IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF MANAGEMENT

MASTER THESIS

THE IMPACT OF RENEWABLE ENERGY PERFORMANCE ON CORPORATE FINANCIAL PERFORMANCE

DOUNIA CHLYEH

THESIS SUPERVISOR: PROF. MUSTAFA KEMAL YILMAZ

ISTANBUL, 2020

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THE IMPACT OF RENEWABLE ENERGY PERFORMANCE ON CORPORATE FINANCIAL PERFORMANCE

by

DOUNIA CHLYEH

A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Arts in Management

THESIS SUPERVISOR: PROF. MUSTAFA KEMAL YILMAZ

ISTANBUL, 2020

APPROVAL PAGE

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Management.

Thesis Jury Members

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Assoc. Prof. Ali Osman Kuşakcı	________________	________________

This is to confirm that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University.

Date of Submission   Seal/Signature

ACADEMIC HONESTY ATTESTATION

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name Surname: Dounia Chlyeh

Signature:

ÖZ

YENİLENEBİLİR ENERJİ PERFORMANSININ FİRMALARIN FİNANSAL PERFORMANSI ÜZERİNDEKİ ETKİSİ

Yazar: Chlyeh, Dounia
İşletme Tezli Yüksek Lisans Programı
Tez Danışmanı: Prof. Dr. Mustafa Kemal Yılmaz
Haziran 2020, 95 sayfa

Bu çalışmada, yenilenebilir enerji performansının (YEP) firmaların finansal performansı (FFP) üzerindeki etkileri, yenilenebilir enerji (YE) başlığı altındaki Sürdürülebilir Kalkınma Hedefleri (SKH) ve bazı Çevresel, Sosyal, Yönetişim (ÇSY) faktörler ele alınarak incelenmiştir. Çalışma, 46 ülkeden 563 şirketin verileri kullanılarak 2009-2018 yıllarını kapsayacak şekilde panel veri analizi yöntemi kullanılarak ülke ve şirket bazında gerçekleştirilmiştir. Elde edilen sonuçlar, etkili bir YEP sürecinin üç ana aşamada ölçülebildiğini göstermektedir: benimsenen politikalar, belirlenen hedefler ve alınan önlemler. Bulgular, YEP ile ilgili benimsenen politikaların ve belirlenen hedeflerin özellikle gelişmiş ülkelerde oluşturdukları maliyet açısından finansal karlılık üzerinde olumsuz bir etkisi olduğunu, YEP konusunda atılan adımların ise hem gelişmiş ve hem de gelişmekte olan ülkelerde uzun vadeli finansal performansı pozitif ve anlamlı bir şekilde etkilediğini göstermektedir. Firma bazında ise, YEP konusunda atılan adımların özellikle finansal olmayan şirketler üzerindeki etkilerinin genellikle pozitif ve anlamlı olduğu görülmektedir. Ayrıca çalışmanın sonuçları, 7. SKH'nin şirketlerin hem ülke hem de firma düzeyinde finansal performansları üzerinde olumsuz bir etki yarattığını ortaya koymaktadır. 12. SKH'nin ise hem ülke hem de firma düzeyinde finansal performans üzerinde uzun vadede olumlu ve anlamlı bir etkisi vardır. Son olarak, çevresel faktörlerin ülke düzeyinde şirketlerin finansal performansı üzerinde olumsuz bir etkisi bulunmakla birlikte, firma düzeyinde finansal performansa etkisi olumlu ve anlamlıdır.

Anahtar Kelimeler: Çevresel, Sosyal ve Yönetişim, Finansal Performans, Sürdürülebilir Kalkınma Hedefleri, Yenilenebilir Enerji Performansı.

ABSTRACT

THE IMPACT OF RENEWABLE ENERGY PERFORMANCE
ON CORPORATE FINANCIAL PERFORMANCE

Student Name: Chlyeh, Dounia
MA in Management
Thesis Supervisor: Prof. Mustafa Kemal Yılmaz
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This study investigates the effect of renewable energy performance (REP) on corporate financial performance (CFP) taking into account renewable energy (RE) related Sustainable Development Goals (SDGs), and Environment, Social, Governance (ESG) factors. We conduct the study by using a data sample of 563 companies from 46 countries over the period of 2009-2018. We employ panel data analysis on firm-level and on the country of headquarters. We cover the 7th and 12th SDGs, and environmental ESG variables to assess the impact of REP on CFP. The results suggest that the effectiveness of REP could be measured by three phases: policies adopted, targets established, and actions implemented. The findings indicate that there is a negative impact of REP policies and targets on profitability in developed markets due to the massive costs incurred by the companies. However, the impact is positive and significant in developing countries, particularly in long-term financial performance since they are at the beginning of the implementation process. On firm-level, RE policies negatively affect both financial and non-financial companies, while RE actions have a positive and significant influence on non-financial companies rather than on financial ones. The results also reveal that the 7th SDG has a negative effect on the financial performance of companies on both country of headquarter-level and firm-level, while the 12th SDG has a positive and significant effect on both country of headquarter-level and firm-level financial performance. Finally, the environmental factors of ESG have a negative impact on the financial performance of companies on both country of headquarter-level and firm-level.

Keywords: ESG, Financial Performance, Renewable Energy Performance, SDG.

To my beloved father’s soul, Mohamed Essaid Chlyeh

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I wish to show acknowledgment to my family, especially my dear father for supporting me throughout my life despite the hard circumstances.

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Dounia Chlyeh

ISTANBUL, 2020

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LIST OF SYMBOLS AND ABBREVIATIONS

CAGR : Compounded Annual Growth Rate

CE : Capital Expenditure

CEO : Chief Executive Officer

CEP : Corporate Environmental Performance

CFP : Corporate Financial Performance

CI : Capital Intensity

CO2 : Carbon Dioxide

CSP : Concentrated Solar Power

CSR : Corporate Social Responsibility

EMS : Environmental Management System

EP : Environmental Performance

EPS : Environmental Pillar Score

ES : Emissions Score

ESG : Environment, Social, Governance

EU : European Union

FE : Fixed Effect Model

FP : Financial Performance

GDP : Gross Domestic Product

GMM : Generalized Method of Moments

GR : Growth

GW : GigaWatt

IEA : International Enegy Agency

INF : Inflation Rate

ISO : International Standards Organization

KWh : KiloWatt Hour

LM : Lagrange Multiplier

NRBV : Natural Resource Based View

OECD : Organization for Economic Co-operation and Development

OLS : Ordinary Least Square

PEE : Policy Energy Efficiency

PP&E : Property, Plant & Equipment

PV : Photovoltaics

RBV : Resource Based View

RE : Renewable Energy

REC : Random Error Component

REM : Random Effect Model

REP : Renewable Energy Performance

REU : Resource Energy Use

REUR : Renewable Energy Use Ratio

ROA : Return on Assets

ROE : Return on Equity

RUS : Resource Use Score

R&D : Research and Development

SDGs : Sustainable Development Goals

SMART : Specific, Measurable, Attainable, Realistic and Time-Bound

S&P 500 : Standard and Poor’s 500

TEE : Targets Energy Efficiency

TQ : Tobin’s Q

TRBC : Thomson Reuters Business Classification

UK : United Kingdom

UN : United Nations

UNDP : United Nations Development Program

UN SDGs : United Nation Sustainable Development Goals

US : United States

USD : United States Dollar

VIF : Variance Inflation Factor

WWF : World Economic Forum

CHAPTER I

INTRODUCTION

1.1. General Outlook

The rapid economic growth and globalization have increased the consumption of natural resources, leading to concerns for humans. As reported by the Global Footprint Network, Earth overshoot day was the earliest ever in 2019 (WWF Report, 2019). This means that humans have exceeded what earth ecosystem can regenerate in 2019, consuming almost 1.7 of Earth. Similarly, the demand for energy consumption is growing. As reported by the International Energy Agency (IEA), the global energy-related CO2 emissions rose by 2% due to higher energy consumption in 2018 (Global Carbon Budget, 2019). Another serious concern humans face today is the increase in the global average temperature mainly due to fossil fuel burning that intensifies the CO2 emissions. According to the IEA, global emissions grew by 1.4% and 2.1% in 2017, in 2018 respectively (IEA, 2018).

Consequently, Renewable Energy (RE) has gained widespread popularity over the last two decades due to its massive impact on the environment and impact investing. Since the 2015 Paris Agreement on Climate Change, the European Union (EU) has taken serial steps to reduce greenhouse gas emissions by using more RE sources. One of the EU targets for 2020 and 2030 is to reach 20% and 30% energy consumption from renewables (Owen, 2018).

Global investment in RE has reached its peak in the last 5 years. Although the global investment in RE continues to increase, the market share of developed countries gradually dropped. Figure 1.1 shows the investments in RE in developed and developing countries. Until 2014, developed countries had the upper hand on RE investments. In 2015, the balance shifted in favor of developing countries. By 2017, developing economies accounted for 63% of the global RE investments, while developed countries only had 37% share, the US suffered a decline of 6% due to strict regulations. The UK, Europe and Japan witnessed 65%, 36%, and 28% decrease in RE investments respectively (Louw *et al.*, 2018).

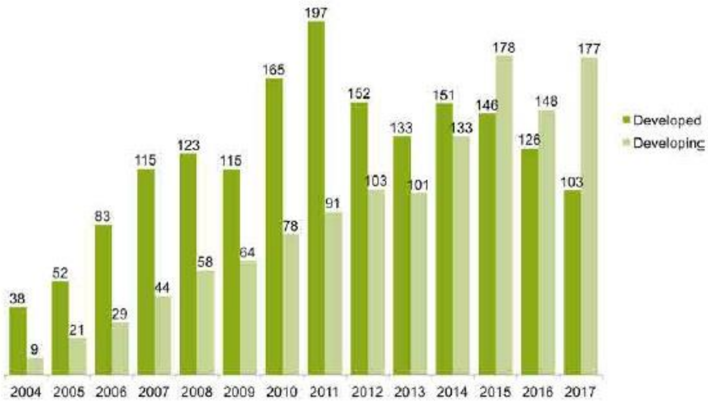

Figure 1.1. Global Renewable Energy Investments: Developed vs. Developing Countries (2004-2017) (Louw *et al.*, 2018)

In the last couple of years, few developed countries and most developing ones testified sharp increases in RE investment. According to Global Trends in Renewable Energy Investment (2018), China was the leading country in 2017 and accounted for 50% of the global total RE investment and at least 58% of solar investment. Developing countries invested USD 177 billion in RE projects, exceeding developed countries by USD 74 billion. Figure 1.2 shows how the global RE investments are split from 2004 to 2017. Developed countries invested in RE the most from 2004 until 2011, then had a drastic decrease. China, India, and Brazil steadily increased RE investments and had the lion's share by 2017. Other developing countries have also increased their RE investments to reach USD 33.9 billion in 2017 (Louw *et al.*, 2018).

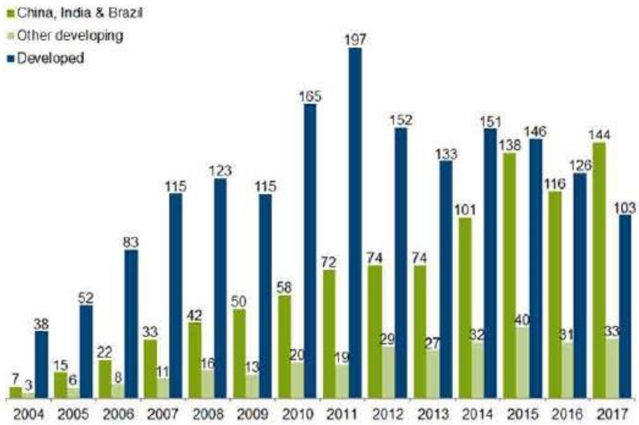

Figure 1.2. Global Renewable Energy Investments Split (2004-2017) (Louw *et al.*, 2018)

In 2018, RE capacity investment reached USD 47.5 billion in developing countries, while it was USD 125.8 billion in developed economies. These investments included solar and wind projects, public market equity, global asset finance, and research and development in renewable power technologies. The Middle East and Africa regions spent up to USD 16.1 billion in financing solar energy projects in Morocco, Kenya, and South Africa. Likewise, the US allocated almost USD 43 billion to green power plant projects, while solar energy investments in Europe rose to USD 19.2 billion and wind energy to USD 36.7 billion (Ajadi *et al.*, 2019). Thus, RE investment had an increase of USD 2.6 trillion over the years 2010-2019 with an increase of 4% in 2018. This investment involved solar PV, hydropower, bioenergy, and wind energy and accounted for almost 45% of the world's electricity (Ajadi *et al.*, 2019).

On firm-level, many companies have shifted their interests into investing more in green energy believing that it is the right solution to prevent global warming and to be sustainable in the long-run. They realized that this approach does not just boost the environmental performance (EP), but also affect the financial performance (Hart & Ahuja, 1996). Many companies such as Google, Facebook, and Apple pledge to generate 100% of their power from RE in the upcoming years.

From an academic perspective, many researchers started investigating the association of RE and financial performance. Some scholars found a one-way relationship, either that Renewable Energy Performance (REP) affecting Corporate Financial

Performance (CFP) or the opposite (Clarkson, Overell, & Chapple, 2011; Nelling & Webb, 2009), while some others were convinced that this relationship is a virtuous circle, suggesting that CEP positively affects REP, which in return lead to an increase in the CEP. Some recent studies (Shin, Ellinger, Nolan, DeCoster, & Lane, 2018) focused on investigating the association of RE utilization and CFP and inspecting whether the implementation of sustainable energy systems improved CFP (Martí-Ballester, 2017). However, there are few studies that search for the impact of REP on CFP as well as on the United Nations Sustainable Development Goals (UN SDGs).

This study aims to provide a deeper understanding of the impact of renewable energy performance on financial performance in emerging markets after the 2008 global financial crisis. For this purpose, we measure renewable energy performance of companies by referring to the relevant Sustainable Development Goals (SDGs) set up by the UN in 2015, including 17 SDGs and 169 targets that cover economic, ecologic, and social dimensions of sustainability. Figure 1.3 illustrates the 17 UN SDGs.

Figure 1.3. UN SDGs (Mancini *et al.*, 2019)

The UN 2030 Agenda set these 17 SDGs to encourage companies in engaging strategies that align with sustainability improvement. In this study, we are interested in relating the SDGs to renewable energy. The 7th SDG concentrates on guaranteeing access to affordable, dependable, sustainable, and clean energy. UN expects that by 2030, the share of RE would substantially increase due to the advancements in energy efficiency and cleaner fossil fuel technologies. The 12th SDG emphasizes on ensuring sustainable consumption and production. The UN anticipates that by 2030, companies will adopt sustainable practices such as reducing waste and using efficient natural resources. Therefore, this will allow companies to elevate their sustainable management capabilities. In addition to the UN SDGs, this study also covers some environmental factors from the Environmental, Social, Governance (ESG) indicators, including resource use, emissions, and innovation.

1.2. Problem Statement

This study focuses on investigating how renewable energy performance affects corporate financial performance in emerging markets. International policy-makers made huge efforts to enact environmental regulations that would be in the best interest of countries in general and companies in specific. However, these policies have to be followed and implemented by countries, and companies. However, we are faced with a problem. Countries have different regulations and social standings, and so do the firms.

Many scholars (P. M. Clarkson et al., 2011; Martí-Ballester, 2017; Nelling & Webb, 2009; Shin et al., 2018) investigated how renewable energy and energy efficiency are associated with financial performance without taking into account cultural differences of countries and different structures of industries and companies. This thesis attempts to fill out the gap by exploring how renewable energy performance affects financial performance. Thereby, it seeks answers to the following research questions: How does renewable energy performance affect financial performance on an economical development level? How does renewable energy performance affect financial performance on firm level?

1.3. Contribution of the Thesis

This study's contribution to the literature is two-folds. First, it expands the research framework of the relationship between renewable energy performance and financial performance, covering a large scale of countries (developed and developing) and companies (financial and non-financial). Second, the study uses for the first time the renewable energy related variables under the UN SDGs and investigates their impact on the short and long term financial performance of companies.

This research also provides valuable insights to the professional field, i.e. managers and institutional investors on how to invest in the UN SDGs related renewable energy resources to increase profitability and to improve corporate reputation. It also draws the attention of policymakers to enact new and applicable renewable energy policies in developed and developing countries.

1.4. Organization of the Thesis

The thesis is structured into six chapters. Chapter 2 reviews the literature on sustainability, and the relationship between renewable energy performance and corporate financial performance. Chapter 3 presents theoretical background and hypothesis development. Chapter 4 provides the data and research methodology. Chapter 5 discusses the empirical findings, and finally the last chapter concludes.

CHAPTER II

LITERATURE REVIEW

2.1. Definition of Sustainability

The concept of sustainability could be traced back to more than 50 years, but it was first mentioned in 1972 at the UN Conference on the Human Environment in Stockholm. Linguistically, the term sustainability originates from the Latin words: “sus” meaning “up” and “tenere” meaning “to hold”. Hence, technically speaking, sustainability maintains a civilized mode of existence over the long-term. The UN (1987) defines sustainability as "any development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Sustainable development doctrine has acquired three main domains over time, namely social, economic, and environmental sustainability (Slaper & Hall, 2011). These dimensions were then introduced as interlocking circles demonstrating the importance of integrating and addressing them from a holistic view. Today, the three pillars of sustainability are known as the triple bottom line approach (Hutchins & Sutherland, 2008). Figure 2.1 shows the triple bottom line that is used to describe the long-term responsibility to the shareholders. It helps assess how firms manage their economic, social, and environmental duties despite internal and external hurdles they may face.

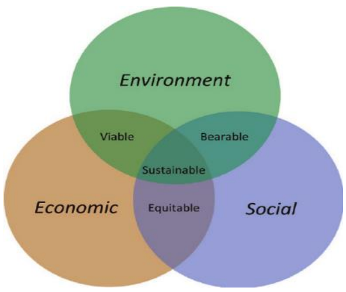

Figure 2.1. Three Pillars of Sustainability (Hutchins & Sutherland, 2008)

2.2. Measuring Sustainability

Measuring sustainability and the social impact of investment in business is defined by three factors: Environmental, Social, and Governance (ESG). Integrating ESG practices reflects broader and richer opportunities for companies. In a survey held for 207 investors from 28 countries in 2019, the results show that 84% of the investors believe that integrating ESG provides a strong and positive benefit on risk-adjusted returns, cost savings, and new market opportunities. On academia, 63 % of the studies that investigated the relationship between ESG and CFP found that there is a positive relationship between them (LGT Capital Partners, 2018).

In 2015, a key initiative was adopted by the UN, i.e. the 2030 Agenda for the SDGs. The goals are to be integrated into the ESG framework to enhance sustainable activities and make them more outcome-oriented. Of the 17 SDGs, three goals are directly related to the environment and especially energy topics. The 7^{th} goal deals with ensuring access to affordable, reliable, sustainable and modern energy. The 12^{th} goal ensures sustainable consumption and production patterns, while the 13^{th} goal emphasizes on taking urgent action to combat climate change and its impacts. While ESG practices concentrate on merely establishing policies and basic reporting, SDGs measure the amount of impact towards achieving the targets. The combination of ESG and SDGs enable financial markets to address more to environmental and social issues.

2.2.1. Environmental Sustainability

Sustainability has gained widespread popularity due to the serious problems faced by humankind especially the environmental ones such as global warming, and depletion of earth sources. Sustainable development practices whether economic, social, or environmental all serve the interest of human welfare. Sutton (2004) identified environmental sustainability as the ability to maintain a quality life for all people from clean water and air to a livable environment, ensuring the functionality of society. OECD (2001) suggested few environmental sustainability criteria that include the efficient use of renewable resources, the limited use of non-renewable resources, and low level of emission concentrations for protecting human health and the environment.

Today, consumers' demand environmental-friendly products. The public request for preserving the natural environment, the complex environmental regulations by governments, and the increase of law suits against companies that have environmental issues leads to an increase of awareness and actions in businesses. The pressures of suppliers, investors and other stakeholders also push companies to grow their green investment, to pursue strategies for waste minimization and energy conservation. Companies have even started training employees, establishing work practices, and defining targets to achieve SDGs for short and long-term periods.

2.2.2. Environmental Performance

Over the last two decades, with global warming and the drastic decline of natural resources, there is a significant pressure that has risen from customers, investors, and environmental organizations (Tatoglu, Bayraktar, Sahadev, Demirbag, & Glaister, 2014). This pressure has left no other option for companies but to initiate strategies to implement and improve environmental management systems which act as a strong competitive weapon that guarantees the survival and continuity in the global market (M. Rafiq, Zhang, Yuan, Naz, & Maqbool, 2020).

Policies towards environmental protection were first introduced in the 1970s. These initiatives included water, air, and emission control (Rondinelli, 2000; Turk, 2009). Later, the adoption of environmental management programs became mandatory due to social responsibility and community pressure especially in developed countries (B. Zhang et al., 2007). They include the tendency to look green through the control of environmental degradation and pollution, environmental education and training, even implementing green supply chain (Dasgupta, 2001; Henriques & Sadorsky, 1996; B. Zhang et al., 2007; Zhu, Sarkis, & Lai, 2007). In the literature, environmental performance measures are divided into three categories: *environmental impact indicators* such as carbon emissions and resource depletion, *regulatory compliance* that deals with regulations, laws, and guidelines imposed by governments and organizations, and finally the *organizational processes* that comprise several principles of an environmental management system (Lober, 1996; Wood & Gray, 1991).

These policies are set by companies to protect the environment from pollution and excessive damage caused by their activities. Hence, environmental performance policies are a reflection of companies' objectives and measurements that shows the way they deal with environmental and social damages. When it comes to measuring environmental performance, environmental regulations and standards are established to assess how firms reduce environmental impact with their products, processes, and energy use (Bobby Banerjee, 2001). The aim is to achieve sustainable practices that align with the good-will of society and environment (Welford & Gouldson, 1993).

Assessing environmental performance is a critical bridge that companies must cross for a better understanding of their impacts on the environment. It includes identifying, measuring, analyzing, and tracking the pros and cons of various objectives, standards, and criteria set by firms for a better decision-making (Chen, Han, & Zhu, 2017). Thus, the administrative and operational divisions of companies should develop a solid mechanism allowing them to identify opportunities from reducing environmental risks, improving energy efficiency, to rationally allocate resources, and to have some managerial contributions as in legislative aspects (Aragón-Correa & Sharma, 2003).

When environmental regulations are properly designed, employee awareness of environmental issues increases (Rondinelli, 2000). This improves the recycling efforts and reduces resource use. Therefore, the development of companies is enhanced leading to better financial performance (Porter, 1991a; Porter & Van Der Linde, 1995). Zhang, Wang, & Wang (2014) noted the importance of environmental performance in improving the economic one. They conditioned the success of the long-term stakeholders' relationship to the essential need for improving environmental performance. Renaud (2004) classified the processes and results of environmental performance into two categories. The first is the external environment impact which manifests in maintaining good relations with stakeholders, and second is the internal financial impact that concerns product and improvement. In other words, a good environmental reputation facilitates the interaction between firms and stakeholders, allowing them to attract more investors which boosts the external economic performance. In return, integration of environmental practices implies a reduction in the costs and an improvement of quality, enabling companies to increase productivity and encourage innovations that represent the internal aspect of performance.

2.2.3. Renewable Energy Performance

Energy is an indispensable component of life. *"Energy can neither be created nor destroyed but can only be transformed from one form to another"* is the first law of thermodynamics. There are two major categories of energy; primary energy and secondary energy. The former indicates the natural phase of energy that does not undergo any kinetic or potential conversion such as coal, oil, and natural gas. The latter is renewable energy which does not require any conversion process, but is easily produced through solar and wind energy. This kind of energy is cost-efficient, prevent environmental degradation, and results in high financial outcomes.

The increase in greenhouse emissions is a mere consequence of energy consumption. According to the center of sustainable systems at Michigan University, petroleum is the top source of energy consumption in the US by 37%, followed by natural gas (29%), and coal (14%) (Figure 2.2). The share of RE sources is only 11%. In RE, biomass has the highest share (44.6%) and geothermal energy the lowest one (1.9%). The most abundant source of energy in the world is only being harnessed at 7% directly and 21.3% indirectly (Michigan University, 2019).

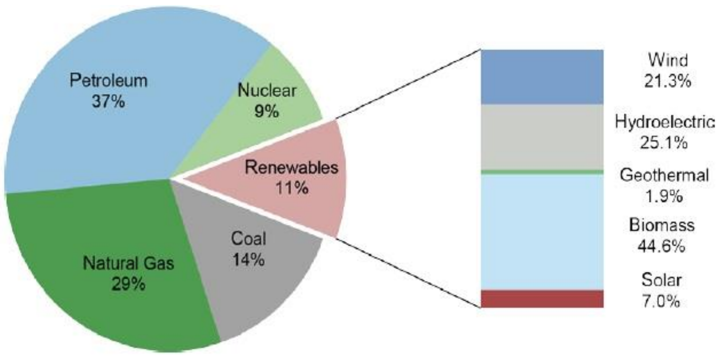

Figure 2.2. The US Total Energy Consumption by Sources (Michigan University, 2019)

EU is not different from the US on yearly energy consumption. As shown in Figure 2.3, the main energy source of EU has been oil and petroleum, followed by natural gas and fossil fuels. Nevertheless, RE has found its way up in the last couple of years replacing fossil fuels which dramatically decreased by 2017 (Energy Statistics, 2019).

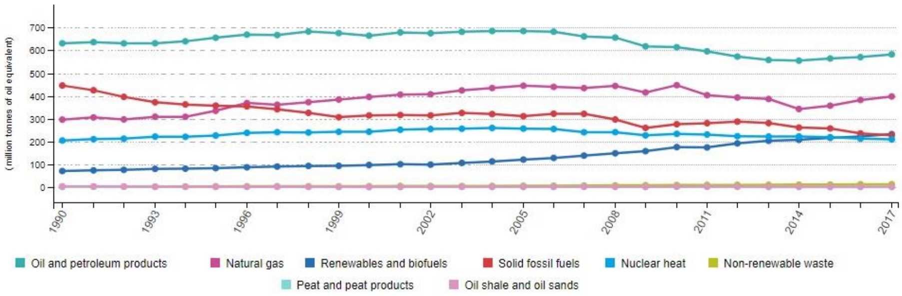

Figure 2.3. European Inland Energy Consumption (1990-2017) (Energy Statistics, 2019)

RE “is derived from natural processes that are replenished constantly. It derives directly from the sun, or heat generated deep within the earth" (IEA, 2013). Some widely-used RE sources are wind, solar, biomass, bio-fuel and hydropower energy. Hydropower energy accounts for almost 65% of the global power generation with a hydroelectric installed capacity surpassing 16% of the world's electricity production. Wind energy is one of the fastest-growing clean power sources, developing countries producing more than 80% of it. Solar energy has an installed capacity of more than 100 GW worldwide. It is the most promising one among RE sources.

The growing demand for RE is driven by many factors, including technology, costs, accessibility, political environment, and economic development (Atabi, 2004). However, there is a gap in RE investments when we compare developed markets and emerging countries. Among 66 countries where RE policies are implemented, we find that almost 30 of them are countries belonging to the EU, 29 states are from the US, and 9 provinces are from Canada (Saygn & Ceti, 2011). This gap could be related to demographic indicators, i.e. income level, welfare and R&D budget.

Thus, developed countries have a green agenda for climate protection and include different parties into the decision-making process to come up with significant proposals (Mendonça, Lacey, & Hvelplund, 2009). Contrarily, the lack of adequate environmental initiatives in emerging markets represents a serious burden against RE development. For instance, the MENA region possesses more than 45% of the world's potential for RE. However, their interest in RE policy and implementation is insufficient (Jablonski et al. 2012; Jalilvand, 2012). Also, the Gulf countries have infinite solar capital, but not enough RE projects.

Effective policies directed towards sustainable development help reduce emissions and greenhouse gases. Also, the nature of the policy-making processes by which RE policies are formulated and implemented are affected by the cost-competitiveness of renewable technologies, better access to financing, and energy security (Holburn, 2012). The adoption of the Renewable Energy Directive by the EU in 2010 to increase the share of RE consumption has shown a positive result. The target is to increase RE to 20% share by 2020, and 27% share by 2030 and a cost saving of more than 25 billion USD per year (Irena Map, 2018). Figure 2.4 provides a RE map showing how the full implementation of RE would increase the share by up to 33% by 2030, mainly through solar photovoltaics (PVs), the concentrated solar power (CSP), hydropower, geothermal power, and wind.

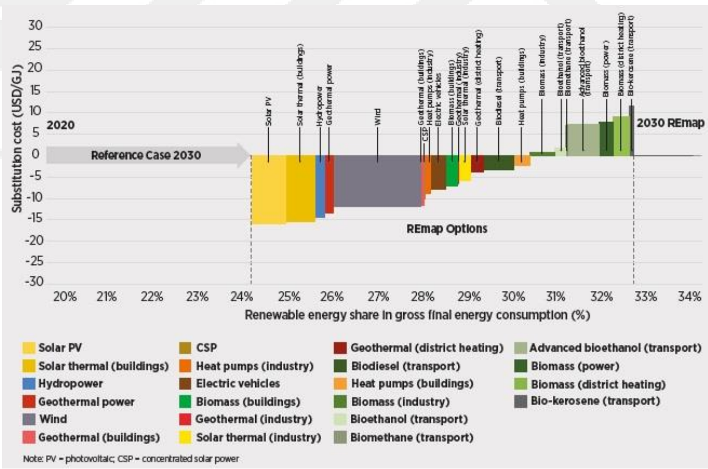

Figure 2.4. Cost-Supply Curve of Renewable Energy Options to Go Beyond the 27% Target for 2030 (Irena Map, 2018)

Since such initiatives and regulations strongly align with the development of the strategic business environment, their consequences on firm performance can be seen through an improved reputation and lower costs (Aragón-Correa & Sharma, 2003). Another consequence of RE investments is the increasing employment rate. In 2016, 9.8 million people were employed following the market expansion of RE making it possible to create new job opportunities, especially in Asia. On a country-level, Denmark and Ireland have pledged to reach 100% renewable electricity by 2050 using a combination of biomass, solar, and wind (Mathiesen, Lund, & Karlsson, 2011; Pleßmann, Erdmann, Hlusiak, & Breyer, 2014). Countries including Australia, China, India, Morocco, and the US are developing RE hybrid projects. Likewise, solar energy is mostly the speciality of Germany and Spain, bioenergy is mostly spread in Sweden, hydropower systems technology is found in Norway and Australia (Vona, 2012).

Following the fourth industrial revolution, many companies have adopted strict policies regarding the reduction of carbon footprint and the cost of energy used. Besides, going green contributes to being socially responsible which plays a vital role in the strategic competitiveness. In particular, companies in the private sector started committing to get 100% of their electricity from renewable sources.

Embracing RE on a grand scale has caused business owners and investors to realize the long-term impact that comes with the use of green energy sources. One of the leading tech companies, Intel, is using green energy drawn from wind, solar, hydro, and biomass sources. According to their corporate responsibility reports, 73% of the electricity used by Intel comes from RE sources. The company plans to increase this percentage to 100% by 2020 (Intel, 2017). Likewise, Apple achieved a success in the company's environmental reporting. It has not only covered the company's 100% needs from renewable energies, but also it has chosen its suppliers accordingly (Apple, 2018). In 2017, Google committed to make the firm's energy consumption from wind and solar energy (Google, 2017). Microsoft is by far the greenest company globally. It uses more than 1.3 billion kWh of sustainable energy every year for software development manufacturing. Microsoft President Brad Smith expressed that green energy is not only a source of clean power, but also has better financial results. He pledged to reduce the company's carbon emissions by 75% by 2030 (Microsoft, 2018).

2.3. Corporate Financial Performance

Financial performance is a broad concept where it has different definitions, and different measurement methodologies. It is a reflection of how an organization is performing in economic terms. Adams & Buckle (2003) defines financial performance as a notion that provides companies with helpful insights of how to accomplish its objectives. Atkinson (1997) adds up to this definition by shedding light on how financial resources offer firms investment opportunities that help them meet the expectations of stakeholders. Meanwhile, Al-Khatib et al. (2010) along with other scholars, believe that financial performance measures the extent to which firms succeed in optimizing financial resources in the short and long-run. While some consider financial performance as only an output of a company's activities, strategies, and objectives, some others consider it an output as well as an input that contributes to the equation. It provides a robust picture of how firms use their assets, resources, and capabilities to generate returns and to take proper decisions for future investment opportunities and financial matters.

Measuring financial performance is one of the means that reflect the fulfillment of economic goals of companies (Hofer, 1983; Venkatraman & Ramanujam, 1986). Collecting financial charts, reports, and records, developing measurement standards, and interpreting the data are key steps taken by companies to reflect their economic performance. Financial performance measurement also helps businesses make better decisions on pricing, budgeting, and strategic planning. Although there are several measures of financial performance, we will concentrate on profitability ratios in this study. Profitability ratios measure the company's ability to generate revenue compared to expenses to create value by profit margin and cost reduction; and to compensate shareholders for investment risks (Bertonèche & Knight, 2001). Accounting-based performance measures are indicators from financial statements and are a direct reflection of the management's actions (Hutchinson & Gul, 2004; Mashayekhi & Bazaz, 2008). The most commonly used accounting-based performance measures are Return on Assets (ROA) and Return on Equity (ROE). Market-based performance measures are usually shown by Tobin's q (TQ) (Hammond & Slocum, 1996).

ROA is a measure of the efficiency of capital deployment and net income production (Miller, 2001). The higher the ROA is, the more effective is the use of assets by the firm in serving shareholders interests (Ibrahim & Samad, 2011). ROA is calculated by dividing a firm’s net income by total assets:

Return on Assets (ROA) = (Net Income) / (Total Assets)

ROE shows how much income a company makes out of the investments of shareholders, i.e. equity capital. It is critical for investors and shareholders (Demsetz & Lehn, 1985). ROE is calculated by dividing the firm's net income by total equity.

Return on Equity (ROE) = (Net Income) / (Total Equity).

Tobin's q is a market-based performance measure. It was first developed by the economist James Tobin and is an indicator of the effectiveness and use of intellectual capital. Firms are only able to make a profit when Tobin's q has a value greater than 1 (Luthy, 1998). Tobin's q is calculated by dividing the stock market value by the replacement cost of its assets.

Tobin's q = (Total Market Value) / (Total Asset Value)

2.4. Environmental Performance and Financial Performance

Over the last couple of decades, increasing number of studies have been conducted to examine the relationship between environmental performance (EP) and financial performance (FP). While some studies found a one-way relationship, the EP affecting the FP (P. M. Clarkson et al., 2011), other studies found the reverse, the FP influencing the EP (Nelling & Webb, 2009). Alternatively, Hart (1996) suggested the existence of a so-called "virtuous circle" between these two performances, claiming that companies with abundant resources tend to improve their corporate environmental performance (CEP) which would positively affect their corporate financial performance (CFP). (Makni, Francoeur, & Bellavance, 2009) supported this theory providing evidence from 329 companies in the US, Europe, and Asia. They showed that superior CEP leads to improved CFP which in turn enables reinvestments in CEP.

According to Delma and Blass (2010), measuring the CEP could be divided into three parts. The first deals with the environmental impact in terms of energy use, emission reduction, and carbon footprint. The second handles the regulatory compliance on the EP standards and policies. The third one addresses organizational processes involving environmental management systems from environmental requirements to auditing, reporting, and accountability. This paper focuses on environmental impact measuring the CEP, i.e. how renewable energy performance of companies affect their FP.

Before, people were believing that corporate social responsibility (CSR) and EP lead to a decrease in cash inflows and an increase in operational and administrative costs reducing financial performance (Hatakeda, Kokubu, Kajiwara, & Nishitani, 2012; Sprinkle & Maines, 2010; Waddock & Graves, 1997). This view was based on the argument of Friedman (1970) who emphasized that the only social responsibility of a business is to increase its profit, and was supported by many studies (Haveman & Christiansen, 1981; Jaggi & Freedman, 1992; Levy, 1995; Palmer, Oates, & Portney, 1995; Portney, 1994; Walley & Whitehead, 1994). Song, Niu, & Xiao (2017) added business competitiveness to the equation, suggesting some sort of trade-off; either improving the CEP at the expense of the CFP or the other way around. While it is true that green manufacturing may bring a unique advantage, companies have to bear some costs. Further, its effect on CFP is not only determined by environmental practices, but also by cultural and social dimensions (Ortas, Álvarez, Jaussaud, & Garayar, 2015).

To elaborate more on the results, many studies found negative correlation between EP and FP and aligns the findings with the trade-off hypothesis (Allouche & Laroche, 2007; Friedman, 1970; Friedman & Friedman, 1962). Cordeiro and Sarkis (1997) for instance, acknowledged the debate going on over environmental actions and strategies taken to prevent pollution and to reduce emissions and their implications on the firm's financial performance. Using security analyst earnings forecasts as a measure of firm performance and a sample of 523 US firms, they demonstrated a negative relationship between environmental practices and FP. Filbeck and Gorman (2004) examined the nature of relationship gathering the environmental and financial performance of electric utilities and found a negative relationship between them. Hassel (2005) expressed the value relevance of environmental performance and how it treats the market value of equity and accounting earnings and presented complete support to the cost-concerned school which argues that environmental performance has a negative influence on FP. Escobar and Vredenburg (2011) focused on how oil and gas multinational corporations respond to sustainable development issues such as climate change, renewable energy development and social investment in terms of financial performance over 5 years period, and found no superior financial performance between the companies that considered environmental practices and those that did not.

There is also a significant number of studies that found a positive relationship between CEP and CFP based on theoretical frameworks. Recent meta-analysis studies identify largely positive associations between EP and FP. Endrikat, Guenther, & Hoppe (2014) examined 30 review studies and 274 empirical studies to answer the question of whether CFP and CEP were a perfect match. In another attempt, Günther, Hoppe, & Endrikat (2011) shed light on the conflicting empirical findings between CEP and CFP. Integrating almost 150 studies, the results indicate a positive relationship between CEP and CFP. Further, the findings suggest a stronger linkage when the CEP approach is rather proactive than reactive. Friede (2015) analyzed a combination of more than 2,200 individual studies and failed to identify any negative link between ESG and CFP. In another meta-analysis study held by Orlitzky, Schmidt, & Rynes (2003), they uncovered a positive association between corporate social/environmental performance and CFP. With a total sample size of 33,878 observations, the findings were quite satisfying. Similarly, Dixon-Fowler, Slater, Johnson, Ellstrand, & Romi (2013) demonstrated some empirical results on the CEP-CFP relationship. They were more interested in discovering when it pays to be green. The results showed that both small and large firms benefit evenly from environmental performances. Albertini (2013) carried a meta-analysis of 52 studies over a 35-year period that endorsed the positive effect of CEP on CFP. These studies were influenced by Porter's hypothesis (Porter, 1990, 1991b) that suggested designing guidelines for environmental practices lines up with cost-saving and implies a positive increase in CFP.

Drawing on the theoretical configurations of the relationship between CEP and CFP, and using natural resource-based argument, some authors found a positive association between EP and FP. Russo and Fouts (1997) tested this hypothesis by using environmental ratings and concluded a strong CEP-CFP relationship. In another study, Hart and Ahuja (1996) narrowed down the environmental practices to only emissions reduction and prevention of pollution and indicated that these environmnetal practices improve financial performance in the long run. This fact was also supported by Stanwick & Stanwick (2001) who found that the CEO of companies that maintain an environmental reputation tend to compensate a lot in terms of FP. This is also in line with the findings of Fombrun and van Riel (1997) and Dangelico and Pontrandolfo (2015) who suggested that a firm's reputation is a competitive advantage that can affect its revenues depending on the strategies implemented.

King and Lenox (2001) claimed that EP boosts FP of companies, emphasizing on the moderating effect of the industry. For instance, a tourism-based study found that hotels in Costa Rica holding certifications of superior environmental performance empowered them with an advantage, resulting in higher sales (Rivera, 2002). Subrahmanya (2006) studied small scale industries in India, focusing on brick and tile clusters, and found that working on energy efficiency is like hitting one bird with three stones. Not only does it minimizes the costs and maximizes the environmental impact, but it also serves as a competitive advantage. Chai, Guo, Wang, & Lai (2009) acknowledged that the energy intensity could not be applied to all firms with the same measurement. It depends on the industry the firm operates, firm size and operating framework. Auditing energy efficiency for 1000 big Chinese companies in the shoe industry, Chai, Guo, Wang, & Lai (2009) concluded that when a company invests USD 1.9 million as an effort to enhance the energy efficiency, the investment's net present value would be USD 9.8 million with a discount rate of 12%. Moreover, this investment would have environmental dimensions like reducing the firm's energy consumption and gas emissions. Therefore, it would generate high net revenue.

From another perspective, Wagner & Schaltegger (2004) analyzed European manufacturing industries and found out that not only the type of industry moderates the CEP-CFP relationship, but also the sort of environmental strategies implemented by the companies. They noticed a more positive CFP in firms embracing shareholders' value strategies than firms who did not. In the same context, Christoffersen, Larsen, and Togeby (2006) claimed that integrating energy management systems to firm strategies would reduce energy consumption, lower utility bills and achieve a higher benefit. Awan, Imran, and Munir (2014) supported this argument and provided a number of environmental initiatives (cost reduction techniques, high energy efficiency procedures) towards an improved energy management. Kushwaha and Sharma (2016) noted a strong link between CEP and CFP in a study held in automobile industry. Earnhart and Lizal (2006) revealed some evidence for the Czech Republic firms. They found that better EP improved the profitability of firms. All these came up because of the strict regulations imposed by environmental agencies such as high emission taxes and new green technology requirements. To exemplify, only a 10% decline in carbon emissions may result in a USD 34 million increase in the market value of S&P 500 companies (Konar & Cohen, 2001). Bunse, Vodicka, Schönsleben, Brülhart, and Ernst

(2011) also encouraged firms to integrate energy management paradigms into their decision-making processes, as this would promote their CFP.

The arguments based on "It pays hypothesis" were supported by many authors. Some believe that including environmental innovation to the equation of traditional trade-off would turn the facts upside down. Porter & Van Der Linde (1995) were one of the first scholars who adopted this view. They argued that innovation is a solution for companies to ameliorate their financial resources, help them use it as a competitive advantage, and thus, increase financial efficiency. In the same vein, three important stages of using environmental practices to increase FP were underlined by Hart (1995). The first stage is to use pollution prevention strategies instead of pollution control. The second stage is to employ product stewardship as a focal key to reduce consumption. The final stage is to utilize clean technology as a mean to improve sustainability. Also, a very interesting perspective displayed by Reinhardt's paper in the late 90s advises pursuing environmental policies only if it is in favor of economic growth of companies.

Many other authors did not necessarily find a superior FP in companies having better environmental performance across industries and countries. Sarumpaet (2005) held a study on Indonesian companies by using corporate environmental ratings as a measure for the CEP and ROA as a measure for the CFP and revealed that CEP is not significantly associated with CFP. Iwata and Okada (2010) evaluated the association between CEP and financial stability by using waste and greenhouse gas emissions as the measures of CEP in Japanese companies, and showed a decrease in long term CFP. Nakao, Amano, Matsumura, Genba, and Nakano (2007), however, provided a contradictory evidence from the Japanese manufacturing companies. They found that firms that follow environmental standards tend to have higher Tobin’s q.

Studies investigating the relationship between environmental and financial performance are not only are affected by environmental performance measures, but also by the methodology. Salama (2005) noted that the CEP-CFP relationship is mostly analyzed by a simple OLS regression, and he tested this relationship by using median regression that is more robust and reliable. Using corporate reputation as a proxy to measure environmental performance, his claim was proved to be true for the British companies. Equally, Horváthová (2010) indicated that the empirical methodology used matters. She stated that the simpler the methodology is, the more is the likelihood of finding a negative correlation between environmental and financial performance. Granger causality is usually more related to proving a one-way or two-way relationship. Illustratively, Nakao (2007) supported the two-way relationship as he indicated that the beneficial impact of environmental investment occur to the firm after the initial financial investment and reciprocally. Results supporting the one-way relation of CEP-CFP (P. M. Clarkson et al., 2011) or the other way as in the CFP-CEP relationship (Nelling & Webb, 2009) also used the Granger approach.

Since the methodology is important, recent studies preferred using more complex techniques. Leong (2015) used the generalized method of moments (GMM) intending to find the correlation between the green innovation systems and financial performance in 163 international companies in the automobile industry. To evaluate the green innovation, he used energy and climate change, environmental policy reporting, and resource management. He found a positive relationship between green innovation systems and the CFP. This helps companies maintain a healthy reputation on social responsibility. However, this was not the case in Greece. Alexopoulos, Kounetas, and Tzelepis (2018) examined manufacturing plants by using the cost of energy consumption to measure the impact of environmental performance on the financial one and found that while EP has no significance effect on the FP, the latter has an impact on the former in Greece companies. Li, Ngniatedema, and Chen (2017) investigated the impact of green performance on the FP in the top 500 publicly traded US companies in distinct sectors by using energy, carbon, waste, and water productivity and green reputation as the criteria to measure environmental practices. The regression analysis showed that the EP of companies has a positive impact on CFP in the long-term. This result is also in line with the findings of Rezende, Bansi, Alves, and Galina (2019) who measured 356 multinational companies' green intensity by applying a fixed effect regression.

One of the fundamental ways to fulfill sustainability in green performance is energy efficiency. Investors do not only look for green growth, but seek improvements in energy fields. A strategically designed course of action that align with SDGs is considered a much brighter opportunity for shareholders. In her article, Bergmann, Rotzek, Wetzel, and Guenther (2017) found a strong relationship between corporate energy efficiency and ROA in 650 manufacturing corporations in Japan, Europe, and the US. Using a more specific approach to energy efficiency, Fan, Pan, Liu, and Zhou (2017) took advantage of energy intensity and energy efficiency index for 17 Chinese companies to analyze how the financial performance responded to energy efficiency and found better financial outcomes in firms that used less energy. Stinchfield (2010) also argued that renewable energy production and deployment resulted in greater financial benefits, especially on ROA and ROE. Shin (2018) reached similar results when he analyzed the relationship between RE utilization and CFP in the top 60 RE user firms in the US. Businesses that consistently utilized RE in their operations revealed higher return on investment and Tobin's q than their competitors.

CHAPTER III

THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

3.1. Importance of Corporate Social Responsibility

Corporate Social Responsibility (CSR) became a hot topic of discussion in the 1960s. It was first perceived as a responsibility rather than an option. (Friedman, 1970) viewed CSR as a responsibility only towards stockholders. Caroll (1979), on the other hand, claimed that CSR includes, but is not limited to the economic responsibilities where businesses are expected to add value to the society. Moreover, legal and ethical responsibilities are also part of the CSR.

As defined by Wood and Gray (1991), CSR is a monitoring system adapted by organizations to surveil their social and ethical practices. Thus, corporations have to fulfill both the economical obligations towards society, and the social ones. CSR practices affect the society in different ways. They shape people's perception on what is right and wrong, and more importantly, what should be done and should not (Davis, 1967). Carroll (1989) discussed the adoption of a CSR business model in which there is a place for economic, legal, ethical, and philanthropic responsibilities. Economic responsibilities include minimizing the costs, maximizing the sale, but also creating jobs and providing investment. This all can be done if the management team possesses good decision-making mechanism and adopt profitable strategic plans for mutually beneficial outcomes. This works in parallel with the legal responsibilities of corporations. Businesses are expected to comply with the regulations. After the fulfillment of the economic and legal parts of business plan, the ethical responsibility rises. Ethical practices reflect a deep understanding and caring for what the community regards as right, and fair. The last component of the CSR business model is not regarded as a responsibility nor as an obligation, rather as a voluntary practice that add value to the society. Figure 3.1 summarizes Carroll’s pyramid of CSR practices.

In the literature, the focus of CSR topics vary from the perspective of the profit motive and how CSR increase the long-term financial returns (Friedman, 1970; Jensen & Gao, 2007; McWilliams & Siegel, 2000) to the discretionary and the common good of the society (Andriof & McIntosh, 2001; Logsdon & Wood, 2002) and to stakeholder management which appears to improve business performance (Carroll, 1989; Mitchell, Agle, & Wood, 1997; Rowley & Traub, 1977). As Jones, Wicks, & Freeman (2002) suggested, there is a deep-rooted relationship between stakeholder theory and CSR. Since CSR aims to integrate the social needs of all stakeholders into corporations' business strategies, it became vital for every organization's survival to use CSR as a tool to improve the firm's image (Preston & Post, 1981).

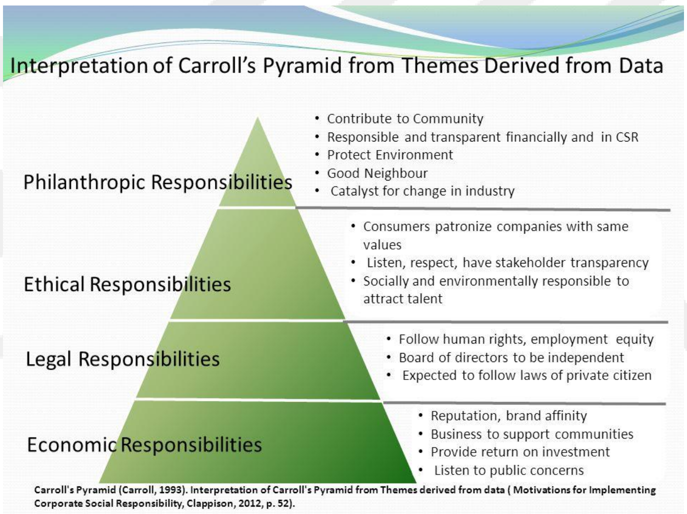

Figure 3.1. Carroll's Pyramid of CSR Practices (Carroll, 1989)

Formulating strategic plans that take into account the demands of customers, suppliers, buyers, employees, and community members promotes product differentiation (McWilliams & Siegel, 2000). From his side, Campbell (2007) treated the integration of environmental management practices that are well-fitted in the CSR business plan. On the economic side, it increases long-term profit, while on the ethical side it forms high ethical standards. Firms should integrate environmentally responsible operations such as finding new creative ways to use energy more efficiently, developing innovative products that are abiding by the effective energy measure (Sodhi, 2015).

3.2. Theoretical Background

3.2.1. Stakeholder Theory

The term "stakeholder" was first introduced in 1963 by Stanford Research Institute and was defined as "groups without whose support the organization would cease to exist". The concept was then developed by Freeman in the 1980s and revisited as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984).

The evolution of the stakeholder theory literature includes several definitions and arguments based on the theoretical framework of Freeman. For instance, Donaldson and Preston (1995) argued that stakeholder theory is "descriptive, instrumental, and normative". First, the stakeholder describes the way business works today, and how it should be, and it shows the importance of other shareholders other than managers and how they should be treated to increase firm performance. Jawahar and McLaughlin (2001) discussed that the descriptive stakeholder theory was developed due to the divergent needs of organizations at different stages of its life cycle. Therefore, to differentiate between critical stakeholders and other stakeholders is vital to survive. Second, stakeholder theory is instrumental because it helps increasing firm financial performance efficiently and effectively. Finally, it is normative because it manages the interests of different stakeholder groups by implementing processes that satisfy all groups and fairly allocating societal resources. Bouckaert and Vandenhove (1998) claimed that the normative function of stakeholder theory is manifested in the concept of social responsibility in terms of social and ethical practices.

Clarkson (1995) claimed that stakeholders could be any individual or organization that has an interest in the corporation's activities. Thus, there are primary and secondary stakeholders. Primary stakeholders are actors having a direct relationship, either a functional or financial one, determined by a contract like employees, stockholders, customers, suppliers, and creditors. Secondary stakeholders, on the other hand, are those who impact or are impacted by the actions of the firm such as general public, governments, regulators, and communities. Donaldson and Preston (1995) distinguished stakeholders into two categories based on their legitimate interests. Those whose legitimate interests are identified and those whose interests are based on intrinsic values. Lépineux (2005) put stakeholders into four categories: shareholders that own stock, internal stakeholders from employees and managers to board of directors and investors. Then, customers, suppliers, creditors as operational partners, and finally, the social community including the state authorities and trade unions.

Due to different perspectives, expectations play a vital role in identifying the satisfaction level. Wilson and Gordon (2003) illustrated this by showing each group's goals and priorities; investors and shareholders await a profitable return on investment, while employees expect safe working conditions, accurate wage payment, job security, and local communities and regulators are keen to be involved in community investments and full compliance on regulations. Thus, a sustainable stakeholder relation should be implemented by strategies to have a good reputation and enhance competitiveness of firms (Perrini & Tencati, 2006).

On the environmental issues, stakeholder pressure is constantly increasing. Buysse and Verbeke (2003) found that stakeholders affect the environmental strategies adopted by the companies. Delmas and Toffel (2004) investigated the reason behind the adoption of additional environmental management practices beyond legal requirements and found that the philanthropic act of those companies has more to do with the public stakeholder as well as the institutional stakeholder pressure, plus their competitive position. The supply chain is one of the areas that environmental management issues are heavily addressed. In a study covering of 84 companies in North America, Vachon and Klassen (2006) split green practices into environmental collaborations and monitoring. On technological level, the integration of modern technology affected environmental collaboration positively when dealing with customers and suppliers. In another study of 153 Slovenian manufacturing companies, Cater and Prasnikar (2009) looked for justifications of why companies implement environmental strategies and found that the top management commitment, public concern, regulatory forces, and the need for a strong competitive advantage were the reasons that push firms to adapt environmental strategies. Similar findings are revealed in another study held on 26 Tunisian companies over the period 1994-2008 (Zrelli & Belloumi, 2015).

3.2.2. Resource-Based-View (RBV)

The RBV theory dates back to the 1970s and 1980s when scholars showed an interest in studying the impact of firm resources on its performance. In his book, Chandler (1962) investigated how 70 large US industrial enterprises used a well-structured strategy to efficiently expand their businesses. Wernerfelt (1984) look at firms more in terms of their resources, less in terms of their products. Wrigh (1994) believes that available products are a consequence of strong resources that is why we should concentrate on the primary source of the company, i.e. its resources. Rumelt (1984) attributed the outperformance of some firms on others in the same industry to the strategic use of the resources.

Barney (1986) also helped to establish RBV theory in strategic management throughout the years. He first defined firm resources as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enables it to conceive and implement strategies that improve its efficiency and effectiveness". He explains that homogenous resources do not create competitive advantage because then all firms would be applying the same strategies. Whereas firms that have heterogeneous resources have the advantage of being different, therefore, can focus on formulating strategies that will result in superior financial performance. Later, Barney (1991) emphasized on the fact that having diversified resources is not sufficient for a sustainable competitive advantage. Rivals should be unable to copy or imitate the competitive advantage and the strategies used to implement it. He also pointed out that the socially complex resources are the most important kind of resources any company can own. Physical and technological infrastructure and financial capabilities are easily accessible and are at the disposal of all companies. On the other hand, human capital, social network, interpersonal relationships, culture, and social relations are scarce, durable, and inimitable which makes them strategic assets that help companies to exploit the technological and physical resources.

Various scholars (Armstrong & Shimizu, 2007; Barney, 1991; Barney, 1986; Gray, 2010; Wernerfelt, 1984) had significant contributions to the development of the RBV theory. They found that owning exquisite resources that are rare, and may not be copied by rivals, and used differently lead to a positive difference in performance and a favorable positioning amongst companies. Porter (1990) provided three main competitive strategies on how firms can position themselves and sustain profitability (Figure 3.2). First is cost leadership; companies tend to exploit their resources to become the lowest-cost producer. Second is differentiation strategy; here companies seek uniqueness. Although a bit expensive, firms create differentiating attributes to distinguish their products. The third is focus strategy; as the name suggests, firms either focus on competitors' prices and keep their prices lower (cost focus), or focus on competitors' missing features and build on them (Differentiation focus).

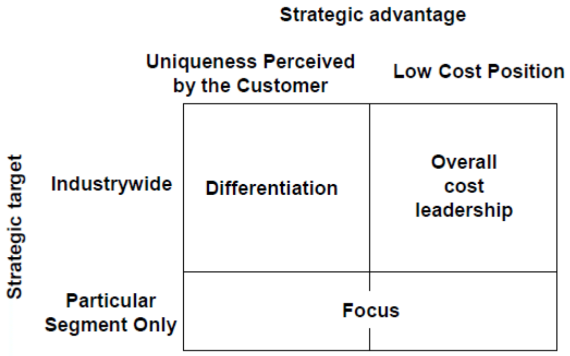

Figure 3.2. Porter's Generic Strategies (Porter, 1980)

Barney (1991) drew on the findings of Porter's environmental model of competitive advantage and added a resource-based model. He considered Porter's model focusing more on the external environment, thus, only including opportunities and threats. However, he believes that it is essential to also look at the strengths and weaknesses inside. Since opportunities and threats apply to all, there is not much to change about them. What companies can control is what happens inside. Internal analysis of companies reveals value, rareness, imperfect imitability, and non-substitutability. Those are firm resource immobility and heterogeneity which create a competitive advantage. Figure 3.3 shows how Barney's approach.

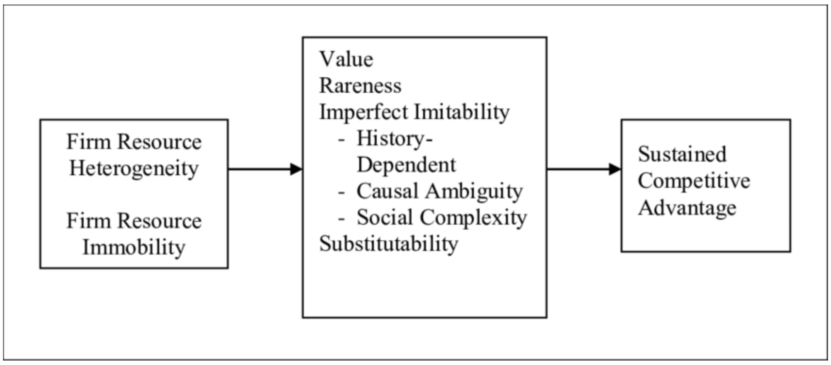

Figure 3.3. Barney's Approach to Identifying Sustainable Competitive Advantage (J. Barney, 1991)

RBV is an integration of both the firm's internal capabilities (de Ven, Peters, & Waterman, 1983; Prahalad & Hamel, 1990) and external factors (Hannan & Freeman, 1977; Porter, 1980, 1990). External environment challenges are countless ranging from globalization to rapid technological developments. Internal challenges are also of equal importance ranging from financial management to controlling organizational processes. Figure 4 illustrates the resource-based model proposed by Barney (1991).

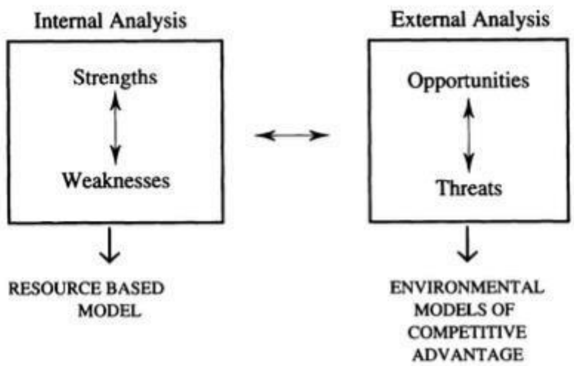

Figure 3.4. Barney's Resource-Based Model in Contrast with the Environmental Model of Competitive Advantage (Barney, 1991)

3.2.3. The Natural Resource-Based View

Companies face with several environmental constraints. Thus, the natural environment should be considered as an important component in the equation. Hart (1995) proposed the integration of the natural environment factor into the resource-based theory and named it as Natural Resources Based View (NRBV). This theory focuses on creating competitive advantages by environmental sustainability. The NRBV put forward three strategies to help attain a competitive advantage. According to Figure 3.5, pollution prevention, product stewardship, and sustainable development are three components of strategic capabilities adopted by the NRBV.

A Natural-Resource-Based View: Conceptual Framework

Strategic Capability	Environmental Driving Force	Key Resource	Competitive Advantage
Pollution Prevention	Minimize emissions, effluents, & waste	Continuous improvement	Lower costs
Product Stewardship	Minimize life-cycle cost of products	Stakeholder integration	Preempt competitors
Sustainable Development	Minimize environmental burden of firm growth and development	Shared vision	Future position

Figure 3.5. Hart's Conceptual Framework of the Natural-Resource-Based View (S. Hart, 1995)

The driving force behind pollution prevention is the minimization of emissions and waste. There are two ways a company could achieve this; an efficient and an inefficient one. The former one is performed rationally by the prevention of pollution in the first place. Young (1991) and Hart (1995) estimated that this could be done by using innovative technology to reduce toxicity, remanufacture waste materials, and by reducing the sources used. This results in lower costs and better total quality management, hence, attaining sustainable competitive advantage. The latter approach is controlling pollution activities. This is both time-consuming, expensive and inefficient because it requires performing a closed-loop analysis starting with formulating then implementing strategies to finally clean up the mess using end-of-pipe cleaning technologies. The second environmental strategy is product stewardship. It is about minimizing the cost and environmental impact of products throughout the entire value chain system. The last strategic capability is sustainable development. It has broader compromises, but is not limited to pollution prevention and product stewardship. It does not only focus on minimizing environmental hazards, but it also seeks to improve the future environmental, social and economic positions of the firm.

Combining these key characteristics of resources such as being valuable, rare; adopting smart strategies of both firm resource capabilities such as advanced technology, stakeholder management, and management skills; and environmental strategies or the natural resources from pollution prevention, product stewardship, and sustainable development, will lead to a strong positioning and creation of sustainable competitive advantage that would differentiate the firm from its competitors.

3.3. Hypotheses Development

Taking into account the theoretical background and the findings of previous studies, we may come up with a new conceptual framework, which is a combination of the 2030 SDGs and the ESG environment targets. We cluster the hypotheses into three groups. The first group is composed of three hypotheses derived from the 7th SDG. The second one consists of two hypotheses derived from the 12th SDG. The last one comprises four hypotheses derived from the ESG environment factors. We also insert a fourth part dealing with control variables.

3.3.1. Sustainable Development Goal on Energy (SDG7)

The UN’s 7th SDG’s theme focuses on ensuring access to affordable, reliable, sustainable and modern energy services by 2030. A 2018 Energizing Finance report reveals that almost 20 countries worldwide, and that 1 out of 7 people in the world have electricity access. Moreover, even the countries with access to electricity spent 3% of finance on coal-fired power stations, while spending only 1% on renewable energy power plants. Statistics show that 2 out of 3 of the global energy usage is not efficient. The funds required for universal access to electricity are USD 4.4 billion a year, while only USD 32 million a year is invested (Finance, 2018).

On a country level, the 7th SDG aims to:

- ✓ Close the gap between people with access to energy and those without.
- ✓ Double the share of renewable energy for electricity production purposes.
- ✓ Double the rate of energy efficiency for more cost-effective savings by raising awareness of policy-makers.
- ✓ Increase investments in sustainable renewable energy.

- ✓ Using advanced technology systems to improve energy efficiency and widen electricity access.

On a firm-level, the 7th SDG intends to make sure that companies:

- ✓ Adopt policies to improve energy efficiency.
- ✓ Generate and use more renewable energy sources in their production.
- ✓ Create innovative technologies for clean/renewable energy use.
- ✓ Advocate for environmental, responsible, and cost-efficient products and services.

Thus, we propose the following hypotheses:

H_{a1}: There is a positive and significant association between policy energy efficiency and corporate financial performance.

H_{a2}: There is a positive and significant association between renewable energy use and corporate financial performance.

H_{a3}: There is a positive and significant association between renewable/clean energy products and corporate financial performance.

3.3.2. Sustainable Development Goal on Energy (SDG12)

The 12th SDG deals with responsible consumption and production. It emphasizes three levels for sustainable economic growth and a reduction of mankind's ecological footprint; water, energy, and food. An UNDP report published in 2020 stated that 20% of the total energy used in 2013 was from renewable sources. It also mentions that USD 120 billion would be saved per year if people only used efficient lightbulbs. It also refers to the huge energy amount consumed by households in the OECD countries which increase CO_2 emissions by 21% annually. This emission rate is expected to reach 35% in the forthcoming years.

On a country level, the 12th SDG aims to:

- ✓ Achieve sustainable management and efficient use of natural resources.

- ✓ Dramatically decrease toxic chemical waste through recycling, reproduction, and reuse.
- ✓ Support the enhancements in technology in developing countries.
- ✓ Rationalize the use of fossil fuels by implementing strict policies.

On a firm-level, the 12th SDG intends to make sure that companies:

- ✓ Take initiatives to cycle, reuse, and reduce the total waste.
- ✓ Have policies that improve the use of sustainable packaging.
- ✓ Use environmental criteria to the source of eliminating materials.
- ✓ Have policies to include its supply chain to lessen its overall environmental impact.

Thus, we propose the following hypotheses:

H_{b1}: There is a positive and significant association between resource use score and corporate financial performance.

H_{b2}: There is a positive and significant association between emissions score and corporate financial performance.

3.3.3. ESG Environment Factors

Following an ESG strategy helps firms to assess their sustainability performance. Metrics to measure environmental performance vary from resource management, emission reduction, production, green procurement, to global warming prevention.

On a firm-level, ESG environment factors investigate whether companies:

- ✓ Produce renewable energy or purchase it, and if their waste is converted to energy.
- ✓ Claim to have ISO (International Organization for Standardization) or EMS (Environmental Management System) certificates.
- ✓ Use their best management practices to avoid environmental risks.
- ✓ Set targets and objectives to be achieved regarding energy efficiency.

Relying on the NRBV and stakeholder theory, we propose the following hypotheses:

H_{c1}: There is a positive and significant association between renewable energy use ratio and corporate financial performance.

H_{c2}: There is a positive and significant association between ISO 1400 or EMS and corporate financial performance.

H_{c3}: There is a positive and significant association between environment pillar score and corporate financial performance.

H_{c4}: There is a positive and significant association between target energy efficiency and corporate financial performance.

Figure 3.6. delineates the hypothesized relationships, along with control variables.

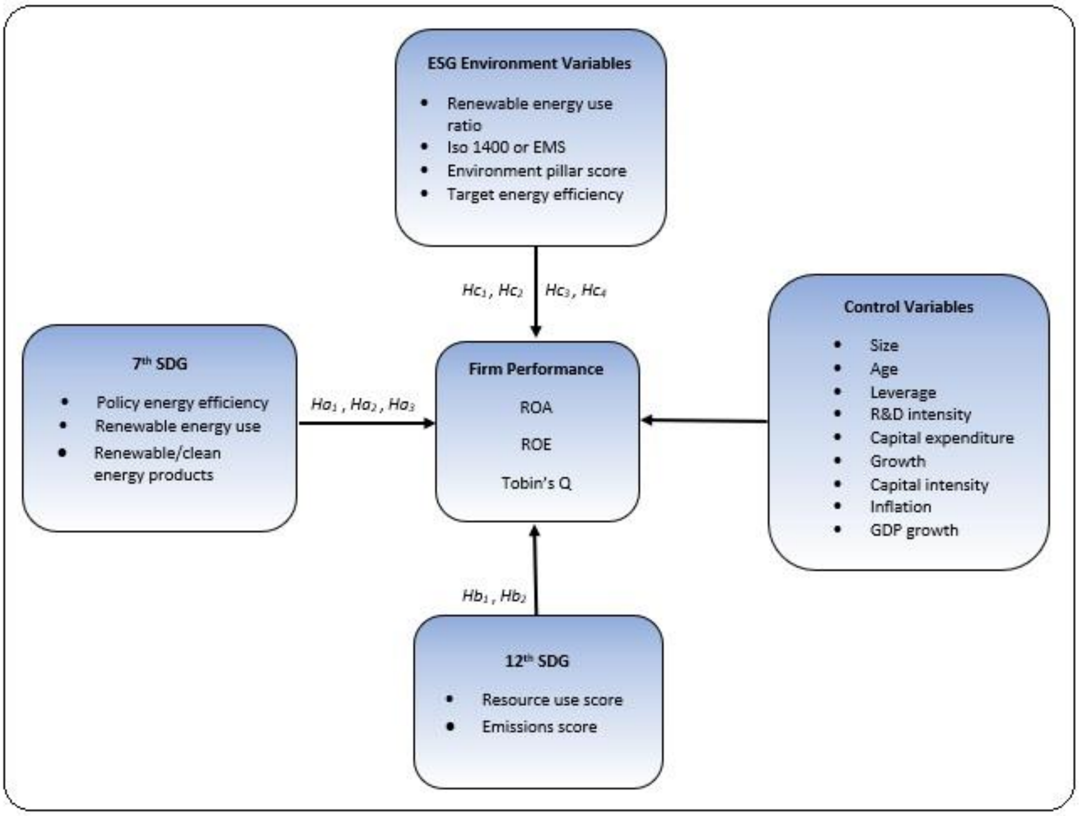

Figure 3.6. Research Framework

CHAPTER IV

RESEARCH METHODOLOGY

In this chapter, we discuss the scope of the research, data collection methodology and the sample. Then, we present the dependent, independent and control variables and descriptive statistics. In the last part, we provide data analysis and regression models.

4.1. Research Scope

Environmental sustainability is quite important in the long run. Thus, in many industries professionals try to move to more natural solutions, including renewable energy. This study aims to provide insights to professionals and policy-makers on the implementation of renewable energy on reaching SDGs. It investigates the effect of renewable energy performance on the financial performance of companies by conducting country-level and firm level analysis for developed and developing countries by using the following approaches:

- Identifying the components of sustainability and measuring them with a special focus on environmental sustainability,
- Assessing environmental and financial performance with an emphasis on renewable energy performance,
- Implementing a quantitative research methodology to evaluate renewable energy performance in in financial and non-financial companies,
- Providing managerial implications.

In this frame, we explore the integration of the UN SDGs and the ESG pillars under the Thomson Reuters' "Mapping to UN SDGs" report. The template maps relevant ESG metrics to UN SDGs. On this framework, we concentrate on only two SDGs, namely the 7th and the 12th SDGs. We also use ESG environment factors.

4.2. Methodological Approach and Data Collection

In this study, we use a quantitative approach. We employ secondary data from Thomson Reuters database (EIKON) for firm-level variables and from the World Bank database for country-level variables. The data collection process has four steps. First, we select dependent, independent, and control variables. Second, we choose the time frame which is 2009 to 2018 to observe the trends after the global financial crisis. Third, we determine countries and companies. Fourth, we filter the data set.

We take the "Mapping to the UN SDGs" as a solid ground for the dependent variables. There are four variables under the 7^{th} SDG, nine variables under the 12^{th} SDG, and one variable under the 13^{th} SDG. After the filtering, variables that do not have enough data are deleted. We end up with only five SDG variables: three from the 7^{th} SDG and two from the 12^{th} SDG. For the ESG pillars, we take only the environmental factors. Although the EIKON database covers almost 121 environment variables under three categories, namely Resource Use, Emissions, and Innovation, we choose only four of them since we base our discussion on only renewable energy related variables.

For the independent variables, we choose four variables for measuring financial performance. Nevertheless, we proceed with only three of them due to data availability. Likewise, we use nine control variables.

For the sample, we ended up with 44 countries and 563 firms in total. Table 4.1 shows the classification of the countries. We use the World Bank classification for the list of developed and developing countries. There are 25 developed and 21 developing countries. Among the 563 listed companies, 118 of them are financial, while 445 of them are non-financial. Table 4.2 shows the industry classification of the companies as reported by the Classification of Thomson Reuters Business (TRBC).

Table 4.1. World Bank Classification of Developed/Developing Countries

Developped Countries	Developing Countries
Australia	Brazil
Austria	Chile
Belgium	China
Canada	Colombia
Denmark	Cyprus
Finland	Hungary
France	India
Germany	Indonesia
Greece	Kenya
Hong kong	Kuwait
Ireland	Malaysia
Israel	Mexico
Italy	Peru
Japan	Poland
Luxembourg	Russia
Netherlands	Saudi Arabia
Norway	Singapore
Portugal	South Africa
S.Korea	Tailand
Spain	Turkey
Sweden	UAE
Switzerland	
Taiwan	
UK	
USA	

Source: World Bank

Table 4.2. TRBC by Industry for the Listed Companies

Financial Companies	Non-financial Companies
Banks	Basic Materials
Commercial REITs	Consuer Cyclicals
Consumer lending	Consumer Non-Cyclicals
Diversified REITs	Energy
Financial & Commodity Market Operators & Service	Healthcare
Investment Banking & Brokerage Services	Industrials
Investment Holding Companies	Technology
Inverstment Management & Fund Operators	Telecommunications Services
Life & Health Insurance	Utilities
Multiline Insurance & Brokers	
Property & Casualty Insurance	
Real Estate Rental, Development & Operations	
Reinsurance	
Specialized REITs	

Source: Thomson Reuters Business Classification

4.3. Limitations of the Study

The first limitation of the study is the sample size. We cover only 563 companies from 44 countries. The second limitation is the time frame. The study makes the analysis over the period 2009-2018. Third, we use only variables on renewable energy from the SDGs and ESG pillars. Future studies may include more variables.

4.4. Variables Definition and Measurement

In this section, we define the dependent, independent, and control variables. We analyze 3 dependent, 9 independent and 9 control variables for the years 2009-2018.

4.4.1. Dependent Variables

For financial performance measurement, return on assets and return on equity are utilized as accounting-based measures; andTobin’s q is used as a market-based measure.

- ROA measures operating efficiency of a company without considering the degree of financial leverage. It is calculated by dividing net income by total assets (Equation 1).

Return on Assets (ROA) = Net Income / Total Assets (1)

- ROE is calculated by dividing net income to total equity as shown in Equation 2. Both ROA and ROE are usually used to measure short-term CFP, while Tobin's q is a measure of the long-term CFP.

Return on Equity (ROE) = Net income / Total Equity (2)

- Tobin's Q is calculated following Lindenberg and Ross (1981) definition by dividing total market value to total assets. It reflects the investor trust (Inoue & Lee, 2011).

Tobin's Q = Total Market Value / Total Asset Value (3)

4.4.2. Independent Variables

We use variables under the 7th and 12th SDGs and some environment variables under the ESG pillars to measure renewable energy performance of companies. Policy energy efficiency, renewable energy use, and renewable energy/clean products are classified under the 7th SDG, while resource use scores and emissions scores are grouped under the 12th SDG. Finally, renewable energy use ratio, ISO 14000 or EMS, environment pillar score, and target energy efficiency are under the ESG pillars. A description of these variables is given below:

- *Policy Energy Efficiency (PEE)* is measured as a set of formal documented processes for efficient use of energy and driving continuous improvement. It investigates whether the company has the policy to improve its energy efficiency in terms of processes/mechanisms/procedures to improve energy use in operation efficiently. PEE is a dummy variable where "0" implies companies that use energy efficiency policies and "0" denotes otherwise.

- *Renewable Energy Use (REU)* inspects whether the company makes use of renewable energy by the amount of renewable energy produced/purchased for its own use only. It also measures the amount of waste that is converted to energy and is used by the firm for its own use. REU is measured by a dummy variable where "1" denotes firms that use renewable energy and "0" otherwise.

- *Renewable/Clean Energy Products (REP)* analyzes whether or not the companies use clean renewable energy sources such as wind, solar or biomass power in the forming process of their products and services. It also examines if firms derive at least 25% of the power produced or revenue from clean technologies and much of it is used to finance RE projects. REP is a dummy variable where "1" suggests that companies use renewable and clean energy products and "0" otherwise.

- *Resource Use Score (RUS)* evaluates how a company diminishes material use, water and energy employment. It also reflects the eco-efficient and technological solutions in the management of the company's supply chain.

- *Emissions Score (ES)* assesses the impact of the company in reducing environmental emissions in both the production and operational processes.

- *Renewable Energy Use Ratio (REUR)* represents the allocation of the primary renewable energy sources in contrast to the total energy generated.

- *ISO 14000 or EMS (ISO)* examines if the company claims to have an ISO 14000 or EMS certification. ISO is a dummy variable where "1" indicates companies that use ISO certification and "0" otherwise.

- *Environment Pillar Score (EPS)* determines the impact of a company on the ecosystem from living and non-living creatures. It also assesses how well companies use their management practices to avoid environmental risks.

- *Target Energy Efficiency (TEE)* inspects if the company sets targets to achieve on energy efficiency. It is measured as a dummy variable where "1" implies companies with energy efficiency targets and "0" otherwise.

4.4.3. Control Variables

We usually use control variables that may have an influence on the results. In this study, we employ the following 9 control variables:

- *Firm Size (Size)* has a debatable impact on firm performance. Majumdar (1997) and Isik and Tasgin (2017) found a positive association between size and profitability, while Hatem (2014) and Shehata, Salhin, and El-Helaly (2017) found negative relationship. Firm size is measured as a proxy by the logarithm of total assets.

  Firm Size = $\ln(Total\ Assets)$ (4)

- *Firm Age (Age)* has also an ambiguous effect on firm performance. While few authors believe that there is a significant positive relationship between firm age and profitability (Ilaboya & Ohiokha, 2016), many others show that firm age affects firm's performance negatively (Haykir & Çelik, 2018; Pervan, Pervan, & Ćurak, 2017). This is explained by the fact that as firms get older, they accumulate a holistic knowledge in almost all industry aspects which is difficult for younger firms. Firm age is measured as a proxy by the logarithm of the number of years a company has been working since its foundation.

  Firm Age = $\ln(Number\ of\ working\ years)$ (5)

- *Firm Leverage (Leverage)* has a positive effect on CFP according to the market timing theory and pecking order theory. This is exactly what Dey, Hossain, and Rahman (2018) found when they studied the behavior of 48 companies within a time frame of 17 years in Bangladesh. They detected that while leverage has a positive effect on ROA and Tobin's q, it harms ROE. In another study, Chu and Wang (2017) found a negative relationship between leverage and firm performance in Pakistan. Firm leverage is calculated by dividing total debt to total assets (Equation 6).
  Firm Leverage = Total Debt / Total Assets (6)

- *R&D Intensity (RD)* has a strong influence on the CFP as depicted by many studies. Investing in R&D helps generate patterns which improves sales and boosts reputation (Lee & Min, 2015; Rafiq *et al.*, 2018). It is measured by dividing R&D investments to net sales as illustrated in Equation 7.

$$\text{R\&D Intensity} = \text{R\&D expenses} / \text{Revenue} \quad (7)$$

- *Capital Expenditure (CE)* are the funds used by a firm to acquire or upgrade physical assets such as property, industrial buildings, or equipment. It may have positive effect on CFP. It is measured as in Equation 8.

  Capital Expenditure = Net increase in PP&E (Property, Plant, and Equipment) + Depreciation Expense (8)

- *Capital Intensity (CI)* may have a negative influence on CFP increasing its risk (Brealey, Myers, & Allen, 2008; S. Lee, Singal, & Kang, 2013) or a positive one (Gamlath & Lahiri, 2014). It is measured as a proxy by the natural logarithm of capital expenditure divided to sales as shown in Equation 9.

  $$\text{Capital Intensity} = \ln(Capital\ Expenditure/Sales) \quad (9)$$

- *Growth (GR)* enhances positive relationship between energy intensity and financial performance (Fan *et al.*, 2017). We use Compounded Annual Growth Rate (CAGR) as a proxy to measure firm growth.

- *Gross Domestic Product (GDP)* is a commonly used measure. GDP growth rate has a significant effect on firm financial performance, especially on ROA (Egbunike & Okerekeoti, 2018).

- *Inflation Rate (INF)* is the increase in the price of goods and services over a certain period in the market.

4.5. Data Analysis

In this study, we use panel data analysis. It fits to our data set since the sample is composed of both cross-sectional and time-series data. According to Baltagi (2001), panel data methodology is quite efficient and comprehensive because it is a merge of two data sets: a horizontal cross-sectional number of units (N), and a corresponding vertical time dimension (T). Our research is an investigation of how renewable energy performance affects the financial performance of companies (N) over 10 years (T).

Panel data methodology consists of running regressions on data that comprises individual observations over time. It is sometimes called multidimensional analysis, longitudinal or pooled data analysis (Gujarati, 2003). There are so far two types of panel data: micro and macro panels. When the data has several individuals (N) greater than the period (T), then it is a sign of micro panel data. On the contrary, when (N) is greater than (T), then it is a macro panel data (Baltagi, 2005). In our case, as we have a number of individuals ($N_{(companies)} = 563$; $N_{(countries)} = 46$) and a time period of 10 years (T = 2009-2018), and thus, our data is a micro panel data set.

Many authors (Asteriou & Hall, 2011; Baltagi, 2001; Cameron & Trivedi, 2005; Hsaio, 2002) agree that panel data has many advantages compared to other econometric methodologies. Some of them may be summarized as follows:

- Increased accuracy and preciseness due to expansion of pooled observations of each individual through several periods.
- It enables control for multicollinearity, heterogeneity, and heteroscedasticity since it increases the degrees of freedom.
- It provides more information, and thus, opens the door to analyze the dynamics of adjustment regarding the individuals.
- Unlike cross-section and time-series data, panel data makes it possible to detect unnoticeable connections amongst variables.
- Permits to build and analyze increasingly sophisticated behavioral models contrary to simple cross-sectional or time-series data.

Although panel data has several benefits vis-à-vis other methodologies, it also has some limitations. Baltagi (2005) mentioned some of them as follows:

- Panel data faces a shortage in data collection and design because of incomplete coverage in databases or nonresponse of the interviewers in panel surveys.
- High measurement error due to faulty or misleading responses especially in questionnaires, surveys, and interviews.

- Sample selection bias or selectivity bias due to self-selection or nonresponse of the respondents.

Two types of data panels are used to describe whether a panel dataset is properly designed: balanced and unbalanced datasets. When the collected dataset has several observations (n) following (N) and (T) as in (n = N x T), then it is a balanced panel. Whereas, an unbalanced panel is when we have an (n < N x T), that is when at least one individual (N) is not observed over at least one period of time. Figure 4.1 shows the type of panels we have, i.e. a strongly balanced panel data on both country of headquarter-level and firm-level. Table 4.3 indicates our variables and the number of observations.

```
panel variable:  country1 (strongly balanced)
 time variable:  year, 2009 to 2018
         delta:  1 year

panel variable:  company1 (strongly balanced)
 time variable:  year, 2009 to 2018
         delta:  1 year
```

Figure 4.1. Balanced Panel Data on Country-Level and Firm-Level

Table 4.3. Number of Observations of Each Variable with the Minimum and Maximum Values

	Financial firms			Non-financial firms		
Variables	**Obs.**	**Min**	**Max**	**Obs.**	**Min**	**Max**
TQ	1180	0	14.5	4450	0	12.14
ROA	1180	-0.11	0.38	4450	-0.36	107.45
ROE	1180	-5.99	0.7	4450	-19	18.88
PEE	1180	0	1	4450	0	1
REU	1180	0	1	4450	0	1
REP	1180	0	1	4450	0	1
RUS	1180	0	99.76	4450	0	99.86
ES	1180	0	99.92	4450	0	99.81
REUR	1180	0	1	4450	0	1
ISO	1180	0	1	4450	0	1
EPS	1180	0	98.98	4450	0	99.08
TEE	1180	0	1	4450	0	1
SIZE	1180	0	28	4450	18.34	26.44
AGE	1180	0	7.61	4450	0	5
LEVERAGE	1180	0	42.41	4450	0	3.04
RD	1180	0	0.22	4450	-0.05	0.58
CE	1180	0	23.36	4450	10.89	24.41
CI	1180	0	3.59	4450	-1.5	6.17
GR	1180	-0.68	1.88	4450	-0.57	1.35
GDP	1180	-8.07	11.11	4450	-9.13	25.16
INF	1180	-2.31	16.43	4450	-5.99	24.8

The following step is to determine the appropriate panel data regression model. Equation 10 shows a simple linear regression panel model where Y_{it} is the dependent variable, X_{it} is the independent variable, α and β are constant coefficients, and the U_{it} is the Random Error Component (REC). REC is combined with μ_i denoting the unobserved individual effect, λ_t denoting the unobserved time effect, and ε_{it} is the error term or as called the remainder disturbance.

$$Y_{it} = \alpha_{it} + \beta\, X_{it} + U_{it} \qquad , \quad i = 1, 2, \dots, N \;\; , t = 1, 2, \dots, T \qquad (10)$$

$$U_{it} = \mu_i + \lambda_t + \varepsilon_{it} \qquad , \quad i = 1, 2, \dots, N \;\; , t = 1, 2, \dots, T \qquad (11)$$

To finalize the proper regression model for testing the hypotheses, we conducted some model selection testing. As claimed by Baltagi (2005), the Hausman test best fits to decide on which estimator is the most suitable one for the analysis. Hausman specification test is a statistical approach that helps one choose between the Fixed Effect (FE) and Random Effect (RE) models. Hausman (1978) explains that in the null hypothesis, the coefficient β in both the FE and the RE models is consistent, but that of the FE model is inefficient. In the alternative hypothesis, however, the coefficient β is only consistent in the FE model and inconsistent in the RE model.

In a FE regression model, the group mean is fixed; meaning that effect size in similar studies is the same. The generalized fixed-effect model equation is given in Equation 12.

$$Y_{it} = \alpha_{0it} + \beta_{1it}\, X_{1it} + \beta_{2it}\, X_{2it} + \beta_{3it}\, X_{3it} + \beta_{kit}\, X_{kit} + U_{it} \qquad (12)$$

Where:

$\alpha_{0it} = \alpha_{it} = \acute{\alpha} + u_i$

u_i indicates the constant units over time and U_{it} is the error term

$\beta_{1it} = \beta_1$; $\beta_{2it} = \beta_2$; … ; $\beta_{kit} = \beta_k$

In a RE regression model, the group mean is assumed to be a random sample from a population, meaning that the effect size differs from one study to another. The generalized random effect model equation is given in Equation 13.

$$Y_{it} = \alpha_{0it} + \beta_{1it}\, X_{1it} + \beta_{2it}\, X_{2it} + \beta_{3it}\, X_{3it} + \beta_{kit}\, X_{kit} + U_{it} + V_{it} \qquad (13)$$

Where:

$U_{it} = u_i + e_{it}$

u_i represents the unobservable individual-specific effect, and e_{it} represents the white noise.

It should be noted that u_i plays a vital role in distinguishing between FE and RE models. As it represents a measure of unobserved heterogeneity at the unit level. Therefore, correlated heterogeneity assures the usage of a FE model, whereas an uncorrelated heterogeneity suggests employing the RE model. It should also be noted that the structure of data makes a difference in choosing between the models. For instance, the process of investigating the effect of renewable energy performance on firm performance includes 3 independent variables, 9 independent variables, and 9 control variables over the period 2009-2018. Thus, having several units higher than the time designates that the RE model is a better fit for our data than the FE model. Table 4.4. and Table 4.5. present Hausman test results on country level and firm level.

Table 4.4. Results of Hausman Test on Country Level

	Developed Countries			*Developing Countries*		
	TOBIN'S Q	**ROA**	**ROE**	**TOBIN'S Q**	**ROA**	**ROE**
chi2(18)	19.12	16.16	6.86	8.27	15.01	11.75
Prob>chi2	0.3842	0.5124	0.9913	0.9406	0.5945	0.8153

Table 4.5. Results of Hausman Test on Firm Level

	Financial Firms			*Non-financial Firms*		
	TOBIN'S Q	**ROA**	**ROE**	**TOBIN'S Q**	**ROA**	**ROE**
chi2(18)	23.66	9.19	18.92	5.29	24.02	25.48
Prob>chi2	0.1666	0.9552	0.333	0.9983	0.1544	0.1122

Hausman test results show a probability value greater than 0.05 in all cases. This means that the null hypothesis is not rejected, denoting that the RE model is best fitted to our data in Tobin's q, ROA, and ROE. Consequently, according to the Hausman test, the model selection process suggests that the effect of renewable energy performance on firm performance should be measured by a random effect model.

To ensure robustness of Hausman test results, we also employed a Lagrangian Multiplier (LM) test. An LM test measures whether the data is properly fitted to the RE or to Simple Ordinarily Least Square (OLS) regression. The null hypothesis in the LM test suggests no significant difference across units. Otherwise, when there is variance across units, then the null hypothesis is rejected. The results of the LM test are given with details in Table 4.6., 4.7., 4.8. and 4.9.

Table 4.6. Test Results of Lagrangian Multiplier for Developed Countries

roa[country1,t] = Xb + u[country1] + e[country1,t]

roe[country1,t] = Xb + u[country1] + e[country1,t]

tq[country1,t] = Xb + u[country1] + e[country1,t]

	Var	sd = sqrt(Var)
ROA	0.8	0.89
e	0.37	0.61
u	0.19	0.44

	Var	sd = sqrt(Var)
TQ	0.05	0.24
e	0.008	0.09
u	0.03	0.17

	Var	sd = sqrt(Var)
ROE	0.39	0.62
e	0.2	0.45
u	0.02	0.16

$Chibar2(01)_{ROA} = 17.68$

$Chibar2(01)_{ROE} = 27.89$

$Chibar2(01)_{TQ} = 351.28$

$Prob > chibar2_{ROA} = 0.0000$; $Prob > chibar2_{ROE} = 0.0000$

$Prob > chibar2_{TQ} = 0.0000$

Table 4.7. Test Results of Lagrangian Multiplier for Developing Countries

roa[country1,t] = Xb + u[country1] + e[country1,t]

roe[country1,t] = Xb + u[country1] + e[country1,t]

tq[country1,t] = Xb + u[country1] + e[country1,t]

	Var	sd = sqrt(Var)
ROA	0.003	0.05
E	0.001	0.03
U	0.0003	0.01

	Var	sd = sqrt(Var)
TQ	2.63	1.62
E	0.07	0.26
U	0.64	0.8

	Var	sd = sqrt(Var)
ROE	0.67	0.81
E	0.32	0.56
U	0.21	0.46

$Chibar2(01)_{ROA} = 57.67$

$Chibar2(01)_{ROE} = 26.56$

$Chibar2(01)_{TQ} = 339.4$

$Prob > chibar2_{ROA} = 0.0000$; $Prob > chibar2_{ROE} = 0.0000$

$Prob > chibar2_{TQ} = 0.0000$

Table 4.8. Test Results of Lagrangian Multiplier for Financial Companies

roa[firm1,t] = Xb + u[firm1] + e[firm1,t]

roe[firm1,t] = Xb + u[firm1] + e[firm 1,t]

tq[firm1,t] = Xb + u[firm1] + e[firm1,t]

	Var	sd = sqrt(Var)
ROA	1.2	1.09
e	0.28	0.53
u	0.34	0.58

	Var	sd = sqrt(Var)
TQ	0.08	0.29
e	0.005	0.07
u	0.2	0.14

	Var	sd = sqrt(Var)
ROE	0.53	0.73
e	0.25	0.5
u	0.17	0.41

$Chibar2(01)_{ROA} = 661.07$

$Chibar2(01)_{ROE} = 491.98$

$Chibar2(01)_{TQ} = 1816.45$

$Prob > chibar2_{ROA} = 0.0000$; $Prob > chibar2_{ROE} = 0.0000$

$Prob > chibar2_{TQ} = 0.0000$

Table 4.9. Test Results of Lagrangian Multiplier for Non-Financial Companies

roa[firm1,t] = Xb + u[firm1] + e[firm1,t]

roe[firm1,t] = Xb + u[firm1] + e[firm1,t]

TQ[firm1,t] = Xb + u[firm1] + e[firm1,t]

	Var	sd = sqrt(Var)
ROA	0.01	0.1
E	0.008	0.09
U	0.002	0.05

	Var	sd = sqrt(Var)
TQ	1.33	1.15
E	0.26	0.51
U	0.71	0.84

	Var	sd = sqrt(Var)
ROE	0.4	0.63
E	0.37	0.614
U	0.01	0.11

$\text{Chibar2(01)}_{\text{ROA}}$ = 160.27

Chibar2(01) = 42.29

Chibar2(01) = 6853.94

Prob > $\text{chibar2}_{\text{ROA}}$ = 0.0000 ; Prob > chibar2 = 0.0000

Prob > chibar2 = 0.0000

According to Tables 4.6., 4.7., 4.8., and 4.9., the probability results under the dependent variables, namely ROA, ROE and Tobin's q for developed and developing countries and financial and non-financial companies are less than 0.05. Thus, the null hypothesis is rejected and our previous statement is valid, meaning that the RE model is properly fitted for our data. After finalizing the appropriate regression model for our dataset, measuring the effect of renewable energy performance on financial performance is indicated in Equation 14:

$$\begin{aligned} CFP_{it} = \alpha_{0it} &+ \beta_{1it}\, PEE_{1it} + \beta_{2it}\, REU_{2it} + \beta_{3it}\, REP_{3it} + \beta_{4it}\, RUS_{4it} \\ &+ \beta_{5it}\, RUS_{5it} + \beta_{6it}\, RUS_{6it} + \beta_{7it}\, RUS_{7it} + \beta_{8it}\, RUS_{8it} \\ &+ \beta_{9it}\, RUS_{9it} + \beta_{10it}\, RUS_{10it} + \beta_{11it}\, RUS_{11it} \\ &+ \beta_{12it}\, RUS_{12it} + \beta_{13it}\, RUS_{13it} + \beta_{14it}\, RUS_{14it} \\ &+ \beta_{15it}\, RUS_{15it} + \beta_{16it}\, RUS_{16it} + \beta_{17it}\, RUS_{17it} \\ &+ \beta_{18it}\, RUS_{18it} + \mu_{it} + v_{it} \end{aligned} \tag{14}$$

Where:

i denotes the ith country (i= 1 … 46) or the ith company (i= 1 … 563)

t denotes the tth year (t= 2009 … 2018)

CFP is the corporate financial performance measured by Tobin's q, ROA, and ROE. Since we measure financial performance by these dependent variables, we construct three different panel regression models as indicated in Equation 15, 16, and 17.

$$\begin{aligned} TOBIN'S\ Q_{it} = \alpha_{0it} &+ \beta_{1it}\ PEE_{1it} + \beta_{2it}\ REU_{2it} + \beta_{3it}\ REP_{3it} \\ &+ \beta_{4it}\ RUS_{4it} + \beta_{5it}\ RUS_{5it} + \beta_{6it}\ RUS_{6it} \\ &+ \beta_{7it}\ RUS_{7it} + \beta_{8it}\ RUS_{8it} + \beta_{9it}\ RUS_{9it} \\ &+ \beta_{10it}\ RUS_{10it} + \beta_{11it}\ RUS_{11it} + \beta_{12it}\ RUS_{12it} \\ &+ \beta_{13it}\ RUS_{13it} + \beta_{14it}\ RUS_{14it} + \beta_{15it}\ RUS_{15it} \\ &+ \beta_{16it}\ RUS_{16it} + \beta_{17it}\ RUS_{17it} + \beta_{18it}\ RUS_{18it} \\ &+ \mu_{it} + v_{it} \end{aligned} \quad (15)$$

$$\begin{aligned} ROA_{it} = \alpha_{0it} &+ \beta_{1it}\ PEE_{1it} + \beta_{2it}\ REU_{2it} + \beta_{3it}\ REP_{3it} + \beta_{4it}\ RUS_{4it} \\ &+ \beta_{5it}\ RUS_{5it} + \beta_{6it}\ RUS_{6it} + \beta_{7it}\ RUS_{7it} + \beta_{8it}\ RUS_{8it} \\ &+ \beta_{9it}\ RUS_{9it} + \beta_{10it}\ RUS_{10it} + \beta_{11it}\ RUS_{11it} + \beta_{12it}\ RUS_{12it} \\ &+ \beta_{13it}\ RUS_{13it} + \beta_{14it}\ RUS_{14it} + \beta_{15it}\ RUS_{15it} \\ &+ \beta_{16it}\ RUS_{16it} + \beta_{17it}\ RUS_{17it} + \beta_{18it}\ RUS_{18it} + \mu_{it} + v_{it} \end{aligned} \quad (16)$$

$$\begin{aligned} ROE_{it} = \alpha_{0it} &+ \beta_{1it}\ PEE_{1it} + \beta_{2it}\ REU_{2it} + \beta_{3it}\ REP_{3it} + \beta_{4it}\ RUS_{4it} \\ &+ \beta_{5it}\ RUS_{5it} + \beta_{6it}\ RUS_{6it} + \beta_{7it}\ RUS_{7it} + \beta_{8it}\ RUS_{8it} \\ &+ \beta_{9it}\ RUS_{9it} + \beta_{10it}\ RUS_{10it} + \beta_{11it}\ RUS_{11it} + \beta_{12it}\ RUS_{12it} \\ &+ \beta_{13it}\ RUS_{13it} + \beta_{14it}\ RUS_{14it} + \beta_{15it}\ RUS_{15it} \\ &+ \beta_{16it}\ RUS_{16it} + \beta_{17it}\ RUS_{17it} + \beta_{18it}\ RUS_{18it} + \mu_{it} + v_{it} \end{aligned} \quad (17)$$

For the calculation of the results and hypothesis testing, we use STATA 15. STATA is a statistical software package mostly used in econometrical and statistical research.

CHAPTER V

EMPIRICAL FINDINGS

This chapter presents the results of panel data analysis. We first provide descriptive statistics and multicollinearity tests, then we give the results for the hypotheses.

5.1. Descriptive Statistics

Table 5.1 provides a summary of the descriptive statistics. According to Table 5.1, 9.6% of the developed countries use energy from primary renewable energy sources compared to only 5.9% in developing countries. Likewise, 78.2% of companies in developed countries produce and purchase renewable energy compared to 59.1% of the companies in developing countries. We observe a similar picture for the number of companies that have an ISO 14000 certificate. 72% of the companies in developed countries have either an ISO 14000 or an EMS certificate, while 58.5% of the companies possess it in developing countries.

Developed countries have higher ratios of renewable energy/clean products, policy energy efficiency, and energy efficiency targets with ratios of 27.5%, 91.4%, and 51.8% respectively. These ratios are relatively small in developing countries, i.e. 7.1%, 66.2%, and 27.8% respectively. Companies in developed countries also show high renewable energy use, emissions score, and environmental pillar scores, almost 1.5 times higher than emerging markets.

As to the dependent variables, both developed and emerging markets have a ROA of over 5%. This indicates efficient asset management. Similarly, the mean of Tobin's Q is close to 1. Conversely, companies in developing countries have an ROE of 16% compared to only 12.8% in developed countries. This indicates an efficient deployment of capital in emerging markets.

It seems that companies in developed countries benefit more from RE. This may be due to their vast experience. For instance, the age of companies in developed countries is almost double of the companies in developing countries. Another reason may be the technological progress in total productivity. The R&D of companies in developed countries is equal to 1.2%, whereas it is much lower in developing countries. From a firm-level perspective, non-financial companies have higher financial ratios. For instance, Tobin's q in financial companies (0.3) is extremely lower than non-financial ones (1.17). The same is true for the ROA and ROE.

When we look at the independent variables, although non-financial companies have higher financial ratios and hold easy access to R&D capabilities, they are short of RE exploitation and applications. We identify an equivalency of renewable energy use, resource use score, policy energy efficiency, emissions score, environmental pillar score, and targets energy efficiency between financial and non-financial institutions. The only exception is in renewable energy use ratio and renewable energy/clean products for which the score of financial companies is higher than non-financial ones with values of 16.5% and 34.2% to 8.6% and 16.5% respectively. Nevertheless, 63.9% of non-financial companies have either an ISO 14000 or an EMS certificate, while just 34.3% of financial companies have one of it.

In a nutshell, from Table 5.1, we detect that the REP with regard to the 7^{th} and 12^{th} SDGs as well as the environmental factors of ESGs are well met in developed countries than in developing ones. It is also worth to note that financial companies perform better on the 12^{th} SDG, whilst non-financial ones perform better on the 7^{th} SDG. Both financial and non-financial companies equally perform on the ESG variables.

The correlation matrices are given in the Appendices. The coefficients are not exceeding 0.7. However, variables under the 7th SDG, 12th SDG, and the environmental factors of ESG are highly correlated with each other. For instance, there is a 97% correlation between resource use score (RUS) and emissions score (ES). Renewable energy use (REU) and policy energy efficiency (PEE) also have a high correlation (89%). However, the pairwise correlation matrices do not present material multicollinearity problem.

Table 5.1. Descriptive Statistics

	Developed Countries		Developing Countries		Financial Firms		Non-Financial Firms	
Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
reur	0.096	0.108	0.059	0.131	0.165	0.259	0.086	0.185
reu	0.782	0.252	0.591	0.428	0.659	0.474	0.705	0.456
iso	0.72	0.245	0.585	0.389	0.343	0.475	0.639	0.48
rep	0.275	0.212	0.071	0.167	0.342	0.474	0.165	0.371
pee	0.914	0.166	0.662	0.434	0.767	0.423	0.779	0.415
rus	60.314	17.305	40.813	28.12	64.236	31.97	61.637	33.474
es	59.25	18.961	40.179	28.824	64.602	32.398	60.767	33.737
eps	57.387	16.782	39.673	26.892	63.454	30.471	58.139	30.454
tee	0.518	0.26	0.278	0.36	0.382	0.486	0.456	0.498
roa	0.061	0.272	0.058	0.058	0.013	0.025	0.082	1.613
roe	0.128	0.091	0.159	0.145	0.08	0.198	0.163	0.629
tq	0.884	0.569	1.273	1.58	0.324	0.873	1.175	1.178
size	24.391	1.259	23.167	0.859	24.698	3.497	22.931	1.469
age	41.788	22.477	25.951	17.149	44.305	185.675	31.13	33.867
leverage	0.633	1.359	0.563	1.067	1.377	4.557	0.417	5.255
rd	0.012	0.019	0.001	0.002	0.001	0.014	0.016	0.048
ce	19.722	2.997	18.878	4.152	6.736	9.012	19.721	1.546
gr	0.055	0.098	0.048	0.122	0.036	0.166	0.055	0.142
ci	1.977	1.183	4.456	8.433	2.143	4.415	3.074	14.999
inf	1.224	1.552	3.869	5.691	1.611	1.983	1.836	2.292
gdp	1.38	2.954	3.499	3.426	1.412	2.34	1.677	2.658

Notwithstanding, we also check for multicollinearity by performing a Variance Inflation Factors (VIF). Freund (2006) suggested an acceptable cutoff of 10 in any given model. Table 5.2., 5.3., 5.4. and 5.5. show no evidence of multicollinearity.

Table 5.2. VIF Results for Developed Countries

	ROA		ROE		TOBIN'S Q	
VARIABLES	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
RUS	8.57	0.11672	9.18	0.108878	8.57	0.11672
ES	6.55	0.152713	6.97	0.143459	6.55	0.152713
EPS	6.08	0.164352	6.09	0.164197	6.08	0.164352
REU	2.84	0.351867	2.85	0.351262	2.84	0.351867
ISO	2.03	0.492383	2.02	0.495366	2.03	0.492383
PEE	1.85	0.541291	1.86	0.538138	1.85	0.541291
SIZE	1.82	0.548213	1.86	0.538728	1.82	0.548213
TEE	1.7	0.587801	1.71	0.585319	1.7	0.587801
AGE	1.69	0.590744	1.69	0.592144	1.69	0.590744
REUR	1.67	0.598767	1.77	0.564532	1.67	0.598767
REP	1.59	0.629936	1.57	0.635851	1.59	0.629936
GDP	1.52	0.659456	1.52	0.655983	1.52	0.659456
RD	1.49	0.670433	1.42	0.705161	1.49	0.670433
LEVERAGE	1.46	0.68384	1.47	0.678705	1.46	0.68384
CI	1.42	0.706635	1.4	0.714623	1.42	0.706635
GR	1.33	0.753236	1.47	0.678052	1.33	0.753236
CE	1.32	0.759766	1.33	0.752376	1.32	0.759766
INF	1.09	0.915331	1.11	0.901269	1.09	0.915331
MEAN VIF	**2.56**		**2.63**		**2.56**	

Table 5.3. VIF Results for Developing Countries

	ROA		ROE		TOBIN'S Q	
VARIABLES	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
RUS	8.71	0.114826	8.19	0.122156	8.71	0.114826
ES	8.35	0.119802	7.81	0.127965	8.35	0.119802
EPS	8.06	0.124105	7.8	0.128124	8.06	0.124105
REU	8.03	0.124516	6.47	0.154518	8.03	0.124516
ISO	6.35	0.157591	2.9	0.3445	6.35	0.157591
PEE	3.13	0.319957	1.79	0.559569	3.13	0.319957
SIZE	1.81	0.552392	1.63	0.612073	1.81	0.552392
TEE	1.57	0.635047	1.63	0.612073	1.57	0.635047
AGE	1.4	0.711807	1.46	0.683876	1.4	0.711807
REUR	1.38	0.724581	1.35	0.738297	1.38	0.724581
REP	1.31	0.761744	1.23	0.815392	1.31	0.761744
GDP	1.25	0.798244	1.18	0.844271	1.25	0.798244
RD	1.25	0.800955	1.37	0.727583	1.25	0.800955
LEVERAGE	1.19	0.841664	1.18	0.844271	1.19	0.841664
CI	1.18	0.846893	1.14	0.874491	1.18	0.846893
GR	1.16	0.864906	1.17	0.852841	1.16	0.864906
CE	1.16	0.865349	1.25	0.796831	1.16	0.865349
INF	1.1	0.909863	1.11	0.899885	1.1	0.909863
MEAN VIF	**3.24**		**3.19**		**3.24**	

Table 5.4. VIF Results for Financial Firms

	ROA		ROE		TOBIN'S Q	
VARIABLES	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
RUS	4.74	0.210783	4.86	0.205572	4.81	0.207975
ES	4.58	0.218577	4.74	0.211031	4.65	0.215242
EPS	2.76	0.361846	2.82	0.35442	3.28	0.304736
REU	1.79	0.559178	1.93	0.518847	2.16	0.463075
ISO	1.29	0.775922	1.3	0.767475	1.3	0.770672
PEE	2.46	0.4067	2.62	0.382329	3.02	0.331046
SIZE	2.44	0.40964	2.56	0.39101	1.56	0.639799
TEE	1.33	0.751658	1.35	0.740382	1.38	0.72437
AGE	1.07	0.936422	1.07	0.933819	1.06	0.939535
REUR	1.22	0.820018	1.24	0.805592	1.27	0.789883
REP	1.85	0.539785	1.84	0.543044	1.52	0.657139
GDP	1.57	0.638377	1.62	0.615552	1.56	0.6406
RD	1.06	0.939624	1.09	0.921339	1.04	0.96154
LEVERAGE	1.42	0.704604	1.47	0.681725	1.41	0.709117
CI	1.06	0.939346	1.06	0.940128	1.05	0.95305
GR	1.03	0.966771	1.03	0.968817	1.03	0.966978
CE	1.48	0.677682	1.49	0.67002	1.24	0.805736
INF	1.18	0.847629	1.18	0.844321	1.15	0.870856
MEAN VIF	**1.91**		**1.96**		**1.92**	

Table 5.5. VIF Results for Non-Financial Firms

	ROA		ROE		TOBIN'S Q	
VARIABLES	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
RUS	4.28	0.233613	4.28	0.233613	4.28	0.233613
ES	4.21	0.237679	4.21	0.237679	4.21	0.237679
EPS	4.31	0.23202	4.31	0.23202	4.31	0.23202
REU	2.1	0.47567	2.1	0.47567	2.1	0.47567
ISO	1.37	0.731521	1.37	0.731521	1.37	0.731521
PEE	3.75	0.266498	3.75	0.266498	3.75	0.266498
SIZE	2.97	0.336183	2.97	0.336183	2.97	0.336183
TEE	1.37	0.731336	1.37	0.731336	1.37	0.731336
AGE	1.06	0.944061	1.06	0.944061	1.06	0.944061
REUR	1.14	0.879081	1.14	0.879081	1.14	0.879081
REP	1.11	0.897344	1.11	0.897344	1.11	0.897344
GDP	1.08	0.927551	1.08	0.927551	1.08	0.927551
RD	1.06	0.944409	1.06	0.944409	1.06	0.944409
LEVERAGE	1	0.995922	1	0.995922	1	0.995922
CI	1.03	0.975163	1.03	0.975163	1.03	0.975163
GR	1.03	0.969782	1.03	0.969782	1.03	0.969782
CE	2.52	0.396092	2.52	0.396092	2.52	0.396092
INF	1.14	0.880044	1.14	0.880044	1.14	0.880044
MEAN VIF	**2.03**		**2.03**		**2.03**	

We clustered our data set into four categories: developed countries, developing countries, financial companies, and non-financial companies. We performed panel data regressions for each group, following OLS, fixed effects, and random effects models. In harmony with the previous chapter, we used random effects as a fit base-model to run our panel regression. Table 5.6 displays the results of random effect regression models to predict the effects of renewable energy performance on the CFP in developed countries. The adjusted R^2 varies between 3.8 and 38.4 percent, suggesting that the independent variables and control variables can explain at least 3.8 to 38.4 percent of the companies' financial performance. In other terms, R^2 variation symbolizes the strength of the relationship between our model and the dependent variables. Thus, our linear model almost fits 38.4% of the set of observations.

Table 5.6. Panel Data Analysis Results in Developed Countries

		TOBIN'S Q									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			-0.067	0.052					-0.089	0.056
REU	Renewable energy use			0.152***	0.040					0.001	0.049
REP	Renewable/clean energy products			-0.158***	0.049					-0.161***	0.054
12th SDG											
RUS	Resource use ratio					0.002*	0.001			-0.0003	0.002
ES	Emissions score					-0.0003	0.001			-0.003	0.002
ESG Environment Variables											
REUR	Renewable energy use ratio							0.583***	0.113	0.518***	0.125
ISO	ISO 1400 or EMS							0.148***	0.048	0.174***	0.053
EPS	Environmental pillar score							-0.002*	0.001	0.002	0.003
TEE	Target energy efficiency							-0.061*	0.036	-0.049	0.038
Control Variables											
Size	Company's size	-0.100***	0.025	-0.108***	0.027	-0.116***	0.026	-0.076***	0.024	-0.0003	0.025
Age	Company's age	0.002	0.001	0.0005	0.001	0.0007	0.001	-0.070***	0.001	0.012	0.001
Leverage	Company's leverage	-0.005	0.006	-0.007	0.005	-0.001	0.006	-0.001	0.005	0.009	0.005
RD	R&D intensity	2.251***	0.549	2.318***	0.529	1.906***	0.566	-0.001	0.516	0.535***	0.531
CE	Capital expenditure	-0.003	0.002	-0.0007	0.002	-0.002	0.002	-0.005	0.002	0.547***	0.002
CI	Capital intensity	0.010	0.016	0.006	0.015	0.007	0.015	-0.007	0.014	-0.008*	0.014
GR	Growth rate	0.589***	0.089	0.532***	0.087	0.551***	0.089	2.178***	0.085	-0.008*	0.086
INF	Inflation	-0.009*	0.005	-0.007	0.004	-0.009*	0.005	2.222***	0.004	0.005*	0.004
GDP	GDP Growth	0.007**	0.003	0.005*	0.003	0.007**	0.003	-0.002	0.002	0.004	0.002
	Constant	2.927***	0.613	3.139***	0.643	3.276***	0.616	2.484***	0.571	2.379***	0.601
	Observations	250		250		250		250		250	
	Adjusted R-Square	0.038		0.066		0.056		0.094		0.144	

*** p<0.01, ** p<0.05, * p<0.1

		ROA									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			-1.66***	0.404					-2.447***	0.420
REU	Renewable energy use			0.314	0.217					0.324	0.217
REP	Renewable/clean energy products			-0.841*	0.429					0.019	0.451
12th SDG											
RUS	Resource use ratio					0.03***	0.01			0.070***	0.014
ES	Emissions score					-0.1***	0.01			0.010	0.015
ESG Environment Variables											
REUR	Renewable energy use ratio							0.673	0.701	-0.209	0.636
ISO	ISO 14000 or EMS							-0.455	0.359	-0.447	0.326
EPS	Environmental pillar score							-0.005	0.006	-0.073***	0.025
TEE	Target energy efficiency							0.492	0.303	0.475	0.293
Control Variables											
Size	Company's size	-0.107	0.104	-0.013	0.091	-0.130	0.092	-0.087	0.105	-0.153*	0.092
Age	Company's age	0.175	0.196	-0.016	0.180	0.197	0.178	0.185	0.197	0.080	0.180
Leverage	Company's leverage	-0.038	0.043	-0.056	0.042	-0.031	0.044	-0.052	0.045	-0.049	0.041
RD	R&D intensity	5.255	3.583	7.609**	3.477	2.710	3.648	4.405	3.624	2.306	3.394
CE	Capital expenditure	-0.003	0.021	0.017	0.021	-0.0007	0.021	-0.006	0.022	0.022	0.020
CI	Capital intensity	-0.143	0.207	-0.159	0.181	-0.176	0.186	-0.194	0.204	-0.232	0.177
GR	Growth rate	0.159***	0.057	0.181***	0.056	0.150**	0.058	0.177***	0.059	0.158***	0.053
INF	Inflation	-0.04	0.035	-0.019	0.035	-0.054	0.035	-0.054	0.035	-0.029	0.032
GDP	GDP Growth	0.037*	0.020	0.034*	0.020	0.044**	0.020	0.038*	0.021	0.034*	0.019
	Constant	-0.562	2.422	-0.747	2.051	-0.269	2.132	-0.579	2.386	2.140	2.064
	Observations	198		198		198		198		198	
	Adjusted R-Square	0.173		0.251		0.244		0.195		0.384	

*** p<0.01, ** p<0.05, * p<0.1

		ROE									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			-0.330	0.256					-0.539*	0.300
REU	Renewable energy use			0.070	0.183					0.041	0.238
REP	Renewable/clean energy products			-0.564**	0.229					-0.524**	0.261
12th SDG											
RUS	Resource use ratio					-0.0005	0.006			0.012	0.010
ES	Emissions score					0.004	0.005			0.002	0.011
ESG Environment Variables											
REUR	Renewable energy use ratio							0.289	0.434	-0.177	0.501
ISO	ISO 14000 or EMS							-0.234	0.196	-0.005	0.225
EPS	Environmental pillar score							0.005	0.003	-0.006	0.019
TEE	Target energy efficiency							0.064	0.179	-0.120	0.195
Control Variables											
Size	Company's size	-0.008	0.061	0.025	0.066	-0.007	0.057	0.019	0.040	0.021	0.049
Age	Company's age	-0.003	0.003	-0.004	0.003	-0.004	0.003	-0.005**	0.002	-0.005**	0.002
Leverage	Company's leverage	-0.048*	0.027	-0.063**	0.028	-0.041	0.028	-0.038	0.031	-0.048	0.030
RD	R&D intensity	3.388	2.499	3.773	2.482	3.292	2.565	3.521	2.504	2.909	2.570
CE	Capital expenditure	0.008	0.014	0.014	0.014	0.006	0.014	-0.0007	0.015	0.008	0.015
CI	Capital intensity	0.273**	0.112	0.230**	0.116	0.238**	0.103	0.148*	0.084	0.127	0.093
GR	Growth rate	1.221***	0.428	1.200***	0.441	1.254***	0.440	1.582***	0.415	1.189***	0.459
INF	Inflation	0.045	0.068	0.039	0.068	0.048	0.068	0.058	0.066	0.058	0.067
GDP	GDP Growth	0.021	0.013	0.017	0.013	0.017	0.014	0.022	0.014	0.018	0.014
	Constant	-2.242	1.462	-2.715*	1.550	-2.408*	1.318	-2.846***	0.906	-2.685**	1.121
	Observations	232		232		232		232		232	
	Adjusted R-Square	0.193		0.212		0.217		0.252		0.282	

*** p<0.01, ** p<0.05, * p<0.1

Likewise, Table 5.7 illustrates the results of random effect regression models to predict the effects of renewable energy performance on the CFP in developing countries. The adjusted R^2 ranges from 18.40 to 47.12 percent. This suggests that the independent variables and control variables explain at least 18.40% to 47.12% of the companies' financial performance. This implies that our independent variables explain 47.12% of the variation in ROA, ROE, and Tobin's q around the mean. Thus, our linear model almost fits 47.12% of the set of observations.

Table 5.7. Panel Data Analysis Results in Developing Countries

		TOBIN'S Q									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			0.071	0.137					0.089	0.172
REU	Renewable energy use			-0.182	0.137					-0.221	0.179
REP	Renewable/clean energy products			0.006	0.156					0.013	0.202
12th SDG											
RUS	Resource use ratio					-0.001	0.002			0.001	0.005
ES	Emissions score					0.0006	0.003			0.0007	0.005
ESG Environment Variables											
REUR	Renewable energy use ratio							-0.068	0.238	-0.083	0.283
ISO	ISO 1400 or EMS							-0.183*	0.111	-0.187	0.128
EPS	Environmental pillar score							0.002	0.002	0.001	0.007
TEE	Target energy efficiency							-0.213*	0.128	-0.204	0.143
Control Variables											
Size	Company's size	-0.502***	0.094	-0.488***	0.095	-0.494***	0.097	-0.504***	0.096	-0.558***	0.104
Age	Company's age	-0.436***	0.099	-0.396***	0.105	-0.404***	0.105	-0.388***	0.103	-0.414***	0.102
Leverage	Company's leverage	-0.023	0.022	-0.029	0.023	-0.029	0.023	-0.034	0.024	-0.034	0.026
RD	R&D intensity	20.63	13.86	22.25	14.08	21.11	14.20	22.41	14.25	29.67*	15.96
CE	Capital expenditure	0.002	0.006	0.001	0.006	0.002	0.006	0.0007	0.006	0.0002	0.007
CI	Capital intensity	0.138**	0.053	0.146***	0.054	0.139**	0.055	0.114**	0.056	0.112*	0.061
GR	Growth rate	-0.241	0.222	-0.179	0.227	-0.215	0.228	-0.234	0.235	-0.084	0.273
INF	Inflation	0.007*	0.004	0.008*	0.004	0.007*	0.004	0.008*	0.004	0.009*	0.005
GDP	GDP Growth	0.003	0.008	0.002	0.008	0.002	0.008	0.001	0.008	0.002	0.009
	Constant	13.95***	2.108	13.58***	2.147	13.73***	2.192	13.99***	2.166	15.31***	2.336
	Observations	210		210		210		210		210	
	Adjusted R-Square	0.3557		0.3580		0.3530		0.3566		0.3783	

*** p<0.01, ** p<0.05, * p<0.1

		ROA									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			0.015*	0.009					-0.025*	0.014
REU	Renewable energy use			0.0002	0.006					-0.003	0.006
REP	Renewable/clean energy products			-0.011	0.018					-0.015	0.019
12th SDG											
RUS	Resource use ratio					0.0007***	0.0002			0.0008**	0.0004
ES	Emissions score					-0.0004	0.0003			-0.0005	0.0004
ESG Environment Variables											
REUR	Renewable energy use ratio							-0.088***	0.025	-0.075***	0.026
ISO	ISO 1400 or EMS							-0.006	0.011	-0.004	0.012
EPS	Environmental pillar score							0.0006***	0.000	0.0005	0.0007
TEE	Target energy efficiency							0.009	0.012	0.011	0.012
Control Variables											
Size	Company's size	-0.013*	0.006	-0.016**	0.006	-0.016**	0.007	-0.018***	0.006	-0.017***	0.006
Age	Company's age	-0.013***	0.005	-0.014***	0.004	-0.017***	0.005	-0.012***	0.004	-0.013***	0.004
Leverage	Company's leverage	0.001	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.003	0.002
RD	R&D intensity	0.904	1.460	1.106	1.456	0.566	1.432	0.236	1.414	0.379	1.416
CE	Capital expenditure	0.0007	0.0007	0.0006	0.001	0.0006	0.0007	0.0004	0.0007	0.0008	0.0007
CI	Capital intensity	-0.008*	0.004	-0.006	0.004	-0.008*	0.004	-0.008*	0.004	-0.008*	0.004
GR	Growth rate	0.066***	0.025	0.068***	0.026	0.059**	0.024	0.062**	0.02	0.060**	0.025
INF	Inflation	0.001***	0.0005	0.001***	0.000	0.001***	0.0005	0.001***	0.0005	0.001***	0.0005
GDP	GDP Growth	0.002***	0.0009	0.003***	0.001	0.003***	0.0009	0.003***	0.0009	0.003***	0.0009
	Constant	0.371**	0.150	0.429***	0.138	0.441***	0.158	0.481***	0.141	0.464***	0.143
	Observations	208		208		208		208		208	
	Adjusted R-Square	0.3812		0.3980		0.4289		0.4388		0.4712	

*** p<0.01, ** p<0.05, * p<0.1

		ROE									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			0.337**	0.155					-0.019	0.262
REU	Renewable energy use			-0.140	0.111					-0.145	0.113
REP	Renewable/clean energy products			-0.041	0.304					-0.143	0.332
12th SDG											
RUS	Resource use ratio					0.003	0.004			0.003	0.007
ES	Emissions score					0.004	0.005			0.003	0.008
ESG Environment Variables											
REUR	Renewable energy use ratio							-0.222	0.512	-0.251	0.542
ISO	ISO 1400 or EMS							-0.224	0.20	-0.293	0.211
EPS	Environmental pillar score							0.013***	0.003	0.007	0.013
TEE	Target energy efficiency							-0.436*	0.224	-0.386*	0.231
Control Variables											
Size	Company's size	-0.166	0.123	-0.239*	0.133	-0.258**	0.127	-0.271**	0.120	-0.326**	0.136
Age	Company's age	0.044	0.093	0.038	0.104	0.015	0.097	0.045	0.091	0.074	0.107
Leverage	Company's leverage	-0.006	0.044	0.027	0.045	0.034	0.045	0.029	0.046	0.038	0.046
RD	R&D intensity	-23.47	25.96	-25.32	25.98	-36.20	25.83	-28.75	25.63	-33.18	26.31
CE	Capital expenditure	0.016	0.017	0.010	0.017	0.008	0.017	0.011	0.017	0.009	0.017
CI	Capital intensity	-0.177**	0.089	-0.155*	0.092	-0.171*	0.089	-0.199**	0.087	-0.199**	0.093
GR	Growth rate	0.910**	0.437	0.798*	0.434	0.923**	0.428	0.988**	0.437	0.854*	0.449
INF	Inflation	0.013	0.009	0.010	0.009	0.009	0.008	0.012	0.009	0.010	0.009
GDP	GDP Growth	0.035**	0.016	0.040**	0.016	0.041**	0.016	0.040**	0.016	0.038**	0.016
	Constant	1.278	2.728	2.845	2.956	3.303	2.830	3.526	2.675	4.743	3.049
	Observations	198		198		198		198		198	
	Adjusted R-Square	0.1840		0.2076		0.1966		0.2257		0.2095	

*** p<0.01, ** p<0.05, * p<0.1

To summarize, in developed countries, the independent and control variables explain the ROA the most (17.3% to 38.4%), followed by ROE (19.3% to 28.2%) and Tobin's q (3.8% to 14.4%). In developing countries, these ratios are significantly higher. The percentage of ROA explained by the variables varies from 37.12% to 47.12%, while the effect on ROE ranges from 18.4% to 22.5%. Finally, the percentage of Tobin's q explained by the variables is 37.8%. This implies that the relationship between REP and CFP in developing countries is stronger than in developed countries, and thus, the linear model (Random Effect) explains the changes in ROA, ROE, and Tobin's q better in developing countries. Our model also shows a strong relationship between REP and ROA for companies in both developed and developing countries. Thus, we may conclude that REP affects the short term financial performance of companies in developed and developing countries more than it does in the long term.

We also conducted the panel data analysis on firm level. Table 5.8 provides the results for financial institutions. The adjusted R^2 varies from 12.23 to 48.47 percent. This implies that independent and control variables may explain up to 48.47% of the CFP. Here, R^2 represents the good-of-fitness of our model. More specifically, our Random Effect model perfectly fits up to 48.47% of our data set.

Table 5.8. Panel Data Analysis Results for Financial Companies

		TOBIN'S Q									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			-5.25e-05	0.010					-0.016	0.014
REU	Renewable energy use			0.009	0.008					0.007	0.008
REP	Renewable/clean energy products			-0.034***	0.009					-0.037***	0.009
12th SDG											
RUS	Resource use ratio					0.0001	0.0002			8.30e-05	0.0002
ES	Emissions score					-0.0003*	0.0002			-0.0003	0.0002
ESG Environment Variables											
REUR	Renewable energy use ratio							-0.007	0.014	-0.006	0.014
ISO	ISO 14000 or EMS							-0.023**	0.009	-0.022**	0.009
EPS	Environmental pillar score							0.0002*	0.0001	0.0004*	0.0002
TEE	Target energy efficiency							-0.011	0.008	-0.012	0.008
Control Variables											
Size	Company's size	0.004***	0.0009	0.005***	0.0009	0.004***	0.001	0.004***	0.001	0.004***	0.001
Age	Company's age	-8.53e-05	8.06e-05	-7.62e-05	8.04e-05	-8.18e-05	8.07e-05	-8.11e-05	8.06e-05	-6.85e-05	7.88e-05
Leverage	Company's leverage	0.006	0.004	0.002	0.004	0.007*	0.004	0.006	0.004	0.002	0.004
RD	R&D intensity	3.829***	0.288	3.803***	0.287	3.776***	0.291	3.791***	0.288	3.737***	0.290
CE	Capital expenditure	0.002***	0.0003	0.002***	0.0003	0.002***	0.0003	0.003***	0.0003	0.002***	0.0004
CI	Capital intensity	0.045***	0.012	0.044***	0.012	0.043***	0.012	0.045***	0.012	0.041***	0.012
GR	Growth rate	0.039**	0.015	0.043***	0.015	0.036**	0.015	0.039**	0.015	0.042***	0.015
INF	Inflation rate	-0.002	0.002	-0.002	0.002	-0.002	0.002	-0.003	0.002	-0.002	0.002
GDP	GDP Growth	0.003**	0.001	0.002*	0.001	0.003**	0.001	0.003*	0.001	0.002	0.001
	Constant	0.0331	0.029	0.036	0.029	0.059*	0.034	0.032	0.029	0.068**	0.034
	Observations	1180		1180		1180		1180		1180	
	Adjusted R-Square	0.2925		0.3480		0.3051		0.2915		0.3629	

*** p<0.01, ** p<0.05, * p<0.1

		ROA									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			0.165**	0.081					0.028	0.110
REU	Renewable energy use			0.164***	0.062					0.147**	0.065
REP	Renewable/clean energy products			-0.045	0.071					-0.076	0.074
12th SDG											
RUS	Resource use ratio					-0.001	0.001			-0.0003	0.001
ES	Emissions score					0.0007	0.001			0.001	0.001
ESG Environment Variables											
REUR	Renewable energy use ratio							-0.061	0.105	-0.079	0.106
ISO	ISO 1400 or EMS							-0.063	0.067	-0.068	0.067
EPS	Environmental pillar score							0.005***	0.001	0.003*	0.002
TEE	Target energy efficiency							0.089	0.063	0.097	0.063
Control Variables											
Size	Company's size	-0.360***	0.031	-0.391***	0.033	-0.359***	0.031	-0.410***	0.033	-0.409***	0.034
Age	Company's age	0.052	0.036	0.042	0.035	0.051	0.035	0.036	0.035	0.035	0.035
Leverage	Company's leverage	-0.011**	0.005	-0.01	0.005	-0.011**	0.005	-0.008	0.005	-0.009*	0.005
RD	R&D intensity	4.143	2.684	3.305	2.658	4.112	2.691	3.466	2.647	3.527	2.661
CE	Capital expenditure	0.001	0.003	-0.001	0.003	0.001	0.003	-0.001	0.003	-0.001	0.003
CI	Capital intensity	0.089	0.081	0.072	0.079	0.087	0.079	0.063	0.078	0.065	0.078
GR	Growth rate	0.757***	0.111	0.724***	0.111	0.760***	0.112	0.719***	0.111	0.735***	0.112
INF	Inflation rate	0.030	0.038	0.037	0.038	0.034	0.038	0.034	0.038	0.034	0.038
GDP	GDP Growth	0.026**	0.011	0.026**	0.011	0.026**	0.011	0.028**	0.011	0.028**	0.011
	Constant	4.122***	0.800	4.727***	0.835	4.115***	0.780	5.078***	0.807	4.989***	0.838
	Observation	883		883		883		883		883	
	Adjusted R-Square	0.4554		0.4711		0.4554		0.4800		0.4847	

*** p<0.01, ** p<0.05, * p<0.1

		ROE									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	Variable definition	β	S.E	β	S.E	β	S.E	β	S.E	β	S.E
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			-0.019	0.078					0.0008	0.107
REU	Renewable energy use			0.037	0.059					0.029	0.063
REP	Renewable/clean energy products			0.032	0.067					0.023	0.071
12th SDG											
RUS	Resource use ratio					-0.0003	0.001			5.09e-06	0.001
ES	Emissions score					-2.99e-05	0.001			-0.0001	0.001
ESG Environment Variables											
REUR	Renewable energy use ratio							0.028	0.098	0.021	0.099
ISO	ISO 1400 or EMS							0.061	0.063	0.056	0.065
EPS	Environmental pillar score							-0.0006	0.001	-0.001	0.002
TEE	Target energy efficiency							0.058	0.058	0.057	0.058
Control Variables											
Size	Company's size	-0.017	0.022	-0.025	0.025	-0.015	0.023	-0.023	0.025	-0.025	0.027
Age	Company's age	0.041	0.026	0.040	0.026	0.042	0.026	0.041	0.026	0.041	0.026
Leverage	Company's leverage	-0.014	0.009	-0.013	0.010	-0.013	0.010	-0.013	0.010	-0.012	0.010
RD	R&D intensity	3.969**	1.680	3.893**	1.686	3.906**	1.693	3.944**	1.685	3.894**	1.701
CE	Capital expenditure	-0.005**	0.002	-0.006**	0.002	-0.005**	0.002	-0.006**	0.002	-0.006**	0.002
CI	Capital intensity	-0.006	0.008	-0.006	0.008	-0.006	0.008	-0.006	0.008	-0.006	0.008
GR	Growth rate	0.755***	0.108	0.747***	0.109	0.752***	0.109	0.751***	0.109	0.749***	0.110
INF	Inflation rate	0.075**	0.035	0.074**	0.035	0.077**	0.035	0.076**	0.035	0.076**	0.035
GDP	GDP Growth	-0.013	0.038	-0.013	0.038	-0.014	0.038	-0.012	0.039	-0.012	0.039
	Constant	-2.171***	0.570	-1.988***	0.629	-2.196***	0.574	-2.031***	0.613	-1.973***	0.653
	Observations	877		877		877		877		877	
	Adjusted R-Square	0.1311		0.1276		0.1316		0.1234		0.1223	

*** p<0.01, ** p<0.05, * p<0.1

Table 5.9. shows the results of the panel data regression on non-financial companies. The adjusted R^2 shifts from 0.90% to 16.77%. This conveys that the independent and control variables only account for 16.77% of CFP. In other words, the strength of the relationship between the dependent and independent variables is represented by 16.77% of the model's good-of-fitness.

Table 5.9. Panel Data Analysis Results for Non-Financial Companies

		TOBIN'S Q									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	Variable definition	β	S.E	β	S.E	β	S.E	β	S.E	β	S.E
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			0.152***	0.042					-0.115**	0.054
REU	Renewable energy use			0.061	0.038					-0.030	0.040
REP	Renewable/clean energy products			0.058	0.048					-0.046	0.050
12th SDG											
RUS	Resource use ratio					0.0007	0.0008			0.001*	0.0008
ES	Emissions score					-0.002***	0.0008			-0.001*	0.0008
ESG Environment Variables											
REUR	Renewable energy use ratio							-0.094	0.072	-0.080	0.073
ISO	ISO 14000 or EMS							-0.005	0.034	0.002	0.034
EPS	Environmental pillar score							0.006***	0.0007	0.008***	0.001
TEE	Target energy efficiency							-0.0008	0.031	0.002	0.031
Control Variables											
Size	Company's size	-0.227***	0.028	-0.262***	0.029	-0.226***	0.028	-0.292***	0.028	-0.291***	0.029
Age	Company's age	0.001	0.001	0.0005	0.001	0.001	0.001	1.97e-05	0.001	0.0001	0.001
Leverage	Company's leverage	-0.0004	0.001	-0.0003	0.001	-0.0005	0.001	-0.0004	0.001	-0.0006	0.001
RD	R&D intensity	3.020***	0.276	2.927***	0.277	2.954***	0.278	2.927***	0.275	2.939***	0.277
CE	Capital expenditure	0.035**	0.017	0.031*	0.017	0.032*	0.017	0.028	0.017	0.027	0.017
CI	Capital intensity	0.024	0.032	0.015	0.032	0.020	0.032	0.009	0.032	0.011	0.032
GR	Growth rate	0.823***	0.079	0.826***	0.079	0.822***	0.079	0.819***	0.078	0.810***	0.078
INF	Inflation rate	0.001	0.020	-0.002	0.020	-0.004	0.020	-0.005	0.020	-0.006	0.020
GDP	GDP Growth	0.027***	0.004	0.026***	0.004	0.026***	0.004	0.025***	0.004	0.025***	0.004
	Constant	5.494***	0.564	6.235***	0.574	5.615***	0.560	6.841***	0.570	6.814***	0.570
	Observations	3355		3355		3355		3355		3355	
	Adjusted R-Square	0.1213		0.1308		0.1062		0.1584		0.1677	

*** p<0.01, ** p<0.05, * p<0.1

		ROA									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			0.006	0.008					-0.012	0.010
REU	Renewable energy use			0.003	0.007					-0.001	0.007
REP	Renewable/clean energy products			-0.005	0.007					-0.012	0.007
12th SDG											
RUS	Resource use ratio					6.65e-05	0.0001			6.02e-05	0.0001
ES	Emissions score					1.76e-05	0.0001			8.80e-06	0.0001
ESG Environment Variables											
REUR	Renewable energy use ratio							-0.004	0.013	-0.004	0.013
ISO	ISO 1400 or EMS							-0.010*	0.005	-0.009	0.006
EPS	Environmental pillar score							0.0004***	0.0001	0.0006***	0.0001
TEE	Target energy efficiency							-0.001	0.005	-0.001	0.005
Control Variables											
Size	Company's size	0.0004	0.003	-0.0004	0.003	-0.0003	0.003	-0.002	0.003	-0.003	0.003
Age	Company's age	-0.003	0.003	-0.003	0.003	-0.003	0.003	-0.004	0.003	-0.003	0.003
Leverage	Company's leverage	-3.98e-05	0.0002	-3.44e-05	0.0002	-4.11e-05	0.0002	-2.02e-05	0.0002	-3.31e-05	0.0002
RD	R&D intensity	0.084*	0.049	0.078	0.049	0.087*	0.049	0.071	0.050	0.073	0.050
CE	Capital expenditure	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.0008	0.002	-0.0006	0.002
CI	Capital intensity	-0.003	0.003	-0.003	0.003	-0.002	0.003	-0.003	0.003	-0.003	0.003
GR	Growth rate	0.081***	0.015	0.081***	0.015	0.0815***	0.015	0.082***	0.015	0.081***	0.015
INF	Inflation rate	-0.001	0.003	-0.001	0.003	-0.0006	0.003	-0.001	0.003	-0.001	0.003
GDP	GDP Growth	0.002***	0.0008	0.002***	0.0008	0.002***	0.0008	0.002***	0.0008	0.002***	0.0008
	Constant	0.0741	0.0565	0.0928	0.0589	0.0847	0.0575	0.133**	0.0597	0.139**	0.0611
	Observations	2699		2699		2699		2699		2699	
	Adjusted R-Square	0.0386		0.0420		0.0423		0.0472		0.0519	

*** p<0.01, ** p<0.05, * p<0.1

		ROE									
		Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	**Variable definition**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**	**β**	**S.E**
Independent Variables											
7th SDG											
PEE	Policy energy efficiency			-0.005	0.041					-0.011	0.052
REU	Renewable energy use			0.069*	0.036					0.072*	0.038
REP	Renewable/clean energy products			-0.023	0.032					-0.020	0.034
12th SDG											
RUS	Resource use ratio					-6.84e-06	0.0007			-1.54e-06	0.0007
ES	Emissions score					0.0001	0.0007			8.70e-05	0.0007
ESG Environment Variables											
REUR	Renewable energy use ratio							0.012	0.063	-0.008	0.064
ISO	ISO 14000 or EMS							-0.090***	0.028	-0.093***	0.028
EPS	Environmental pillar score							0.001**	0.0005	0.001	0.0008
TEE	Target energy efficiency							-0.008	0.027	-0.011	0.027
Control Variables											
Size	Company's size	0.002	0.013	-0.003	0.013	0.001	0.014	-0.003	0.014	-0.005	0.014
Age	Company's age	0.0001	0.0003	8.02e-05	0.0003	0.0001	0.0003	0.0001	0.0003	8.85e-05	0.0003
Leverage	Company's leverage	0.072*	0.039	0.080**	0.040	0.071*	0.039	0.078*	0.040	0.077*	0.040
RD	R&D intensity	0.617***	0.237	0.571**	0.238	0.617***	0.237	0.557**	0.239	0.541**	0.240
CE	Capital expenditure	0.006	0.012	0.005	0.012	0.006	0.012	0.006	0.012	0.005	0.012
CI	Capital intensity	0.023*	0.013	0.023*	0.013	0.023*	0.013	0.022	0.014	0.021	0.014
GR	Growth rate	0.210***	0.080	0.206**	0.080	0.210***	0.080	0.220***	0.080	0.219***	0.081
INF	Inflation rate	0.014	0.017	0.012	0.017	0.015	0.017	0.012	0.017	0.010	0.017
GDP	GDP Growth	0.011**	0.005	0.011**	0.005	0.011**	0.005	0.011**	0.005	0.011**	0.005
	Constant	-0.106	0.199	0.007	0.210	-0.079	0.211	0.016	0.215	0.0533	0.221
	Observations	3350		3350		3350		3350		3350	
	Adjusted R-Square	0.0090		0.0108		0.0091		0.0130		0.0143	

*** p<0.01, ** p<0.05, * p<0.1

Although our sample includes more non-financial firms than financial ones, the independent and control variables show that renewable energy performance affects the CFP better in financial companies. Our independent and control variables explain ROA the most (45.54% to 48.47%), followed by Tobin's q (29.15% to 36.29%) and then ROE (12.23% to 13.16%). In non-financial companies, these percentages were significantly lower; 0.9% to 1.4% for ROA, 3.8% to 5.19% for ROE, and 10.62% to 16.77% for Tobin's q.

The results indicate that there is a better relationship of REP and CFP in financial companies compared to non-financial ones. Our model also shows a strong relationship between REP and ROA in financial companies, while REP affects Tobin's q much better than other financial measures in non-financial companies. Thus, we may conclude that REP affects short term profitability of financial companies more than their long-term performance, while there is a contrary evidence for non-financial companies; REP affects the long term CFP more than the short term performance.

5.2. Regression Analysis Resulst for the Hypotheses

5.2.1. Policy Energy Efficiency

Hypothesis H_{a1} argues that energy efficiency policies have a positive and significant impact on financial performance. Table 5.6 indicates a negative non-significant coefficient (β_1 = -0.089, p-value>0.1) for Tobin's q, a significantly negative coefficient (β1 = -2.447***, p-value<0.01) for ROA, and a significant negative coefficient (β1 = -0.539*, p-value<0.1) for ROE. These results indicate that having the policies to improve energy efficiency does not significantly influence neither short-term nor long term profitability in developed countries. Thus, the findings do not support H_{a1}. This result may be explained by the fact that companies implement environmental policies due to public pressure, strict regulations, management commitment, and competition, and all of these factors create enormous costs for the companies in developed markets

Table 5.7 displays a dissimilar course of action in developing countries. The PEE coefficient is positive, but not significant (β_1 =0.089, p-value>0.1) for Tobin's q. However, it is significantly positive for both ROA and ROE with values of (β1 = 0.015*, p-value<0.1) and (β1 = 0.337**, p-value<0.05) respectively. These results imply that PEE affects the profitability of the companies in developing countries. Thus, the results support H_{a1}. In fact, developing countries only started to formulate and implement policies on renewable energy over the last two decades. Energy efficiency policies and guidelines help them take steady steps to improve the energy use efficiently. This is reflected positively on their financial performance. For developed countries, the establishment of a system including heavy mechanisms, strict procedures, and operational processes to fulfill energy efficiency policies requires strong capital. Table 5.1 shows that share of R&D investments in developed countries. It is almost 1.2% which is 12 times higher than that of developing countries (0.1%). These findings are in compliance with the previous studies (Martí-Ballester, 2017).

On firm level, as shown in Table 5.8, financial companies have a negative but insignificant coefficient for both Tobin's q (β_1 = -0.016, p-value>0.1) and ROE (β_1 = -0.019, p-value>0.1), while there is a positive significant coefficient for ROA (β1 = 0.165**, p-value<0.05). This implies that PEE has a positive effect on short term financial performance and a negative impact on long term profitability. For non-financial firms, the coefficients of ROA (β1 = -0.012, p-value>0.1) and ROE (β1 =-0.011, p-value>0.1) are negative and insignificant, while Tobin's q coefficient (β1 = 0.152***, p-value<0.01) is positive and significant. This suggests a negative influence of PEE on short term financial performance, but a positive influence in the long term.

Financial companies do not need to integrate energy efficiency policies to generate profit and to build a good reputation. Therefore, investing in energy efficiency would only be beneficial to attract investors and shape the company's prestige which will have a positive impact on the short term. It will not contribute to long term profitability. On the other hand, non-financial companies aim to improve their brand names and reputations to attract investors. Thus, they seriously take into account not only economic aspect, but also environmental aspect beyond legal requirements since this may have a significant effect on their long run financial performance.

The results are in line with the Resource-Based View which claims that complex social interpersonal relations are one of the biggest advantages the companies have. Environmental practices especially the ones in line with energy efficiency are attractive to investors. Further, the Natural Resource-Based View treats external opportunities and risks the same for all companies. Thus, the only way a company can surpass its rivals is by sustaining a superior competitive advantage by its strenghts.

5.2.2. Renewable Energy Use (REU)

The results support H_{a2} in developed countries since the coefficient of REU is positive in both ROA and ROE models, as well as in Tobin's q model. This conveys the important advantage of REU in the short and long run. H_{a2} is also supported on firm level for both financial and non-financial companies. However, the findings do not support H_{a2} in developing countries.

The results for the developing countries may be explained by the fact that producing or purchasing renewable energy and using it to saturate the company needs demands enormous investments. This is due to the volatile energy prices and renewable technologies that are yet to prove their efficiency. The results contradict those of (Martí-Ballester, 2017) who found that the integration of renewable energy sources does not significantly influence companies' financial performance.

5.2.3. Renewable/Clean Energy Products

This study posits that renewable and clean energy products are positively associated with corporate financial performance. Contrary to our expectations, the coefficient of REP is negatively significant for all models in developed countries. We also found a positive but not significant effect of REP on Tobin's q, while there is a negative impact on both ROA and ROE in developing countries.

Developing products and technologies to use in clean renewable energy such as wind, solar, or geothermal energies is a challenging matter. Developed countries may devote more resources in financing R&D projects for RE projects to produce at least 25% of power for clean renewable energies. We should also bear in mind that with the rapid technological advancements, developed countries are in a constant hurry and pressure to keep expanding their technological innovations and formulating optimized solutions. This explains why investing in RE clean products negatively affects the profitability of companies in developed countries. In developing countries, the lack of resources to finance R&D in RE unintentionally drives them to constatnly be dependent on developed countries. New technologies is expensive and thus decrease short term profitability. Nevertheless, implementing RE technology products benefits the developing countries in the long run more than it does in developed countries.

On firm level, although renewable and clean energy products help financial institutions to attract new investors it does not have positive financial implications. Even, financing projects on renewable and clean energy creates short term loss due to its high cost. It has a positive influence in long run only for non-financial companies. This result is supported by the Natural Resource-Based View which states that continuous improvement helps companies grow, lower the costs, and develop future benefits. Lin, Cheah, Azali, Ho, & Yip (2019) noted that green innovative systems positively affect financial performance and Rezende (2019) confirmed that there is a positive association between green innovative intensity and multinational companies' financial performance in the long term more than the short term.

5.2.4. Resource Use Score

This research expects that there is a positive and significant relationship between resource use score and financial performance. The results are consistent with this expectation in all countries and are in line with stakeholder theory. When companies use their internal capabilities to reduce the use of its resources, it becomes easier for them to establish a strong green reputation and create value for their shareholders and stakeholders. Further, eco-efficient solutions by improving green practices at supply chain is an effective tool to sustain competitive advantage. Thus, the results support H_{b1} in developed and developing countries. Similarly, H_{b1} is partially supported in financial and non-financial companies. Although improving the use of resources could be a great expense and may negatively affect the short term profitability of companies, it benefits them in the long run.

5.2.5. Emissions Score

We argue that the higher the emissions score (ES) is the more likely that there will be an increase in corporate financial performance (H_{b2}). However, the results indicate a negative insignificant coefficient ($\beta_1 = -0.003$, p-value>0.1) for Tobin's q model and a negative significant coefficient ($\beta1 = -0.1$***, p-value<0.01) for ROA, while a positive but insignificant coefficient ($\beta_1 = 0.004$, p-value>0.1) for ROE in developed countries. Likewise, the results suggest a negative impact of emissions score on financial performance especially in the long term for financial and non-financial institutions. ES coefficient is positive but not significant for ROA in financial and non-financial firms with values of ($\beta_1 = 0.001$, p-value>0.1) and ($\beta_1 =1.76e-05$, p-value>0.1) respectively. ES has a negative significant influence in long term; Tobin's q model coefficient for financial firms ($\beta1 = 0.0003$*, p-value<0.1) and ($\beta1 = -0.002$*** , p-value<0.01) for non-financial ones.

The findings do not support H_{b2}. To reduce environmental emissions, companies have to follow regulations in their production and operational processes. This commitment has a cost and decrease the profitability in the long term.

5.2.6. Renewable Energy Use Ratio

The influence of renewable energy use ratio (REUR) on financial performance varies on country level. It has a positive and significant coefficient ($\beta 1$ = 0.583***, p-value<0.01) in Tobin's q, and a positive but not significant coefficient for ROA (β_1 = 0.673, p-value>0.1) and ROE (β_1 = 0.289, p-value>0.1). Hence, the results support hypothesis H_{c1} in developed countries. However, the REUR has a negative and significant impact on short term financial performance in developing countries ($\beta 1$ = -0.088***, p-value<0.01), whereas only a negative and non-significant effect in ROE (β_1 =-0.251, p-value>0.1) and Tobin's q (β_1 = -0.083, p-value>0.1). This indicates that although companies attract investors when they use renewable energy sources it negatively affects their financial performance. Thus, the results do not support H_{c1} in developing countries. The reason may be that developed countries have already incurred some losses.

5.2.7. ISO 14000 or EMS

Hypothesis H_{c2} argues that having an ISO 14000 or an EMS certification has a positive and significant impact on financial performance. This is only valid for long term profitability in developed countries. Tobin's q coefficient for ISO is positive and significant ($\beta 1$ = 0.174***, p-value<0.01), while both ROA ($\beta 1$ = -0.447, p-value>0.1) and ROE ($\beta 1$ = -0.234, p-value>0.1) coefficients are negative and significant. The results do not support H_{c2} in developing countries as in financial and non-financial companies. To have an ISO and an EMS certificate, or following ISO policies, affects most companies negatively. The reason may be that although adhering to ISO and EMS certificates have advantages such as improving resource efficiency, reducing waste, increasing customer trust, it can be costly in terms of training, personnel, and other administrative expenses.

5.2.8. Environmental Pillar Score

We find full support for hypothesis Hc3 which claims that Environmental Pillar Score (EPS) has a significant and positive impact on financial performance. This is valid on firm level, for all companies in developing countries. However, EPS has a negative and significant influence on profitability in developed countries. Taking actions on environment helps boosting profitability in developing countries. It generates savings, and is cost-effective. Thus, generating long term shareholder value, capitalizing on environmental opportunities, and avoiding environmental risks help companies improve their financial performance.

5.2.9. Targets Energy Efficiency

Our last hypothesis H_{c4} suggests that setting targets to achieve energy efficiency has a positive and significant effect on financial performance. We find partial support for this hypothesis on both country level and firm level. On country level, TEE has a positive effect on the short run financial performance. However, there is a negative significant relationship between TEE and FP in the long run. On firm level, particularly in financial companies, TEE has a positive impact on ROA and ROE, but has a negative impact on Tobin's q. In non-financial companies, TEE has a negative impact on ROA and ROE, but has a positive impact on Tobin's q.

The results show that setting objectives on reducing energy use and maximizing energy efficiency for companies in developed and developing countries captivates investors' attention and makes them more willing to invest in sustainable businesses. This is positively reflected on short term profitability of these companies. However, establishing goals to reach energy efficiency without taking any actions is reflected negatively on the long term financial profitability. The same is true on firm-level, particularly in financial companies.

For non-financial companies, even though setting targets on energy efficiency may cost and may have a negative financial burden on the short term performance, when companies take steps in implementing these targets, it positively and significantly affects their long term financial performance.

5.2.10. Control Variables

The results show that firm size (SIZE) has a negative and significant influence on ROA and Tobin's q in all countries, and non-financial companies. However, it has a positive and significant impact on Tobin's q in financial institutions and a negative and significant effect on ROA. This implies that small companies show better accounting and market performance compared large firms. The results are consistent with prior studies (Lin *et al.*, 2019; Martí-Ballester, 2017).

Although firm age has no significant relationship with financial performance, our results show that the age of firms positively affects some developed countries. That is because the number of years spent in the market facilitated their possession of higher market share. They also gain experience, consumers loyalty, and high prestige compared to younger companies. We witnessed the opposite in developing countries. Firm age is negatively related to financial performance. Most of the older firms in developing countries belong to the locals, whereas almost all young companies either get foreign investments, or are licensed or franchised businesses of a foreign company. These results are in line with the findings of Martí-Ballester (2017).

We also found that high R&D intensive companies are more likely to achieve better financial performance in all countries. This indicates that R&D activities on green products and energy efficiency reveal more benefits than costs. The results confirm the findings of Martí-Ballester (2017).

Firm leverage (LEVERAGE) is negative and significant in all categories. This is because an increase in financial leverage means an increase in debt which makes it harder for companies to repay it and so, increases business failure risk. This is in line with the findings of other studies (Ellwood & Garcia-Lacalle, 2015; Zakaria, Purhanudin, & Palanimally, 2014).

Capital Expenditure (CE) shows a negative impact in the short term for all companies, but a positive and significant effect in the long run. Purchasing fixed assets and acquiring intangibles along with software developments cost a lot. Thus, it has a negative influence on the ROA. However, these expenses are considered as long-term investment which will increase profitability in the long term. Similarly, Capital Intensity (CI) harms the short term profitability of firms, but has a positive and significant impact in the long term. This implies that high capital intensive firms have lower profitabilities in the short term, but higher performances in the long term.

Both Growth (GR) and GDP have a positive and significant impact on country and firm level. The higher the GDP and growth rate, the higher is the profitability. However, the effect of Inflation (INF) changes from one country to another. For developed countries, an increase in inflation is a negative sign. It raise the living costs, decrease the nominal wages, harming the economy. However, we found that high inflation in developing countries has a positive and significant effect on profitability. This can be justified by the economic theory arguing that liberalization of financial markets results in growth and stability in developing countries.

Table 5.10., 5.11., 5.12. and 5.13 provide the summarized results of the regression analysis and hypothesis tesing.

Table 5.10. Hypotheses and Results Summary in Developed Countries

Hypothesis	Variable Name	Expected Sign	Actual Sign (TOBIN'S Q)	Actual Sign (ROA)	Actual Sign (ROE)	Level of Support
7th SDG						
H1a: There is a positive and significant association between policy energy efficiency and firm financial performance.	PEE	(+)	(-)	(-)***	(-)*	Not Supported
H1b: There is a positive and significant association between renewable energy use and firm financial performance	REU	(+)	(+)***	(+)	(+)	Supported
H1c: There is a positive and significant association between renewable/clean energy products and firm financial performance.	REP	(+)	(-)***	(-)*	(-)**	Not Supported
12th SDG						
H2a: There is a positive and significant association between resource use score and firm financial performance.	RUS	(+)	(+)*	(+)***	(+)	Supported
H2b: There is a positive and significant association between emissions score and firm financial performance	ES	(+)	(-)	(-)***	(+)	Not Supported
ESG Environmental Variables						
H3a: There is a positive and significant association between renewable energy use and firm financial performance.	REUR	(+)	(+)***	(+)	(+)	Supported
H3b: There is a positive and significant association between Iso 1400 or EMS and firm financial performance.	ISO	(+)	(+)***	(-)	(-)	Partially Supported
H3c: There is a positive and significant association between environment pillar score and firm financial performance.	EPS	(+)	(-)*	(-)***	(-)	Not Supported
H4c: There is a positive and significant association between target energy efficiency and firm financial performance.	TEE	(+)	(-)*	(+)	(-)	Not supported
Control Variables						
Size	Size	(+)	(-)**	(-)*	(+)	
Age	Age	(+)	(+)	(+)	(-)**	
Leverage	Leverage	(-)	(-)	(-)	(-)**	
R&D intensity	RD	(+)	(+)**	(+)**	(+)	
Capital expenditure	CE	(+/-)	(-)	(-)	(+)	
Capital intensity	CI	(+/-)	(+)	(-)	(+)**	
Growth rate	GR	(+)	(+)***	(+)***	(+)***	
Inflation	INF	(-)	(-)*	(-)	(+)	
GDP Growth	GDP	(+)	(+)**	(+)*	(+)	

*** p<0.01, ** p<0.05, * p<0.1

Table 5.11. Hypotheses and Results Summary in Developing Countries

Hypothesis	Variable Name	Expected Sign	Actual Sign (TOBIN'S Q)	Actual Sign (ROA)	Actual Sign (ROE)	Level of Support
7th SDG						
H1a: There is a positive and significant association between policy energy efficiency and firm financial performance.	PEE	(+)	(+)	(+)*	(+)**	Supported
H1b: There is a positive and significant association between renewable energy use and firm financial performance	REU	(+)	(-)	(-)	(-)	Not Supported
H1c: There is a positive and significant association between renewable/clean energy products and firm financial performance.	REP	(+)	(+)	(-)	(-)	Not Supported
12th SDG						
H2a: There is a positive and significant association between resource use score and firm financial performance.	RUS	(+)	(+)	(+)***	(+)	Supported
H2b: There is a positive and significant association between emissions score and firm financial performance	ES	(+)	(+)	(-)	(+)	Partially Supported
ESG Environmental Variables						
H3a: There is a positive and significant association between renewable energy use and firm financial performance.	REUR	(+)	(-)	(-)***	(-)	Not Supported
H3b: There is a positive and significant association between Iso 1400 or EMS and firm financial performance.	ISO	(+)	(-)*	(-)	(-)	Not Supported
H3c: There is a positive and significant association between environment pillar score and firm financial performance.	EPS	(+)	(+)	(+)***	(+)***	Supported
H4c: There is a positive and significant association between target energy efficiency and firm financial performance.	TEE	(+)	(-)*	(+)	(-)*	Not Supported
Control Variables						
Size	Size	(+)	(-)***	(-)***	(-)**	
Age	Age	(+)	(-)***	(-)***	(+)	
Leverage	Leverage	(-)	(-)	(+)	(+)	
R&D intensity	RD	(+)	(+)	(+)	(-)	
Capital expenditure	CE	(+/-)	(+)	(+)	(+)	
Capital intensity	CI	(+/-)	(+)**	(-)*	(-)**	
Growth rate	GR	(+)	(-)	(+)***	(+)**	
Inflation	INF	(-)	(+)*	(+)***	(+)	
GDP Growth	GDP	(+)	(+)	(+)***	(+)**	

*** p<0.01, ** p<0.05, * p<0.1

Table 5.12. Hypotheses and Results Summary in Financial Companies

Hypothesis	Variable Name	Expected Sign	Actual Sign (TOBIN'S Q)	Actual Sign (ROA)	Actual Sign (ROE)	Level of Support
7th SDG						
H1a: There is a positive and significant association between policy energy efficiency and firm financial performance.	PEE	(+)	(-)	(+)**	(-)	Partially Supported
H1b: There is a positive and significant association between renewable energy use and firm financial performance	REU	(+)	(+)	(+)***	(+)	Supported
H1c: There is a positive and significant association between renewable/clean energy products and firm financial performance.	REP	(+)	(-)***	(-)	(+)	Not Supported
12th SDG						
H2a: There is a positive and significant association between resource use score and firm financial performance.	RUS	(+)	(+)	(-)	(-)	Not Supported
H2b: There is a positive and significant association between emissions score and firm financial performance	ES	(+)	(-)*	(+)	(-)	Not Supported
ESG Environmental Variables						
H3a: There is a positive and significant association between renewable energy use and firm financial performance.	REUR	(+)	(-)	(-)	(+)	Not Supported
H3b: There is a positive and significant association between Iso 1400 or EMS and firm financial performance.	ISO	(+)	(-)**	(-)	(+)	Not Supported
H3c: There is a positive and significant association between environment pillar score and firm financial performance.	EPS	(+)	(+)*	(+)***	(-)	Supported
H4c: There is a positive and significant association between target energy efficiency and firm financial performance.	TEE	(+)	(-)	(+)	(+)	Partially Supported
Control Variables						
Size	Size	(+)	(+)***	(-)***	(-)	
Age	Age	(+)	(-)	(+)	(+)	
Leverage	Leverage	(-)	(+)	(-)**	(-)	
R&D intensity	RD	(+)	(+)***	(+)	(+)**	
Capital expenditure	CE	(+/-)	(+)***	(-)	(-)**	
Capital intensity	CI	(+/-)	(+)***	(+)	(-)	
Growth rate	GR	(+)	(+)***	(+)***	(+)***	
Inflation Rate	INF	(-)	(-)	(+)	(+)**	
GDP Growth	GDP	(+)	(+)**	(+)**	(-)	

*** p<0.01, ** p<0.05, * p<0.1

Table 5.13. Hypotheses and Results Summary in Non-Financial Companies

Hypothesis	Variable Name	Expected Sign	Actual Sign (TOBIN'S Q)	Actual Sign (ROA)	Actual Sign (ROE)	Level of Support
7th SDG						
H1a: There is a positive and significant association between policy energy efficiency and firm financial performance.	PEE	(+)	(+)***	(-)	(-)	Partially Supported
H1b: There is a positive and significant association between renewable energy use and firm financial performance	REU	(+)	(+)	(+)	(+)*	Supported
H1c: There is a positive and significant association between renewable/clean energy products and firm financial performance.	REP	(+)	(+)	(-)	(-)	Not Supported
12th SDG						
H2a: There is a positive and significant association between resource use score and firm financial performance.	RUS	(+)	(+)*	(+)	(-)	Partially Supported
H2b: There is a positive and significant association between emissions score and firm financial performance	ES	(+)	(-)***	(+)	(+)	Partially Supported
ESG Environmental Variables						
H3a: There is a positive and significant association between renewable energy use and firm financial performance.	REUR	(+)	(-)	(-)	(+)	Not Supported
H3b: There is a positive and significant association between Iso 1400 or EMS and firm financial performance.	ISO	(+)	(-)	(-)*	(-)***	Not supported
H3c: There is a positive and significant association between environment pillar score and firm financial performance.	EPS	(+)	(+)***	(+)***	(+)**	Supported
H4c: There is a positive and significant association between target energy efficiency and firm financial performance.	TEE	(+)	(+)	(-)	(-)	Not Supported
Control Variables						
Size	Size	(+)	(-)***	(-)	(-)	
Age	Age	(+)	(+)	(-)	(+)	
Leverage	Leverage	(-)	(-)	(-)	(+)*	
R&D intensity	RD	(+)	(+)***	(+)*	(+)***	
Capital expenditure	CE	(+/-)	(+)**	(-)	(+)	
Capital intensity	CI	(+/-)	(+)	(-)	(+)*	
Growth rate	GR	(+)	(+)***	(+)***	(+)***	
Inflation Rate	INF	(-)	(-)	(-)	(+)	
GDP Growth	GDP	(+)	(+)***	(+)***	(+)**	

*** p<0.01, ** p<0.05, * p<0.1

CHAPTER VI

CONCLUSIONS AND DISCUSSIONS

5.1. Concluding Remarks

Renewable energy has become an essential part of human life. Countries are increasing their renewable energy investments to control climate change and reduce greenhouse gas emissions. Investing in renewables also boosts the economy by improving energy security, lowering costs, and offering stable energy prices. Besides, companies investing in renewable energy create more job opportunities, improve their business reputation, and therefore, become more profitable in the future.

This study investigates the impact of renewable energy performance on financial performance over the period 2009-2018. We conduct country of headquarters-level and firm-level comparisons using 9 independent, 3 dependent, and 9 control variables. For the analysis, we used the Thomson Reuters' "Mapping to UN SDGs" as a template base to integrate the 7th and 12th SDGs, and environmental ESG variables. Three variables were used under the 7th SDG: Policy Energy Efficiency (PEE), Renewable Energy Use (REU), and Renewable/Clean Energy Products (REP). We used two variables under the 12th SDG: Resource Use Score (RUS) and Emissions Score (ES). As for the ESG, four environmental factors were employed: Renewable Energy Use Ratio (REUR), ISO 14000 or EMS (ISO), Environmental Pillar Score (EPS), and Targets Energy Efficiency (TEE). For financial performance, we used return on assets (ROA) and return on equity (ROE) as the accounting-based measures and Tobin's q as the market-based measure. To deeply understand the effect of renewable energy performance on financial one, we grouped our results into two categories: intentions versus actions. Hence, we measure the process for the renewable energy performance through three phases: policies adopted, targets established, and actions taken.

The results show that the policies adopted by companies in developed countries from energy efficiency to ISO regulations have a negative influence on the short and long term profitability. This is due to the massive costs and expenses that companies have to bear in environmental policies to meet the expectations of stakeholders and shareholders. In developing countries, however, we found that adopting more environmental policies have a positive effect on CFP since these countries are new in taking advantage of renewable energy.

The results differ on firm level. For financial companies, environmental regulations and energy efficiency policies have a negative impact on the financial performance in the short and long term. This is not surprising because of their organizational nature; they do not need to implement energy efficiency policies to attract more investors. On the other hand, non-financial companies sustain a higher competitive advantage by adopting energy efficiency policies and other environmental regulations. Although this negatively affects the short term profitability of companies, it opens the door for more opportunities that will benefit them in the long run.

According to Carroll's CSR pyramid of sustainability, first comes the economic responsibility, i.e. profitability, then comes the legal responsibility, i.e. obeying the law, followed by the ethical responsibility, i.e. doing what is right, and last comes the philanthropic actions of being a good corporate and contributing to the environment and community. After companies have shown their intentions of being responsible for the environment by setting policies and regulations including energy efficiency and renewable energy use, emissions score, and issuing certificates like ISO and EMS, the next step is to translate these intentions and policies into targets. Formulating targets includes setting short and long term achievable goals on renewable energy performance to reduce energy intensity and consumption. Hence, it requires a heavy investment. Our results show that the second phase of the process has a negative impact on financial performance on both country level and firm-level.

The last phase is to take the actions. Our results indicate that there is a positive and significant influence of the measures taken for renewable energy performance on profitability. We found that companies in developed countries benefit from renewable energy investments more than those in developing countries. Developed countries spend more financial resources in issuing environmental and energy efficiency certificates, and have a high capital expenditure on renewable energy R&D. This investment pays back in the long term. The same is true on firm-level. Since non-financial companies invest more in renewable energy performance, it brings more benefit to them in their long term financial performance.

With respect to the 7th and 12th SDGs, our results indicate that the three variables used under the 7th SDG, namely PEE, REU, and REP, have a negative impact on financial performance of companies on both country development level and firm level. However, this negative effect is reflected more on financial profitability of companies when country-level factors are added into the equation.

Our findings also reveal that the two variables used under the 12th SDG, namely RUS and ES, have a positive and significant effect on financial performance of companies on both country economic development level and firm level. However, this positive effect is also more reflected on financial profitability of companies when country-level factors are considered.

Finally, the environmental factors of ESG, namely REUR, ISO, EPS, and TEE, have a negative influence on the financial performance of companies on both country economic development level and firm level. However, this negative impact is more visible on the country-level financial performance of companies.

5.2. Implications of the Study

The study draws the attention of policy-makers in developed countries to decrease the severity of environmental and renewable energy policies. Establishing hard regulations and measures is indeed in favor of not only the environment but also for society. However, after one point, it becomes a matter of excessive expenses and unnecessary costs. Having more regulations and policies will only tie companies' hands and make them less profitable. On the other hand, policy-makers in developing countries may keep the same level of intensity on renewable energy regulations since the companies in these countries are still in the growth phase.

The results also suggest that financial companies may minimize unnecessary environmental and renewable energy policies since it negatively influences their financial performance. Non-financial companies also need to reduce the costs spent on implementing some policies, i.e. buying ISO certificates. Setting targets is not easy task as it takes time to plan strategies, to train personnel, and requires large financial resources. Thus, the companies should be smart in precising reasonable, achievable and less costly targets.

We also encourage companies in developing countries to spend more on modern renewable energy technologies and R&D to improve the implementation of energy efficiency strategies. Further, we endorse companies to invest more in renewable energy projects since it positively affects the long term financial performance.

From a value chain perspective, to decrease carbon footprint emissions and increase effectiveness, companies should increase their renewable energy performance. According to Porter's model, primary activities from logistics, operations, sales, and marketing to servicing ought to create value that is beneficial for the environment and financial profitability of companies. This could be performed by integrating energy efficiency technology in quality control and raw material control during the supply chain activities. Companies also need to develop products and technologies to use for clean renewable energies in manufacturing, production, and even packaging. In short, firms should not only concentrate on renewable energy performance limited to R&D, but also focus on strategies and planning. Embracing renewable energy mindset and implementing it as a part of company’s culture will create a sustainable competitive edge that could have positive implications on managerial and financial performance.

5.3. Limitation of the Study and Future Research

Although this study contributes to the literature on renewable energy and financial performance, we acknowledge that it has some limitations. First, it only deals with the 7th and 12th SDG and limited number of ESG environmental variables. Future research may use other renewable energy variables. Second, the study covers the last 10 years and a sample of 46 countries and 563 companies. Future studies may extend the scope and cover a larger sample and years to better elaborate on the results. Last but not least, future studies may focus on a single industry or renewable energy sector, i.e. solar energy or wind energy, to reveal more comprehensive findings.

REFERENCES

Adams, M., & Buckle, M. (2003). The determinants of corporate financial performance in the Bermuda insurance market. *Applied Financial Economics*, *13*(2), 133–143. https://doi.org/10.1080/09603100210105030

Ajadi, T., Boyle, R., Strahan, D., Kimmel, M., Collins, B., Cheung, A., & Becker, L. (2019). *Global Trends in Renewable Energy Investment 2019*. *Bloomberg New Energy Finance*.

Al-Khatib, I. A., Monou, M., Abu Zahra, A. S. F., Shaheen, H. Q., & Kassinos, D. (2010). Solid waste characterization, quantification and management practices in developing countries. A case study: Nablus district - Palestine. *Journal of Environmental Management*, *91*(5), 1131–1138. https://doi.org/10.1016/j.jenvman.2010.01.003

Albertini, E. (2013). Does Environmental Management Improve Financial Performance? A Meta-Analytical Review. *Organization and Environment*, *26*(4), 431–457. https://doi.org/10.1177/1086026613510301

Alexopoulos, I., Kounetas, K., & Tzelepis, D. (2018). Environmental and financial performance. Is there a win-win or a win-loss situation? Evidence from the Greek manufacturing. *Journal of Cleaner Production*, *197*, 1275–1283. https://doi.org/10.1016/j.jclepro.2018.06.302

Allouche, J. & Laroche, P. (2007). The Relationship between Corporate Social Responsibility and Corporate Financial Performance: A Survey. Retrieved May 22, 2020, from https://www.researchgate.net/publication/302586183_The_Relationship_between_Corporate_Social_Responsibility_and_Corporate_Financial_Performance_A_Survey

Andriof, J., & McIntosh, M. (2001). *Perspectives on corporate citizenship*. Greenleaf Pub.

Apple. (2018). Apple now globally powered by 100 percent renewable energy - Apple. Retrieved May 21, 2020, from https://www.apple.com/newsroom/2018/04/apple-now-globally-powered-by-100-percent-renewable-energy/

Aragón-Correa, J. A., & Sharma, S. (2003). A Contingent Resource-Based View of Proactive Corporate Environmental Strategy. *The Academy of Management Review*, *28*(1), 71. https://doi.org/10.2307/30040690

Armstrong, C. E., & Shimizu, K. (2007). A Review of Approaches to Empirical Research on the Resource-Based View of the Firm†. *Journal of Management*, *33*(6), 959–986. https://doi.org/10.1177/0149206307307645

Asteriou, D., & Hall, S. G. (2011). *Appiled Econometrics* (2nd ed.). Palgrave Macmillan.

Atabi, F. (2004). Renewable energy in Iran: Challenges and opportunities for sustainable development. *International Journal of Environmental Science & Technology*, *1*(1), 69–80. https://doi.org/10.1007/bf03325818

Atkinson. (1997). A Stakeholder Approach to Strategic Performance Measurement - ProQuest. Retrieved May 22, 2020, from https://search.proquest.com/openview/a595813705052d2d5ffeba05867d3e24/1?pq-origsite=gscholar&cbl=26142

Awan, U., Imran, N., & Munir, G. (2014). Sustainable development through energy management: Issues and priorities in energy savings. *Research Journal of Applied Sciences, Engineering and Technology*, *7*(2), 424–429. https://doi.org/10.19026/rjaset.7.271

Baltagi, B. H. (2001). *Econometric analysis of panel data*. Second edition. John Wiley and Sons, Chichester.

Baltagi, B. H. (2005). *Econometric analysis of panel data*. Third edition. The Atrium, Southern Gate, Chichester, West Sussex: JohnWiley and Sons.

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Barney, J. B. (1986). Organizational Culture: Can It Be a Source of Sustained Competitive Advantage? *The Academy of Management Review*, *11*(3), 656. https://doi.org/10.2307/258317

Bergmann, A., Rotzek, J. N., Wetzel, M., & Guenther, E. (2017). Hang the low-hanging fruit even lower - Evidence that energy efficiency matters for corporate financial performance. *Journal of Cleaner Production*, *147*, 66–74. https://doi.org/10.1016/j.jclepro.2017.01.074

Bertonèche, M., & Knight, R. (2001). *Financial performance*. Butterworth-Heinemann.

Bobby Banerjee, S. (2001). Corporate environmental strategies and actions. *Management Decision*, *39*(1), 36–44. https://doi.org/10.1108/EUM0000000005405

Bouckaert, L., & Vandenhove, J. (1998). Business ethics and the management of non-profit institutions. *Journal of Business Ethics*, *17*(9–10), 1073–1081. https://doi.org/10.1023/A:1006071416514

Brealey, R. A., Myers, S. C., & Allen, F. (2008). Brealey, Myers, and Allen on Valuation, Capital Structure, and Agency Issues. *Journal of Applied Corporate Finance*, *20*(4), 49–57. https://doi.org/10.1111/j.1745-6622.2008.00203.

Bunse, K., Vodicka, M., Schönsleben, P., Brülhart, M., & Ernst, F. O. (2011). Integrating energy efficiency performance in production management - Gap analysis between industrial needs and scientific literature. *Journal of Cleaner Production*, *19*(6–7), 667–679. https://doi.org/10.1016/j.jclepro.2010.11.011

Buysse, K., & Verbeke, A. (2003). Proactive environmental strategies: A stakeholder management perspective. *Strategic Management Journal*, *24*(5), 453–470. https://doi.org/10.1002/smj.299

Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics*. *Microeconometrics*. Cambridge University Press. https://doi.org/10.1017/cbo9780511811241

Campbell, R. J., Robinson, W., Neelands, J., Hewston, R., & Mazzoli, L. (2007). Personalised Learning: Ambiguities In Theory And Practice. *British Journal of Educational Studies*, *55*(2), 135–154. https://doi.org/10.1111/j.1467-8527.2007.00370.

Carroll, A. B. (1989). *Business & society : Ethics & stakeholder management*. South-Western Pub. Co.

Cater, & Prasnikar. (2009). Environmental strategies and their motives and results in Slovenian business practice. Retrieved May 23, 2020, from https://www.researchgate.net/publication/265030092_Environmental_strategies_and_their_motives_and_results_in_Slovenian_business_practice

Chai, J., Guo, J. E., Wang, S. Y., & Lai, K. K. (2009). Why does energy intensity fluctuate in China? *Energy Policy*, *37*(12), 5717–5731. https://doi.org/10.1016/j.enpol.2009.08.037

Chandler, A. D. (Alfred D. (1962). *Strategy and structure: chapters in the history of the industrial enterprise.* M.I.T. Press.

Chen, Y., Han, Y., & Zhu, Q. (2017). Energy and environmental efficiency evaluation based on a novel data envelopment analysis: An application in petrochemical industries. *Applied Thermal Engineering*, *119*, 156–164. https://doi.org/10.1016/j.applthermaleng.2017.03.051

Christoffersen, L. B., Larsen, A., & Togeby, M. (2006). Empirical analysis of energy management in Danish industry. *Journal of Cleaner Production*, *14*(5), 516–526. https://doi.org/10.1016/j.jclepro.2005.03.017

Chu, Y., & Wang, L. (2017). Capital Structure Along the Supply Chain: How Does Customer Leverage Affect Supplier Leverage Decisions? *Quarterly Journal of Finance*, *7*(4). https://doi.org/10.1142/S2010139217500148

Clarkson, M. B. E. (1995). A Stakeholder Framework for Analyzing and Evaluating Corporate Social Performance. *The Academy of Management Review*, *20*(1), 92. https://doi.org/10.2307/258888

Clarkson, P. M., Overell, M. B., & Chapple, L. (2011). Environmental Reporting and its Relation to Corporate Environmental Performance. *Abacus*, *47*(1), 27–60. https://doi.org/10.1111/j.1467-6281.2011.00330.x

Cordeiro, J. J., & Sarkis, J. (1997). Environmental proactivism and firm performance: evidence from security analyst earnings forecasts. *Business Strategy and the Environment*, *6*(2), 104–114. https://doi.org/10.1002/(SICI)1099-0836(199705)6:2<104::AID-BSE102>3.0.CO;2-T

Dangelico, R. M., & Pontrandolfo, P. (2015). Being 'Green and Competitive': The Impact of Environmental Actions and Collaborations on Firm Performance. *Business Strategy and the Environment*, *24*(6), 413–430. https://doi.org/10.1002/bse.1828

Dasgupta. (2001). EconPapers: Inspections, pollution prices, and environmental performance: evidence from China. Retrieved May 22, 2020, from https://econpapers.repec.org/article/eeeecolec/v_3a36_3ay_3a2001_3ai_3a3_3ap_3a487-498.htm

Davis, J. A. (1967). Clustering and Structural Balance in Graphs. *Human Relations*, *20*(2), 181–187. https://doi.org/10.1177/001872676702000206

De Ven, A. H. Van, Peters, T. J., & Waterman, R. H. (1983). In Search of Excellence: Lessons from America's Best-Run Companies. *Administrative Science Quarterly*, *28*(4), 621. https://doi.org/10.2307/2393015

Delmas, M., & Blass, V. D. (2010). Measuring Corporate Environmental Performance: The Trade-Offs of Sustainability Ratings. *Business Strategy and the Environment*, *19*(4), 245–260. https://doi.org/10.1002/bse.676

Delmas, M., & Toffel, M. W. (2004). Stakeholders and environmental management practices: An institutional framework. *Business Strategy and the Environment*, *13*(4), 209–222. https://doi.org/10.1002/bse.409

Demsetz, H., & Lehn, K. (1985). *The Structure of Corporate Ownership: Causes and Consequences*. *Source: Journal of Political Economy* (Vol. 93).

Dey, R. K., Hossain, S. Z., & Rahman, R. A. (2018). Effect of Corporate Financial Leverage on Financial Performance: A Study on Publicly Traded Manufacturing Companies in Bangladesh. *Asian Social Science*, *14*(12), 124. https://doi.org/10.5539/ass.v14n12p124

Dixon-Fowler, H. R., Slater, D. J., Johnson, J. L., Ellstrand, A. E., & Romi, A. M. (2013). Beyond "Does it Pay to be Green?" A Meta-Analysis of Moderators of the CEP-CFP Relationship. *Journal of Business Ethics*. https://doi.org/10.1007/s10551-012-1268-8

Donaldson, T., & Preston, L. E. (1995). The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications. *The Academy of Management Review*, *20*(1), 65. https://doi.org/10.2307/258887

Earnhart, D., & Lizal, L. (2006). Effects of ownership and financial performance on corporate environmental performance. *Journal of Comparative Economics, 34*(1), 111–129. https://doi.org/10.1016/j.jce.2005.11.007

Earth System Science Data. (2019). Global Carbon Budget 2019. Copernicus Publications (Vol. 17). https://doi.org/10.5194/essd-11-1783-2019

Egbunike, C. F., & Okerekeoti, C. U. (2018). Macroeconomic factors, firm characteristics and financial performance. *Asian Journal of Accounting Research*, *3*(2), 142–168. https://doi.org/10.1108/ajar-09-2018-0029

Ellwood, S., & Garcia-Lacalle, J. (2015). The Influence of Presence and Position of Women on the Boards of Directors: The Case of NHS Foundation Trusts. *Journal of Business Ethics*, *130*(1), 69–84. https://doi.org/10.1007/s10551-014-2206-8

Endrikat, J., Guenther, E., & Hoppe, H. (2014). Making sense of conflicting empirical findings: A meta-analytic review of the relationship between corporate environmental and financial performance. *European Management Journal*, *32*(5), 735–751. https://doi.org/10.1016/j.emj.2013.12.004

Energy Statistics. (2019). *Energy statistics-an overview Statistics Explained*. Retrieved from https://ec.europa.eu/eurostat/statisticsexplained/

Escobar, L. F., & Vredenburg, H. (2011). Multinational Oil Companies and the Adoption of Sustainable Development: A Resource-Based and Institutional Theory Interpretation of Adoption Heterogeneity. *Journal of Business Ethics, 98*(1), 39–65. https://doi.org/10.1007/s10551-010-0534

Fan, L. W., Pan, S. J., Liu, G. Q., & Zhou, P. (2017). Does energy efficiency affect financial performance? Evidence from Chinese energy-intensive firms. *Journal of Cleaner Production, 151*, 53–59. https://doi.org/10.1016/j.jclepro.2017.03.044

Filbeck, G., & Gorman, R. F. (2004). The Relationship between the environmental and financial performance of public utilities. *Environmental and Resource Economics*,*29*(2),137–157. https://doi.org/10.1023/B:EARE.0000044602.86367

Finance, E. (2018). Energizing Finance 2018 | Sustainable Energy for All. Retrieved February 18, 2020, from https://www.seforall.org/data-and-evidence/energizing-finance-series/energizing-finance-2018

Fombrun, C. J., & van Riel, C. B. M. (1997). The Reputational Landscape. *Corporate Reputation Review, 1*(1), 5–13. https://doi.org/10.1057/palgrave.crr.1540008

Freeman, R. E. (1984). Strategic management : a stakeholder approach (Livre, 1984) [WorldCat.org]. Retrieved May 22, 2020, from https://www.worldcat.org/title/strategic-management-a-stakeholder-approach/oclc/9685996

Freund, R. J., Wilson W. J. and Sa P. (2006). Regression Analysis - 2nd Edition. Retrieved May 23, 2020, from https://www.elsevier.com/books/regression-analysis/freund/978-0-12-088597-8

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance and Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

Friedman, M. (1970). The social responsibility of business is to increase its prof*its. The New York Times Magazine*.

Friedman, M. (1962). Capitalism and freedom. Retrieved June 3, 2020, from https://www.murdochmurdoch.net/various/books/Capitalism and Freedom - Milton Friedman. Gamlath, S., & Lahiri, R. (2014). Public and Parental Expenditures on Education and Economic Growth. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2489234

Google. (2017). 100% Renewable | Google Sustainability. Retrieved May 21, 2020, from https://sustainability.google/projects/announcement-100/

Gray. (2010). (PDF) Gray et al 2012 Environmental Management. Retrieved May 23, 2020, from https://www.researchgate.net/publication/268207606_Gray_et_al_2012_Environmental_Management

Gujarati, D. N. (2003). *Basic econometrics*. McGraw Hill.

Günther, E., Hoppe, H., & Endrikat, J. (2011). Corporate financial performance and corporate environmental performance: A perfect match? *Zeitschrift Für Umweltpolitik & Umweltrecht*, (3), 279–296.

Hammond, S. A., & Slocum, J. W. (1996). The impact of prior firm financial performance on subsequent corporate reputation. *Journal of Business Ethics*, *15*(2), 159–165. https://doi.org/10.1007/BF00705584

Hannan, M. T., & Freeman, J. (1977). The Population Ecology of Organizations. *American Journal of Sociology*, *82*(5), 929–964. https://doi.org/10.1086/226424

Hart, S. (1995). *A Natural-Resource-Based View Of The Firm*. *Management Review* (Vol. 20).

Hart, S. L., & Ahuja, G. (1996). Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance. *Business Strategy and the Environment*, *5*(1), 30–37. https://doi.org/10.1002/(sici)1099-0836(199603)5:1<30::aid-bse38>3.3.co;2-h

Hart, Stuart L., & Ahuja, G. (1996). Does It Pay To Be Green? An Empirical Examination Of The Relationship Between Emission Reduction And Firm Performance. *Business Strategy and the Environment*, *5*(1), 30–37. https://doi.org/10.1002/(SICI)1099-0836(199603)5:1<30::AID-BSE38>3.0.CO;2-Q

Hassel, L., Nilsson, H., & Nyquist, S. (2005). The value relevance of environmental performance. *European Accounting Review*, *14*(1), 41–61. https://doi.org/10.1080/0963818042000279722

Hatakeda, T., Kokubu, K., Kajiwara, T., & Nishitani, K. (2012). Factors Influencing Corporate Environmental Protection Activities for Greenhouse Gas Emission Reductions: The Relationship Between Environmental and Financial Performance. *Environmental and Resource Economics*, *53*(4), 455–481. https://doi.org/10.1007/s10640-012-9571-5

Hatem, B. S. (2014). Determinants of Firm Performance: A Comparison of European Countries. *International Journal of Economics and Finance*, *6*(10). https://doi.org/10.5539/ijef.v6n10p243

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1251–1271.

Haveman, R., & Christainsen, G. B. (1981). Environmental regulations and productivity growth (USA). Retrieved May 22, 2020, from https://www.researchgate.net/publication/291493546_Environmental_regulations_and_productivity_growth_USA

Haykir, Ö., & Çelik, M. S. (2018). Yaşin Firmanin Performansi Üzerindeki Etkisi: Aile Şirketlerinden İncelemeler. *Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*. https://doi.org/10.25287/ohuiibf.403257

Henriques, I., & Sadorsky, P. (1996). The Determinants of an Environmentally Responsive Firm: An Empirical Approach. *Journal of Environmental Economics and Management*, *30*(3), 381–395.

Hofer. (1983). (14) ROVA: A new measure for assessing organizational performance. Retrieved May 22, 2020, from https://www.researchgate.net/publication/284080724_ROVA_A_new_measure_for_assessing_organizational_performance

Holburn, G. L. F. (2012). Assessing and managing regulatory risk in renewable energy: Contrasts between Canada and the United States. *Energy Policy*, *45*, 654–665. https://doi.org/10.1016/j.enpol.2012.03.017

Horváthová, E. (2010). Does environmental performance affect financial performance? A meta-analysis. *Ecological Economics*, *70*(1), 52–59. https://doi.org/10.1016/j.ecolecon.2010.04.004

Hsaio, C. (2002). *Analysis of Panel Data Second Edition*. Retrieved from http://www.cambridge.org

Hutchins, M. J., & Sutherland, J. W. (2008). An exploration of measures of social sustainability and their application to supply chain decisions. *Journal of Cleaner Production*, *16*(15), 1688–1698. https://doi.org/10.1016/j.jclepro.2008.06.001

Hutchinson, M., & Gul, F. A. (2004). Investment opportunity set, corporate governance practices and firm performance. *Journal of Corporate Finance, 10*(4), 595–614. https://doi.org/10.1016/S0929-1199(03)00022-1

Ibrahim, H., & Samad, F. A. (2011). Corporate Governance Mechanisms and Performance of Public-Listed Family-Ownership in Malaysia. *International Journal of Economics and Finance, 3*(1). https://doi.org/10.5539/ijef.v3n1p105

IEA. (2013). World Energy Outlook 2013 – Analysis - IEA. Retrieved May 21, 2020, from https://www.iea.org/reports/world-energy-outlook-2013

IEA, 2013. (n.d.). World Energy Outlook 2018 – Analysis - IEA. Retrieved May 21, 2020, from https://www.iea.org/reports/world-energy-outlook-2018

Ilaboya, O. J., & Ohiokha, I. F. (2016). Firm Age, Size and Profitability Dynamics: A Test of Learning by Doing and Structural Inertia Hypotheses. *Business and Management Research, 5*(1). https://doi.org/10.5430/bmr.v5n1p29

Inoue, Y., & Lee, S. (2011). Effects of different dimensions of corporate social responsibility on corporate financial performance in tourism-related industries. *Tourism Management*, *32*(4), 790–804. https://doi.org/10.1016/j.tourman.2010.06.019

Intel. (2017). Making Renewable Energy Viable for Businesses and Homes. Retrieved May 21, 2020, from https://www.intel.com/content/www/us/en/energy/making-renewable-energy-viable-for-businesses-and-homes-brief.html

Irena Map. (2018). Renewable Energy Prospects for the European Union. */Publications/2018/Feb/Renewable-Energy-Prospects-for-the-EU*.

Isik, O., & Tasgin, U. F. (2017). Profitability and Its Determinants in Turkish Manufacturing Industry: Evidence from a Dynamic Panel Model. *International Journal of Economics and Finance*, *9*(8), 66–75.

Iwata, H., & Okada, K. (2010). Greenhouse gas emissions and the role of the Kyoto Protocol. *MPRA Paper*.

Jablonski, S., Tarhini, M., Touati, M., Gonzalez Garcia, D., & Alario, J. (2012). The Mediterranean Solar Plan: Project proposals for renewable energy in the Mediterranean Partner Countries region. *Energy Policy*, *44*, 291–300. https://doi.org/10.1016/j.enpol.2012.01.052

Jaggi, B., & Freedman, M. (1992). An Examination Of The Impact Of Pollution Performance On Economic And Market Performance: Pulp And Paper Firms. *Journal of Business Finance & Accounting*, *19*(5), 697–713. https://doi.org/10.1111/j.1468-5957.1992.tb00652

Jalilvand, D. R. (2012). *Renewable energy for the Middle East and North Africa policies for a successful transition*. Friedrich-Ebert-Stiftung.

Jawahar, I. M., & McLaughlin, G. L. (2001). Toward a Descriptive Stakeholder Theory: An Organizational Life Cycle Approach. *The Academy of Management Review, 26*(3), 397. https://doi.org/10.2307/259184

Jensen, J. R., & Gao, J. (2007). *Book Review - Remote Sensing of the Environment, An Earth Resource Perspective 2nd Edition by John R. Jensen*. Retrieved from www.asprs.org

Jones, T., Wicks, A., & Freeman, R. E. (2002). Stakeholder theory: The state of the art. *Academy of Management Annals, 4 (1), 304-445.*

King, A. A., & Lenox, M. J. (2001). Lean And Green? An Empirical Examination Of The Relationship Between Lean Production And Environmental Performance. *Production and Operations Management*, *10*(3), 244–256. https://doi.org/10.1111/j.1937-5956.2001.tb00373.x

Konar, S., & Cohen, M. A. (2001). Does the market value environmental performance? *Review of Economics and Statistics*, *83*(2), 281–289. https://doi.org/10.1162/00346530151143815

Kushwaha, G. S., & Sharma, N. K. (2016). Green initiatives: A step towards sustainable development and firm's performance in the automobile industry. *Journal of Cleaner Production*, *121*, 116–129. https://doi.org/10.1016/j.jclepro.2015.07.072

Lee, K.-H., & Min, B. S. (2015). Lean and green? An empirical examination of the relationship between lean production and environmental performance. *Production and Operations Management, 10(3), 244-256.*

Lee, S., Singal, M., & Kang, K. H. (2013). The corporate social responsibility-financial performance link in the U.S. restaurant industry: Do economic conditions matter? *International Journal of Hospitality Management*, *32*(1), 2–10. https://doi.org/10.1016/j.ijhm.2012.03.007

Lépineux, F. (2005). Stakeholder theory, society and social cohesion. *Corporate Governance*. https://doi.org/10.1108/14720700510562640

Levy, S. R. (1995). Sources of current and future funding. *New Directions for Student Services*, *1995*(70), 39–49. https://doi.org/10.1002/ss.37119957006

LGT Capital Partners. (2018). ESG to SDGs : the road ahead.

Li, S., Ngniatedema, T., & Chen, F. (2017). Understanding the Impact of Green Initiatives and Green Performance on Financial Performance in the US. *Business Strategy and the Environment*, *26*(6), 776–790. https://doi.org/10.1002/bse.1948

Lin, W. L., Cheah, J. H., Azali, M., Ho, J. A., & Yip, N. (2019). Does firm size matter? Evidence on the impact of the green innovation strategy on corporate financial performance in the automotive sector. *Journal of Cleaner Production*, *229*, 974–988. https://doi.org/10.1016/j.jclepro.2019.04.214

Lindenberg, E. B., & Ross, S. A. (1981). Tobin's q Ratio and Industrial Organization. *The Journal of Business*, *54*(1), 1. https://doi.org/10.1086/296120

Lober, D. J. (1996). Evaluating The Environmental Performance Of Corporations. *Journal of Managerial Issues*. Pittsburg State University. https://doi.org/10.2307/40604100

Logsdon, & Wood. (2002). Business Citizenship: From Individuals to Organizations | Request PDF. Retrieved May 22, 2020, from https://www.researchgate.net/publication/228314281_Business_Citizenship_From_Individuals_to_Organizations

Louw, A., Boyle, R., Strahan, D., Collins, B., Kimmel, M., Giannakopoulou, E., & Becker, L. (2018). Global Trends in Renewable Energy Investment 2018. *Bloomberg New Energy Finance*, 20–60. https://doi.org/10.3928/00220124-20081201-03

Luthy, D. H. (1998). *Intellectual capital and its measurement*. Retrived May 21, 2008, from http://www3.bus.osaka-cu.ac.jp/ apira98/archives/htmls/25.htm

Majumdar, S. K. (1997). The impact of size and age on firm-level performance: Some evidence from India. *Review of Industrial Organization*, *12*(2), 231–241. https://doi.org/10.1023/A:1007766324749

Makni, R., Francoeur, C., & Bellavance, F. (2009). Causality between corporate social performance and financial performance: Evidence from Canadian firms. *Journal of Business Ethics*, *89*(3), 409–422. https://doi.org/10.1007/s10551-008-0007-7

Mancini, L., Vidal-Legaz, B., Vizzarri, M., Wittmer, D., Grassi, G., & Pennington, D. W. (2019). *Mapping The Role Of Raw Materials In Sustainable Development Goals*. https://doi.org/10.2760/026725

Martí-Ballester, C. P. (2017). Sustainable energy systems and company performance: Does the implementation of sustainable energy systems improve companies' financial performance? *Journal of Cleaner Production*, *162*, S35–S50. https://doi.org/10.1016/j.jclepro.2016.12.015

Mashayekhi, B., & Bazaz, M. S. (2008). Corporate Governance and Firm Performance in Iran. *Journal of Contemporary Accounting & Economics*, *4*(2), 156–172. https://doi.org/10.1016/s1815-5669(10)70033-3

Mathiesen, B. V., Lund, H., & Karlsson, K. (2011). 100% Renewable energy systems, climate mitigation and economic growth. *Applied Energy*, *88*(2), 488–501. https://doi.org/10.1016/j.apenergy.2010.03.001

McWilliams, & Siegel. (2000). (PDF) Corporate social responsibility and financial performance: Correlation or misspecification? Retrieved May 22, 2020, from https://www.researchgate.net/publication/229641498_Corporate_social_responsibility_and_financial_performance_Correlation_or_misspecification

Mendonça, M., Lacey, S., & Hvelplund, F. (2009). Stability, participation and transparency in renewable energy policy: Lessons from Denmark and the United States. *Policy and Society*, *27*(4), 379–398. https://doi.org/10.1016/j.polsoc.2009.01.007

Michigan University. (2019). U.S. Renewable Energy Factsheet | Center for Sustainable Systems. Retrieved from http://css.umich.edu/factsheets/us-renewable-energy-factsheet

Microsoft. (2018). Microsoft Cloud delivers when it comes to energy efficiency and carbon-emission reductions, study finds - Microsoft on the Issues. Retrieved May 21, 2020, from https://blogs.microsoft.com/on-the-issues/2018/05/17/microsoft-cloud-delivers-when-it-comes-to-energy-efficiency-and-carbon-emission-reductions-study-finds/

Miller. (2001). Financial Analysis. Retrieved May 22, 2020, from https://ag.purdue.edu/agecon/ExtensionPrograms/programs/fbm21/improve_files_/v3_slide0012.htm

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *The Academy of Management Review*, *22*(4), 853. https://doi.org/10.2307/259247

Nakao, Y., Amano, A., Matsumura, K., Genba, K., & Nakano, M. (2007). Relationship between environmental performance and financial performance: An empirical analysis of Japanese corporations. *Business Strategy and the Environment*, *16*(2), 106–118. https://doi.org/10.1002/bse.476

Nelling, E., & Webb, E. (2009). Corporate social responsibility and financial performance: The "virtuous circle" revisited. *Review of Quantitative Finance and Accounting*, *32*(2), 197–209. https://doi.org/10.1007/s11156-008-0090-y

OECD. (2001). *The OECD's Project On Harmful Tax Practices*.

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies*, *24*(3), 403–441. https://doi.org/10.1177/0170840603024003910

Ortas, E., Álvarez, I., Jaussaud, J., & Garayar, A. (2015). The impact of institutional and social context on corporate environmental, social and governance performance of companies committed to voluntary corporate social responsibility initiatives. *Journal of Cleaner Production*, *108*, 673–684. https://doi.org/10.1016/j.jclepro.2015.06.089

Owen, P. W. (2018). *Special Report Renewable energy for sustainable rural development: significant potential synergies, but mostly unrealised* (Vol. 287). Retrieved from https://www.eca.europa.eu/Lists/ECADocuments/SR18_05/SR_Renewable_Energy_EN.pdf

Palmer, K., Oates, W. E., & Portney, P. R. (1995). Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm? *The Journal of Economic Perspectives*. American Economic Association. https://doi.org/10.2307/2138393

Perrini, F., & Tencati, A. (2006). Sustainability and stakeholder management: The need for new corporate performance evaluation and reporting systems. *Business Strategy and the Environment*, *15*(5), 296–308. https://doi.org/10.1002/bse.538

Pervan, M., Pervan, I., & Ćurak, M. (2017). The Influence of Age on Firm Performance: Evidence from the Croatian Food Industry. *Journal of Eastern Europe Research in Business and Economics*, 1–9. https://doi.org/10.5171/2017.618681

Pleßmann, G., Erdmann, M., Hlusiak, M., & Breyer, C. (2014). Global energy storage demand for a 100% renewable electricity supply. In *Energy Procedia* (Vol. 46, pp. 22–31). Elsevier Ltd. https://doi.org/10.1016/j.egypro.2014.01.154

Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors - Book - Harvard Business School. Retrieved May 23, 2020, from https://www.hbs.edu/faculty/Pages/item.aspx?num=195

Porter, M. E. (1990). *The Competitive Advantage of Nations Harvard Business Review*. Retrieved June 3, 2020, from https://hbr.org/1990/03/the-competitive-advantage-of-nations

Porter, M. E. (1991). Towards a dynamic theory of strategy. *Strategic Management Journal*, *12*(S2), 95–117. https://doi.org/10.1002/smj.4250121008

Porter, M. E., & Van Der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives* (Vol. 9).

Portney, P. R. (1994). The Contingent Valuation Debate: Why Economists Should Care. *Journal of Economic Perspectives*, *8*(4), 3–17. https://doi.org/10.1257/jep.8.4.3

Prahalad, C. K., & Hamel, G. (1990). The Core Competence of the Corporation جوهر اختصاصات الشركات. *Harvard Business Review*, *68*(3), 79–91. https://doi.org/10.1007/3-540-30763-X_14

Preston, L. E., & Post, J. E. (1981). Private Management and Public Policy. *California Management Review*, *23*(3), 56–62. https://doi.org/10.2307/41172602

Rafiq, M., Zhang, X. P., Yuan, J., Naz, S., & Maqbool, S. (2020). Impact of a balanced scorecard as a strategic management system tool to improve sustainable development: Measuring the mediation of organizational performance through PLS-Smart. *Sustainability (Switzerland)*, *12*(4), 1–19. https://doi.org/10.3390/su12041365

Rafiq, S., Kaul, R., Sofi, S. A., Bashir, N., Nazir, F., & Ahmad Nayik, G. (2018, October 1). Citrus peel as a source of functional ingredient: A review. *Journal of the Saudi Society of Agricultural Sciences*. King Saud University. https://doi.org/10.1016/j.jssas.2016.07.006

Reinhardt, F. (1999). Market Failure and the Environmental Policies of Firms: Economic Rationales for "Beyond Compliance" Behavior. *Journal of Industrial Ecology*, *3*(1), 9–21. https://doi.org/10.1162/108819899569368

Renaud, A. (2004). (PDF) Les Outils D'Evaluation De La Performance Environnementale : Audits Et Indicateurs Environnementaux. Retrieved May 22, 2020, from https://www.researchgate.net/publication/46478801_Les_Outils_D'Evaluation_De_La_Performance_Environnementale_Audits_Et_Indicateurs_Environnementaux

Rezende, L. de A., Bansi, A. C., Alves, M. F. R., & Galina, S. V. R. (2019). Take your time: Examining when green innovation affects financial performance in multinationals. *Journal of Cleaner Production*, *233*, 993–1003. https://doi.org/10.1016/j.jclepro.2019.06.135

Rivera, J. (2002). Assessing a voluntary environmental initiative in the developing world: The Costa Rican Certification for Sustainable Tourism. *Policy Sciences*, *35*(4), 333–360. https://doi.org/10.1023/A:1021371011105

Rondinelli, D. (2000). *Panacea, Common Sense, or Just a Label? The Value of ISO 14001 Environmental Management Systems (3) managerial awareness, and (4) operational effec-tiveness*. *European Management Journal* (Vol. 18).

Rowley, G. L., & Traub, R. E. (1977). Formula Scoring, Number-Right Scoring, And Test-Taking Strategy. *Journal of Educational Measurement*, *14*(1), 15–22. https://doi.org/10.1111/j.1745-3984.1977.tb00024.x

Rumelt, R.P. (1984) Towards a strategic theory of the firm. *Competitive Strategic Management*, 26, 556-570.

Russo, M. V., & Fouts, P. A. (1997). A Resource-Based Perspective On Corporate Environmental Performance And Profitability. *Academy of Management Journal*, *40*(3), 534–559. https://doi.org/10.5465/257052

Salama, A. (2005). A note on the impact of environmental performance on financial performance. *Structural Change and Economic Dynamics*, *16*(3 SPEC. ISS.), 413–421. https://doi.org/10.1016/j.strueco.2004.04.005

Sarumpaet, S. (2005). *The Relationship Between Environmental Performance And Financial Performance Of Indonesian Companies*. Retrieved from http://www.petra.ac.id/~puslit/journals/dir.php?DepartmentID=AKU

Saygn, H., & Ceti, F. (2011). Recent Developments in Renewable Energy Policies of Turkey. In *Renewable Energy - Trends and Applications*. InTech. https://doi.org/10.5772/25773

Shehata, N., Salhin, A., & El-Helaly, M. (2017). Board diversity and firm performance: evidence from the U.K. SMEs. *Applied Economics*, *49*(48), 4817–4832. https://doi.org/10.1080/00036846.2017.1293796

Shin, H., Ellinger, A. E., Nolan, H. H., DeCoster, T. D., & Lane, F. (2018). An Assessment of the Association Between Renewable Energy Utilization and Firm Financial Performance. *Journal of Business Ethics*, *151*(4), 1121–1138. https://doi.org/10.1007/s10551-016-3249-9

Slaper, T., & Hall, T. (2011). The Triple Bottom Line: What Is It and How Does It Work? Retrieved from https://www.ibrc.indiana.edu/ibr/2011/spring/article2.html

Sodhi, M. S. (2015). Conceptualizing Social Responsibility in Operations Via Stakeholder Resource-Based View. *Production and Operations Management*, *24*(9), n/a-n/a. https://doi.org/10.1111/poms.12393

Song, Z., Niu, D., & Xiao, X. (2017). Focus on the current competitiveness of coal industry in China: Has the depression time gone? *Resources Policy*, *51*, 172–182. https://doi.org/10.1016/j.resourpol.2016.11.011

Sprinkle, G. B., & Maines, L. A. (2010). The benefits and costs of corporate social responsibility. *Business Horizons*, *53*(5), 445–453. https://doi.org/10.1016/j.bushor.2010.05.006

Stanwick, P. A., & Stanwick, S. D. (2001). CEO compensation: does it pay to be green? *Business Strategy and the Environment*, *10*(3), 176–182. https://doi.org/10.1002/bse.284

Stinchfield. (2010). (PDF) Climate Change Strategies and Firm Performance: An Empirical Investigation of the Natural Resource-Based View of the Firm. Retrieved May 22, 2020, from https://www.researchgate.net/publication/267026481_Climate_Change_Strategies_and_Firm_Performance_An_Empirical_Investigation_of_the_Natural_Resource-Based_View_of_the_Firm

Subrahmanya, M. H. B. (2006). Technological innovations in Indian Small and Medium Enterprises (SMEs) sector: does firm size matter? *International Journal of Innovation and Learning*, *3*(5), 499. https://doi.org/10.1504/ijil.2006.010486

Sutton, P. W. (2004). *Nature, Environment and Society*. *Nature, Environment and Society*. Macmillan Education UK. https://doi.org/10.1007/978-0-230-21244-2

Tatoglu, E., Bayraktar, E., Sahadev, S., Demirbag, M., & Glaister, K. W. (2014). Determinants of voluntary environmental management practices by MNE subsidiaries. *Journal of World Business*, *49*(4), 536–548. https://doi.org/10.1016/j.jwb.2013.12.007

Turk, A. M. (2009). ISO 14000 environmental management system in construction: An examination of its application in Turkey. *Total Quality Management & Business Excellence*, *20*(7), 713–733. https://doi.org/10.1080/14783360903036996

Vachon, S., & Klassen, R. D. (2006). Extending green practices across the supply chain: The impact of upstream and downstream integration. *International Journal of Operations and Production Management*, *26*(7), 795–821. https://doi.org/10.1108/01443570610672248

Venkatraman, N., & Ramanujam, V. (1986). Measurement of Business Performance in Strategy Research: A Comparison of Approaches. *Academy of Management Review*, *11*(4), 801–814. https://doi.org/10.5465/amr.1986.4283976

Vona. (2012). (PDF) Determinants of Renewable Energy Innovation: environmental policies vs. market regulation. Retrieved May 22, 2020, from https://www.researchgate.net/publication/235944637_Determinants_of_Renewable_Energy_Innovation_environmental_policies_vs_market_regulation

Waddock, S. A., & Graves, S. B. (1997). The Corporate Social Performance–Financial Performance Link. *Strategic Management Journal*, *18*(4), 303–319. https://doi.org/10.1002/(SICI)1097-0266(199704)18:4<303::AID-SMJ869>3.0.CO;2-G

Wagner, M., & Schaltegger, S. (2004). The effect of corporate environmental strategy choice and environmental performance on competitiveness and economic performance: An empirical study of EU manufacturing. *European Management Journal*, *22*(5), 557–572. https://doi.org/10.1016/j.emj.2004.09.013

Walley, & Whitehead. (1994). It's Not Easy Being Green. Retrieved May 22, 2020, from https://hbr.org/1994/05/its-not-easy-being-green

Welford, R. & Gouldson, A. (1993). *Environmental management and business strategy*. Pittman, London.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. https://doi.org/10.1002/smj.4250050207

Wilson, J. D., & Gordon, R. H. (2003). Expenditure Competition. *Journal of Public Economic Theory*, *5*(2), 399–417. https://doi.org/10.1111/1467-9779.00139

Wood, D. J., & Gray, B. (1991). Toward a Comprehensive Theory of Collaboration. *The Journal of Applied Behavioral Science*, *27*(2), 139–162. https://doi.org/10.1177/0021886391272001

Wrigh. (1994). Human Resources as a Source of Sustained Competitive Advantage. Retrieved May 23, 2020, from https://www.researchgate.net/publication/234075755_Human_Resources_as_a_Source_of_Sustained_Competitive_Advantage

Young, D. J. (1991). Creating a Low-Anxiety Classroom Environment: What Does Language Anxiety Research Suggest? *The Modern Language Journal*, *75*(4), 426–437. https://doi.org/10.1111/j.1540-4781.1991.tb05378.x

WWF. (2019). The Ecological Footprint And Biocapacity Explained The Impact Of Our Ecological Footprint On Biodiversity. Retrieved June 3, 2020, from https://www.footprintnetwork.org/content/uploads/2019/05/WWF-GFN-EU-Overshoot-Day-report.pdf

Zakaria, Z., Purhanudin, N., & Palanimally, Y. R. (2014). Board governance and firm performance: A panel data analysis. *Journal of Business Law and Ethics*, 2 (1), 1–12.

Zhang, B., Bi, J., Yuan, Z., Ge, J., Liu, B., & Bu, M. (2007). Why do firms engage in environmental management? An empirical study in China. https://doi.org/10.1016/j.jclepro.2007.06.016

Zhang, W., Wang, W., & Wang, S. (2014). Environmental performance evaluation of implementing EMS (ISO 14001) in the coating industry: Case study of a Shanghai coating firm. *Journal of Cleaner Production*, *64*, 205–217. https://doi.org/10.1016/j.jclepro.2013.08.028

Zhu, Q., Sarkis, J., & Lai, K.-H. (2007). Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers. *Journal of Environmental Management*, *85*, 179–189. https://doi.org/10.1016/j.jenvman.2006.09.003

Zrelli, H., & Belloumi, M. (2015). Environmental stakeholders, environmental strategies, and productivity of Tunisian manufacturing industries. *Middle East Development Journal*, *7*(1), 108–126. https://doi.org/10.1080/17938120.2015.1025489

APPENDICES

Table A.1. Definitions and Measurement of Variables

	Variable	Measurement	Label
Dependent Variables	Return on assets	Net Income / Total Assets	ROA
	Return on equity	Net income / Total Equity	ROE
	Tobin's Q	Total Market Value / Total Asset	TOBIN'S Q
Independent Variables	Policy Energy Efficiency	A set of formal documented processes for efficient energy use	PEE
	Renewable Energy Use	The amount of renewable energy produced/purchased by companies for its own use only	REU
	Renewable/Clean Energy Products	The amount of products or technologies developed for use in clean, renewable energy such as wind, solar, or biomass power	REP
	Resource Use Score	A company's performance and capacity to reduce the use of materials, energy or water	RUS
	Emissions Score	A company's commitment and effectiveness towards reducing environmental emissions	ES
	Renewable Energy Ratio	Total energy generated from primary renewable energy sources / Total Energy	RER

Table A.1. (Continued)

	Variable	Measurement	Label
Independent Variables	ISO 14000 or EMS	Whether the company has an ISO 14000 or EMS certification	ISO
	Environment Pillar Score	It reflects how well a firm uses best management practices to avoid environmental risks and capitalize on environment opportunities to generate long term shareholder value	EPS
	Target Energy Efficiency	Whether the company sets targets on energy efficiency	TEE
Control Variables	Firm Size	In (Total Assets)	SIZE
	Firm Age	In (Total Assets)	AGE
	Firm Leverage	Total Debt / Total Assets	Leverage
	R&D Intensity	R&D Expenses / Revenue	RD
	Capital Expenditure	Net increase in PP&E + Depreciation Expense	CE
	Capital Intensity	In (Capital Expenditure / Sales)	CI

Table A.1. (Continued)

	Variable	Measurement	Label
Control Variables	Growth	Compounded Annual Growth Rate (CAGR)	Growth
	Gross Domestic Product	Consumption + Investment + Government Spending + (Exports - Imports)	GDP
	Inflation	(Current Period CPI - Prior Period CPI) / Prior Period CPI	INF

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