

Variable	Description
Spread	Difference between the bond's yield and that of the US treasury security of the similar maturity
ISB	Dummy variable, which is equal to 1 for Sukuk and 0 for conventional bonds
LnProceeds	Natural logarithm of the total proceeds of a bond issue
Maturity	Number of years to the maturity of the bond as of its issue date
Debtr	Book value of long term debt divided by the market value of common equity
MB	Ratio of the market value of common equity divided by the total assets
LnTA	Natural log of total assets of the issuing firm
Senior	Priority of bonds in having a claim on assets in an event of financial troubles

underpricing of an IPO is—on average—larger than of an SBO. Also the authors show that the underpricing increases with the risk of the company. Cai et al. (2007) state that firms that are riskier and unknown face a higher underpricing. The results of Liu and Magnan (2014) are in line with those of Cai et al. (2007). Both studies use US data. To our knowledge, there is no using non-US data.

11.5 Data

We extract our data from Bloomberg. Our sample runs from 2009 to 2015. Our analysis starts from 2009 because there are just two Islamic bonds issued before that year. We also limit our analysis to only those countries where firms have issued both the Islamic and conventional bonds. Our initial dataset consists of 7115 bonds, issued by 974 firms from 12 countries. The requirement of financial information reduced our sample to 4297 bonds. Of those 4297 bonds, the required bond specific information (e.g., yield spread and Maturity) is missing for 4113 bonds. Therefore, our final sample consists of 184 (144 conventional and 40 Sukuk) bonds issued by 61 unique firms from four countries, namely the United Arabic Emirates (UAE), Indonesia, Kuwait and Malaysia.

Due to the high number of missing variables our dataset of 7115 observations is reduced to 184 usable observations. Therefore, it is important to test whether the subset of 184 observations is a good indicator for the total set of 7115. Therefore we compare in Table 11.6 of the appendix the 184 observations in the subset with the total observations for the variables total assets and proceeds. Due to missing variables we had only 2743 other observations for the total assets and 7090 other observations for the proceeds. Based on the data of Appendix, we conclude that the total assets of the issuing companies in our subset, on average $6070 million, is substantial higher than the average for the other 2743 companies, $235 million. This is in line with the idea that larger companies release more information (and have therefore a higher probability to come in our dataset than smaller ones). Appendix does not show a difference between our dataset and the other

observations for the proceeds of issued bonds. In other words, it seems that the high number of missing variables is not expected to harm our research.

Table 11.2, Panel B, C present the distribution of our sample over countries and sample years, separately for Islamic and conventional bonds. The distribution among countries is not equally. Indonesia, the country with the highest number of Muslim inhabitants, has by far the highest number of issued bonds (conventional plus Sukuk). It must be noted again that we have many missing variables in our database, and this is likely to influence the distribution among countries of the remaining observations substantially. In this chapter we will do no further research to this point. We see an increase in the number of issued bonds in the years 2012, 2013 and 2014. An explanation can be that in line with the other parts of the world the economic situation during the observed period is not so well and companies are issuing less bonds. However, for our subset containing observations for large companies, this is not the case. They are an alternative for the bonds issued from countries in the US and Europe. The financial crisis of 2007/2008 started in the US in the mortgage market, but also the CDO (collateralized debt obligation) market became severely involved. A CDO is a type of structured asset-backed securities

Table 11.2 The sample construction and distribution of sample statistics

Panel A: Sample construction

	Observations	Countries	Firms
Initial sample (total domestic bonds issued by non-financial firms between 2009 and 2015)	7115	12	974
Bonds with available financial data	4260	10	562
Bonds with available bond specific information	184	4	61

Panel B: Distribution of sample over country of domicile

Country	Conventional Bonds	Sukuk	Total
UAE	13	1	14
Indonesia	121	21	142
Kuwait	0	2	2
Malaysia	10	16	26
Total	144	40	184

Panel C: Distribution of sample over years

Year	Conventional bonds	Sukuk	Total
2009	13	10	23
2010	11	2	13
2011	10	2	12
2012	33	5	38
2013	29	8	37
2014	36	6	42
2015	12	7	19
Total	144	40	184

Panel A describes the sample selection procedure and number of observations dropped at each step. Panel B presents the distribution of sample across countries while Panel C tabulates the distribution of sample over time

(ABS). Originally developed for the corporate debt markets, over time CDOs evolved to encompass the mortgage and mortgage-backed security (MBS) markets. Many Western banks had toxic assets on their balance sheets and survived only by the support of their governments. Banks in the Islamic world did not have such assets—the Islamic rules do not allow derivatives that only transfer risk—and did not require such an intervention from government. Also many western companies were facing a debt- equity ratio that was too high and decided to stop the share buyback programs and to reduce their debt. The general belief (till 2015) was that the emerging and frontier markets will do better than the developed markets leading to an increase in the demand for bonds in those countries.

Table 11.3 contains the descriptive statistics for the conventional (panel A) and Sukuk (panel B). The stars in panel B shows whether the means differ from Table 11.3A (Conventional Bonds). The *t*-test does not reveal any significant difference between Spread over the samples Sukuk and Conventional Bonds. In other words, when we do not control for the firm and bond specific factors, there is no significant difference between the spread of a Sukuk and a conventional bond. Not surprisingly the debt ratio for Sukuk issuing firms is substantially lower than for the conventional bonds. The conventional and Islamic bonds are also comparable in terms of their maturity and size of the issuing firm. However, these descriptive statistics show that Islamic bonds are issued by high growth firms (MB), which are generally considered to be more risky. This also explains that why Islamic bonds on average have lower proceeds.

Table 11.3 Descriptive statistics

Panel A: Conventional bonds sample (ISB = 0)							
Variable	Mean	p25	p50	p75	Std.	Skewness	N
Spread	7.62	3.69	8.29	9.84	3.10	1.25	140
LnProceeds	4.87	4.04	5.32	5.73	1.09	−0.78	144
Maturity	6.70	3.00	5.00	7.01	6.60	2.69	144
Debtr	176.35	65.51	110.80	172.33	221.04	2.37	144
MB	31.06	25.56	30.97	35.43	14.43	0.50	144
LnTA	7.84	6.46	7.62	9.65	1.89	0.21	144
Senior	0.91	1.00	1.00	1.00	0.29	−2.86	144
Panel B: Sukuk (ISB = 1)							
Variable	Mean	p25	p50	p75	Std.	Skewness	N
Spread	6.55	2.79	6.69	9.02	4.29	0.45	40
LnProceeds	4.98	4.69	5.15	5.48	0.64	−1.51	40
Maturity	6.02	5.00	5.01	7.50	3.31	0.27	40
Debtr	104.42**	38.27	87.47	180.88	68.10	0.16	40
MB	36.83*	25.56	28.26	49.28	14.91	0.78	40
LnTA	8.88*	8.21	8.46	10.32	1.78	−0.10	40
Senior	0.90	1.00	1.00	1.00	0.30	−2.67	40

***, **, * show the significance of differences in means on 1 %, 5 % and 10 % level

Table 11.4 presents the correlation between variables of this study. This tables reveals that *Spread* is negatively associated with *ISB* bond. However, this association is not significant. In terms of the relationship between *Spread* and other control variables, *Spread* is negatively related with *LnProceeds*, *Maturity*, *MB* and positively with *LnTA*. Although, some of these correlations are at odds to the expectations, a possible negative relation between *Spread* and *LnProceeds* and *Maturity* could be explained by the fact that bonds with higher sales proceeds and maturity are issued by less risky firms. With respect to the correlation between control variables, there is a positive correlation between the *Maturity* and *LnProceeds,* and a negative correlation between *MB* and *Debtr*. The significant positive correlation between the maturity of a bond and the size of the proceeds of a bond is not surprising and means that larger bonds are issued for a longer time. Larger companies are less risky than smaller ones, have the ability to issue larger bonds and due to the lower required rate they can issue with a longer maturity. So, the high correlation between *LnProceeds* and *Maturity* is not unexpected. Also the significant negative correlation between the debt ratio and the *MB* is not surprising. In case the debt ratio is larger, the market value of equity is lower and the ratio market value of equity related to the book value of the total assets of a company shall be lower.

11.6 Empirical Results

Table 11.5 presents the results of three different regression analyses. All these models include country dummies to control for the country specific effects on bond yield. We use UAE as reference category. Model 1 represents our base model where we examine whether the spread required on Sukuk differs from the return required on conventional bonds. Model 2 includes two additional variable, *Time* and *ISB***Times*, and examines whether the Spread on Sukuk varies over time. *Time* is defined as the year of a bond issue less 2008 while *ISB***Time* is the interaction of *Time* with *ISB*. We assume that during our observed period the interest rates will decrease due to the policy of the central institutions to help the economy by reducing the level of interest rates. The decreasing level of interest during the observed period is a global development, initiated by the policy of the FED (Federal Reserve, the Central bank in the USA) in the USA to stimulate the economy. In case the global development also has its influence on the interest rate of the bonds in the countries in our database, the coefficient of the time variable will be negative.

A more important question is whether the return difference between Sukuk and Conventional bond remains the same during the observed period. Due to scale effects the imperfections of growing markets are becoming lower and less inefficient. We expect that the markets will become less inefficient during the observed period and that the difference in return between Sukuk and Conventional Finance will (slowly) disappear. In other words, we expect a negative coefficient for the *ISB* * *Times*.

Table 11.4 Correlation matrix

	Spread	ISB	LnProceeds	Maturity	Debtr	MB	LnTA	Senior
Spread	1.00							
ISB	−0.09	1.00						
LnProceeds	−0.41***	−0.28***	1.00					
Maturity	−0.32***	−0.05	0.57***	1.00				
Debtr	−0.01	−0.15**	0.06	−0.11	1.00			
MB	−0.22***	0.16**	0.02	0.05	−0.61***	1.00		
LnTA	0.44***	0.05	−0.17**	−0.09	0.08	−0.28***	1.00	
Senior	−0.06	−0.01	0.12	0.18**	0.05	−0.06	0.28***	1.00

***, **, * show the significance of differences in means on 1 %, 5 % and 10 % level

Energy is politics. Countries are energy importing or energy exporting countries and if they import or export energy, the related cash flow for buying energy or selling it is mostly substantial. Energy companies are mainly large and their way of operating tracks attention. Therefore we will have a special look in model 3 on the subsample of energy firms. Due to the low number of observations we do not include country dummies in model 3. The t-statistics reported in parenthesis are adjusted for clustering at firm level.

Table 11.5 shows that for the base sample (model 1) the coefficient on the variable *ISB* is positive and significantly different from zero at 10 % level. This result is not in line with our hypothesis, the significant positive coefficient on ISB

Table 11.5 Regression analysis for three models

	Model 1 Ytm	Model 2 Ytm	Model 3 ytm
ISB	1.025	−0.104	0.133
	(0.050)*	(0.895)	(0.053)*
LnProceeds	0.489	0.503	−0.181
	(0.060)*	(0.049)**	(0.246)
Maturity	−0.121	−0.120	−0.135
	(0.016)**	(0.016)**	(0.193)
Debtr	−0.001	−0.001	2.381
	(0.390)	(0.481)	(0.037)**
MB	−0.010	−0.007	13.847
	(0.669)	(0.758)	(0.037)**
LnTA	−0.370	−0.366	105.127
	(0.078)*	(0.079)*	(0.031)**
Senior	−1.517	−1.553	
	(0.185)	(0.167)	
Indonesia	6.307	6.297	
	(0.000)***	(0.000)***	
Kuwait	−1.144	−1.068	
	(0.191)	(0.212)	
Malaysia	−0.419	−0.498	
	(0.681)	(0.624)	
Time		−0.686	
		(0.010)**	
Time*ISB		0.266	
		(0.161)	
_cons	7.970	8.885	−1588.644
	(0.000)***	(0.000)***	(0.033)**
R^2	0.57	0.57	1.00
N	184	184	21

***, **, * show the significance of differences in means on 1 %, 5 % and 10 % level

show that investors of the Sukuk earn higher returns compared to the investors of the conventional bonds. This surprising result is in line with the increasing importance of the religion in Muslim countries. In the whole Muslim world people are living more and more in line with the provisions of Islam. Probably for Islamic companies the cost of debt is not the only decision making criteria in the selection of the type of a bond, but also the question whether the financial product is accepted as Shariah compliant. The increasing presence of the Islam can have its influence on the investors side as well as on the issuers side. Our results show that the influence on the issuers side is larger, which causes a higher return on Sukuk comparing to Conventional Bonds.

Model 2 includes *Time* and its interaction term with *ISB*. We observe that the coefficient on *Time* is negative and significant at 5 % level and *Time*ISB* is not significantly different from zero. The significant negative value of *Time* means that the spread on bonds (conventional bond and Sukuk) decreased during the observed period. The negative coefficient on *Time* is in line with our expectations. To stimulate the economy after the crisis of 2007/2008 The FED and the ECB (European Central Bank) furnished the market with cheap capital and the yield on treasury bonds became nearly zero. Investors looking at expected returns accepted a higher risk level, causing a decrease in the yield to maturity of the bonds minus the yield the maturity of the treasury bonds. In other words, the need for expected return makes the investors to be more risk appetite. The variable *Time*ISB* is not significant from zero. The return difference between Sukuk and Conventional is probably constant during the observed period, which means that the result of significantly positive return difference between Sukuk and conventional is stable during the period 2009–2015.

Model 3 shows us that for energy companies the *ISB* variable is positive at 10 % level. We also see that the variables *debtr, MB* and *LnTA* differ from zero at a 5 % level. However, the number of observations, 21, is very limited. More research is needed before one can reach to (strong) conclusions.

11.7 Summary and Conclusions

Sukuk are Islamic securities that can only been issued after a approval by the Sharia board. The Sharia forbids interest payments. Therefore there is a tendency to avoid relating Sukuk with interest paying bonds and therefore Sukuk is presented as Islamic certificates. In this chapter we show that Sukuk are not certificates, but bonds.

Due to religious rules there are limitations for using Sukuk. The firms issuing Sukuk, for example, are not allowed to invest in production of tobacco, alcohol,

gambling or pork products. Also firms are not allowed to use Sukuk in financial instruments without any material underlying transactions, such as financial derivatives. Therefore Islamic banks do not have these financial instruments on their balance sheets as many US and European banks have. The US real estate crisis in 2007 was followed by a bank crisis in the US and Europe. The Islamic banks were hit less because they were less affected by the toxic assets.[6]

The investment opportunities of the Sukuk are limited, which can deteriorate the risk- expected return trade-off. The research question in this chapter is: Do holders accept a lower return on their Sukuk. To answer this, we compare the Spread on the issuing day between Sukuk and Conventional bonds. We conclude that—in contrary to what we expected—the return on Sukuk are significantly higher than the return on conventional bonds. This shows that the issuing companies accept a higher cost of debt for Sukuk compared to conventional bonds. We also find that the difference between the Spread of Sukuk and Conventional bonds has not significantly changed during the sample period. When we limit our observations to only energy companies, we find the same results: the return on Sukuk is significantly higher than the return on conventional bonds.

Based on only the expected return- risk trade off matrix no company is able to issue Sukuk. The Sukuk issuing companies are not expected decide in a two-dimensional system, namely; expected return and risk as in the Western world. However their decision making process is three-dimensional: expected return, risk and Shariah rules. Before the year 2009 the number of issued Sukuk is limited. After 2009 we see a considerable increase in Sukuk issues. This development can be matched with the growing influence of the Islam in the Muslim society.

This study has some limitations. First of all the Bloomberg database has many missing variables which reduces our number of observations substantially. Second we look at the yields to maturity, including the returns on issuing days. From studies on IPOs of stocks we know that there is underpricing on the issuing day. It is possible that our results will also be influenced by an underpricing effect. However, such an effect is not expected to explain the our results on the difference between the conventional bonds and the Sukuk.

[6] An exception is the Dubai crisis in 2008. The oil revenues of Dubai were declining and the government of Dubai, under the leadership of Sheikh Muhammed Al Maktoum, decided to diversify and invest in other sectors and thus many real estate projects in the sectors tourism and commerce were realized. The crisis of 2008 hit also the real estate market in Dubai.

Appendix

Table 11.6 Compares the entire population of bonds issued during 2009–2015 and the sample of bonds included in our analysis based on the total assets of bonds issuing firms and the natural log of the total proceeds of the bonds

Variable	Sample	Other observations	Difference	p-value
Total assets	6070.37 (221)	235.31 (2743)	5835.06	0.000
Amount issued	224 (221)	246 (6869)	2.14	0.443

Literature

Akhtar S, Jahromi M (2015) Impact of the global financial crisis on Islamic and conventional stocks and bonds, Accounting and Finance (forthcoming)

Becker B, Milbourn T (2011) How did increased competition affect credit ratings? J Financ Econ 101(3):493–514. doi:10.1016/j.jfineco.2011.03.012

Bhoraj S, Sengupta P (2003) Effect of corporate governance on bond ratings and yields: the role of institutional investors and outside directors. J Bus 76(3):455–475. doi:10.1086/344114

Cai N, Helwege J, Warga A (2007) Underpricing in corporate bond market. Rev Financ Stud 20 (6):2021–2046

Deloitte (2012) Luxembourg: a prime location for Sukuk issuance

Dorsman AB, Gounopoulos D (2014) European Sovereign Debt crisis and the performance of Dutch IPO's. Int Rev Financ Anal 34:308–319

Godlewski CJ, Turk-Ariss R, Weill L (2011) Do markets perceive Sukuk and conventional bonds as different financing instruments? Bank of Finland, 37

Hand JR, Holthausen RW, Leftwich RW (1992) The effect of bond rating agency announcements on bond and stock prices. J Financ 47:733–752

Hassoune A (2014) Green Sukuk; from the initial French experience to broader Shari'ah- compliant solutions. http://worldislamicbanking.megaevents.net/presentations/12.pdf

Ibrahim Y, Minai MS (2009) Islamic bonds and their wealth effects from Malaysia. Invest Manage Financ Innov 6(1):184–191

Jewell J, Livingston M (1998) Split ratings, bond yields, and underwriter spreads. J Financ Res 21 (2):185–204. doi:10.1111/j.1475-6803.1998.tb00679.x

Jiang J (2008) Beating earnings benchmarks and the cost of debt. Account Rev 83:377–416

Liu M, Magnan M (2014) Conditional conservatism and underpricing in US corporate bond market. Appl Financ Econ 24(20):1323–1334

Miller N, Challoner J, Atta A (2007) UK welcomes the Sukuk. Int Financ Law Rev 26:24–25

Ritter JR, Welch I (2002) A review of IO activity, pricing and allocation. J Financ 57:1795–1828

Sengupta P (1998) Corporate disclosure quality and the cost of debt. Account Rev 73:459–474

Sukmana R, Kholdi M (2010) Impact of global financial crisis on Islamic and conventional stocks in emerging market: an application of ARCH and Garch method. Working paper (Department of Islamic Economics and, Airlangga University, Surabaya, Indonesia)

Tahmoures AA (2013) Compare and contrast Sukuk (Islamic bonds) with conventional bonds, are they compatible? J Glob Bus Manage 9:1–9

Toy N, Stonehill A, Remmers L, Wright R, Beekhuisen T (1974) A comparative international study of growth, profitability, and risk as determinants of corporate debt ratios in the manufacturing sector. J Financ Quant Analy 9:875–886

Visser H (2008) De afkeer van interest (The aversion of interest). Vu University

Wenxia G, Jeong-Bon K (2014) Real earnings management and the cost of new corporate bonds. J Bus Res 67:641–647