***ASSOCIAÇÃO DE POLITÉCNICOS DO NORTE* (APNOR)**
INSTITUTO POLITÉCNICO DE BRAGANÇA

The development ways of renewable energy: the economic and financial performance of firms in this sector in Armenia and OECD countries.

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Final Dissertation submitted to *Instituto Politécnico de Bragança*
To obtain the Master Degree in Management, Specialisation in Business Management

Supervisors:
Ana Paula Monte
Ângela Ferreira
Sargis Manukyan

Bragança, July, 2017.

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Abstract

In this research is intended to analyse the expansion of the economic sector related to the development ways of renewable energy and the economic and financial performance of companies operating in this field.

The electricity requirements are increasing at alarming rate and the power demand has been running ahead of supply. The renewable energy industry remains one of the most vibrant, fast-changing, and transformative sectors of the global economy. Technology improvements, cost declines, and the catalytic influence of new financing structures, have turned the sector into a driver of economic growth around the world (IEA, 2012; New energy market, 2015). The recent severe energy crisis has forced the world to develop new and alternative methods of power generation. The non-conventional methods of power generation are solar energy, fuel cells, wind power generation, geo-thermal energy generation, etc. (Riva & Foppapedretti, 2014; Twidelland & Weir, 2006).

The goals of the research project are i) to analyse the available ways of alternative (renewable) energies, their markets and evolution; ii) to analyse the profitability (financial performance) based the analysis of stock returns and on financial ratios of renewable energy companies. The main research question is that renewal energy companies are profitable and do not have negative effect in environment when compared with non-renewable energy companies (Dickson, 2016; Beiter, 2014).

To test it and answer to the goals of the research, it will be collected secondary data, namely financial and non-financial data of renewal energy industry's market and companies' stock prices for companies in Armenia, EU countries and other OECD countries. The time horizon for the data simple is from year 2000 until now.

Keywords: renewable energy (RE), financial data, financial ratios, market price, environment

Resumo

Esta investigação pretende analisar a expansão do setor económico relacionado com o desenvolvimento das energias renováveis e os desempenhos económico e financeiro das empresas que operam nesse setor.

Os requerimentos de energia elétrica estão a aumentar a uma taxa alarmante e a procura de energia tem crescido mais que os meios de produção. A indústria da energia associada a fontes renováveis apresenta-se como uma das mais vibrantes e com mudanças consideráveis no setor de transformação da economia global. As evoluções tecnológicas, a redução dos custos e a influência catalítica de novas estruturas de financiamento, tem posicionado o setor numa posição dominante no crescimento económico a nível global (IEA,2012; New energy market, 2015). As recentes crises no setor dos combustíveis fósseis têm forçado os diversos países a desenvolverem alternativas e novos métodos de produção de energia elétrica. Estes métodos não convencionais são baseados em energia solar, células de combustível, energia eólica, energia geotérmica, etc. (Riva & Foppapedretti, 2014; Twidelland & Weir, 2006).

Os objetivos deste projeto de investigação são i) analisar os meios disponíveis para a produção de energia a partir de fontes renováveis, os seus mercados e respetiva evolução; ii) analisar a rentabilidade (desempenho financeiro) baseada nos preços de mercado e em rácios financeiros de empresas que operam no mercado das renováveis. A principal hipótese de investigação é que as empresas que operam no setor das energias renováveis são lucrativas e contribuem mais para a redução da pegada ecológica quando comparadas com aquelas que operam no setor das energias ditas convencionais [Dickson, 2016; Beiter, 2014].

Para testar esta hipótese e responder aos objetivos desta investigação, será recolhida informação secundária, nomeadamente informação financeira e não financeira e cotações de empresas que operam no setor das energias renováveis na Arménia, países da União Europeia e outros países da OCDE. A amostra temporal dos dados em análise reporta ao ano 2000, até à presente data.

Palavras-chave: Energia renovável (RE), informação financeira, rácios financeiros, preço de mercado.

Համառոտագիր

Այս ավարտական հետազոտական աշխատանքում նախատեսված է վերլուծել վերականգնվող էներգիայի զարգացման ուղղիները, նրանց տնտեսական սեկտորի ընդլայնումը: Նույնպես ներկայացվելու են վերականգնվող էներգիա արտադրող կազմակերպությունների տնտեսագիտական և ֆինանսական ցուցանիշները։

Էլեկտրաթներգիայի պահանջարկն աճռելի արագությամբ աճում է: Վերականգնվող էներգիայի արդյունաբերությունը ներկայումս հանդիսանում է շատ դինամիկ, արագ փոփոխվող և ձևափոխվող ճյուղերից մեկը միջազգային տնտեսական սեկտրում։ Տեխնոլոգիաների բալերավում, գների իջեցումը, նոր ֆինանսական կառուցվածքների կատալիկ ազդեցությունը այս արդյունաբերության ճյուղը դարձել են ամբողջ աշխարհում տնտեսական աճի պատճառներ (IEA, 2012; New energy market, 2015): Վերջերս տեղի ունեցած էներգետիկ ճգնաժամը պատճառ հանդիսացավ նոր այլընտրանքային էներգիաներ բացահայտելու համար։ Վերականգնվող էներգիա արյի տեսակներից են՝ արևային էներգիան, թերմո-էլեկտրական գեներատորները, գեոթերմալ էներգիան, հողմային էներգիայի գեներատորները և այլն (Riva & Foppapedretti, 2014; Twidelland & Weir, 2006):

Հետազոտական աշխատանքի հիմնական նպատակներն են i) վերլուծել վերականգնվող էներգիայի հասանելի ճյուղերի շուկաները և դրանց էվոլուցիան, ii) վերլուծել վերականգնվող էներգիա արտադրող կազմակերպությունների շահութաբերությունը (ֆինանսական հաշվետվությունների) հիմնվելով ֆինանսական հարաբերակցությունների և ֆոնդային շրջապտույտի վրա:

Ատենախոսության նպատակն այն է, որ վերականգնվող էներգիա արտադրող կազմակեր-պությունների շահութաբերությունն ավելին է և նրանց ազդեցությունը շրջակա միջավայրի վրա ավելի քիչ են քան չվերականգնվող էներգիա արտադրողներինը (Dickson, 2016; Beiter, 2014):

Որպեսզի կարողանանք պատասխանել հետազոտական աշխատանքի դիմաց դրված հիպոթեզերին պետք է հավաքագրել երկրորդական տվյալներ, հիմնականում ֆինանսական և ոչ ֆինանսական տվյալներ վերականգնվող էներգիայի ոլորտից, շուկաների և կազմակերպությունների ֆոնդային արժեքները Հայաստանի, Եվրոպական Միության և այլ ՏՀԶԿ երկրների համար։ Տվյալների հավաքագրման ժամանակահատվածը 2000 թվականից մինչև 2016 թվականն է։

Առանցքային բառեր՝ վերականգնվող էներգիա, ֆինանսական տվյալներ, ֆինանսական փոփոխականներ, շուկայական արժեք, շրջակա միջավայր:

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Acronyms

CSP - Concentrated Solar Power

EBIT - Earnings Before Interest and Taxes

EU - European Union

GHG - Greenhouse Gas

GW - Gigawatt

IAENA - International Atomic Energy Agency

INDC - Intended National Determined Contribution

IRENA - The International Renewable Energy Agency

KWh - Kilowatt

MW - Megawatt

NOPAT - Net Income and Net Operating Profit After Tax

OECD - The Organization for Economic Co-operation and Development

PPA - Power Purchase Agreement

PV - Photovoltaic

R2E2 - Renewable Resources and Energy Efficiency

RA - Republic of Armenia

RE - Renewable Energy

RES - Renewable Energy Source

RESh - Renewable Energy Shares

RH - Research Questions

ROA - Return on Assets

ROE - Return on Equity

SHPP - Small Hydropower Plant

SREP - Scaling up the Renewable Energy Program

USA - United State of America

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Introduction

We use energy every day of our live, and energy is the important part of our life. Nowadays, we need more and more energy, but the energy from fossil fuels are not forever, it is going to finish someday. Moreover, the fossil fuels energies are becoming too expensive or too environmentally damaging to retrieve. Renewable energy requirements are increasing a lot because of some of these reasons. The other advantage using renewable resources is that they are distributed over a wide geographical area, ensuring that developing regions have access to electricity generation at a stable cost for the long-term future.

This dissertation is constituted by two parts. The first part describes more about renewable energy. The renewable energy's power sector evolution over the last 15 years in OECD countries and in Armenia. The main renewable energies what is present in first part is solar energy, wind energy, hydropower and geothermal power. The renewable energy has not fewer impacts in the environment that non-renewable energy, but this not mean that renewable energy's impacts are equal zero. In this part of dissertation is also presented the renewable energy in Republic of Armenia, how it has been developed since year 2000 and which kind of renewable energy have more development.

The second part of the thesis has two main objectives: the first (i) analyse the market indicators such as average stock prices and second (ii) analyse financial ratios on these companies. To achieve these objectives the first step consist on to find companies that are from different OCED countries (Portugal, France, Germany, Spain and Italy). These companies are producing renewable and non-renewable energies and have publicly data, namely financial statements and reports. Nevertheless, unfortunately not all companies on their official websites have published financial statements for renewable energy more than 3 years. That is why the sample in the dissertation considers companies are producing both kinds of energy: from fossil fuel and renewable energy. All five companies are listed in stock exchange and have publicly data. From these data it will be computed the daily return on companies' market price and then annualised it in order to check if the companies' annualized average return positive for the period under analysis. Also related to market prices it will be computed and compared companies' market risk of their stocks. It is intended to test if the renewable (an non-renewable) energy companies have more market risk than the underlying stock index (the benchmark for market). In this regard, to answer to the objective of the study and the research questions it will apply a t-test, descriptive and regression analysis.

After selecting the companies and analyse the market indicators based on stock prices, the next step is to analyse the profitability based on financial ratios. From these financial ratios we can know if companies' return on assets is increasing, or not, during the five years period (from year 2011 to 2016). One research question related to this analysis is if its return on equity has increased and how much. Another research question is related to the companies' sales return on that same period and which company is more profitable.

For complete and concise presentation of the final results, different tables, figures, diagrams and detail descriptions are used. All the results are summarised in the conclusion part of master thesis, which presents the most important findings of this work.

PART I: The development trend of renewable energy in the World and in Republic of Armenia

1.1. Main types of renewable energy and assessment of current state of art in the World

The world engenery demand currently relies on fossil fuel (coal, oil and natural gas) and this kind of energy; together with nuclear energy are the main sources to produce electricity. Fossil fuels are non-renewable because they are used at a higher rate than they are naturally regenerated, which translates in finite resources. These resources will not be forever. Fossil fuels are becoming too expensive or environmentally damaging, mainly due to increased concerns about climate change. Additionallym fossil fuel energy prices are unstable due to continues social and political instability in many source countries in the oil trade chain. That is why renewable energies will have to replace traditional energy sources (Alrikabi; 2014).

The another advantage using renewable resources is that they are distributed over a wide geographical area, ensuring that developing regions may have access to electricity generation at an affordable and stable cost for the long-term future (Moving towards a low carbon economy, 2016).

Renewable energies are derived directly from the sun (such as thermal and photovoltaic, indirectly from the sun (such as wind, hydropower, and energy stored in biomass), or from other natural movements and mechanisms of the environment (such as geothermal and tidal energy). They are freely avaiable in nature. Geothermal energy is produced from the Earth's intermal heat, which is used in different ways, for example, electric power production, heating and cooling of buildings etc (Environmental and Natural Resources Economic's, 2000).

Hydrogen can also be found in many organic mixtures. It is the most important element on the Earth. But it doesn't appear naturally. It's always joint with other elements, such as oxygen i the water. Once separated from others elements, hydrogen can be burned as a fuel or converted into electricity.

Nowadays renewable energies are recognized around the world such as main-stream sources of energy. Quick growth, special in the power sector, is driven by several factors, including the improving renewable technologies's cost-competiveness, loyal policy initiatives, better access to financing, energy security and environmental concerns, growing demand for energy in developing and emerging economies, and the need for access to modern energy sector. Therefore, new markets for both centralized and distributed renewable energy are appearing in all regions. The year's events culminated in December at the United Nations Framework Convention on Climate Change's (UNFCCC) 21st Conference of the Parties (COP21) in Paris, where 195 countries agreed to limit global warming to well below 2 degrees Celsius. A majority of countries committed to scaling up renewable energy and energy efficiency through their Intended Nationally Determined Contributions (INDCs). Out of the 189 countries that submitted INDCs, 147 countries mentioned renewable energy, and 167 countries mentioned energy efficiency; in addition, some countries committed to reforming their subsidies for fossil fuels.

During 2015, the total number of countries which is using renewable energy policies increased again. As of year-end 2015, at least 173 countries had renewable energy targets (not considering INDCs), and an estimated 146 countries had renewable energy support policies, at the national or state/provincial level.

As of 2014, renewable energy provided an estimated 19.2% of global final energy consumption. Of this total share, modern renewables (not including traditional biomass) increased their share slightly over 2013 to approximately 10.3%. In 2014, hydropower accounted for an estimated 3.9% of final energy consumption, other renewable power sources comprised 1.4%, and renewable heat energy accounted for approximately 4.2% (Ren21, Global Status Report, 2016).

The overall development of renewable energy is not homogeneous among the different parts of the world. For a majority of the world's population, traditional biomass energy is still an important energy source. Although in recent years this traditional use has started to level off due to increasing urbanization and the uptake of modern energy sources, it still dominates national energy statistics in many developing countries, with a large share of the population in these countries lacking access to modern energy services (Ren21, Global Status Report, 2015).

On a global scale, renewable energy from 2005 till 2013 consumption increase by 28 %, in that case when total energy consumption grow by only 18 % over the same period of time. As a result, between 2005 till 2013 the share of renewable energy in gross energy consumption increased 1 % become 14%. Although in most world countries the absolute consumption of Renewable Energy Shares (RESh) increased over this period too, in comparative terms a region's RESh share could have decreased

during the period if its energy consumption from non-renewable fuels increased by more than its grow in RES energy consumption. Global new investment in renewable power and fuels climbed to a record USD 285.9 billion in 2015 (not including hydropower projects >50 MW). This represents a rise of 5% compared to 2014 and exceeds the previous record (USD 278.5 billion) achieved in 2011. Including investments in hydropower projects larger than 50 MW, total new investment during 2015 in renewable power and fuels (not including renewable heating and cooling) was at least USD 328.9 billion. Investment in renewable energy has been weighted increasingly towards wind and solar power. Solar power was again the leading sector by far in terms of money committed during 2015, accounting for USD 161 billion, which is increase over 12% related to 2014, or more than 56% of total new investment in renewable power and fuels. Wind power followed with USD 109.6 billion, or 38.3% of the total energy and it is increase 4%.

As of 2014, renewable energy provided an estimated 19.2% of global final energy consumption. Of this total share and modern renewables (not including traditional biomass) increased their share slightly over 2013 to approximately 10.3%. (Figure 1) In 2014, hydropower accounted for an estimated 3.9% of final energy consumption, other renewable energy power sources comprised 1.4%, and renewable heat and energy accounted for approximately 4.2%.

Although the use of renewable energy is rising rapidly, the share of renewables n total final energy consumption is not growing as quickly. In developed countries, energy's growth is slow, and displacing the big stock of existing infrastructure and fuels field takes time.

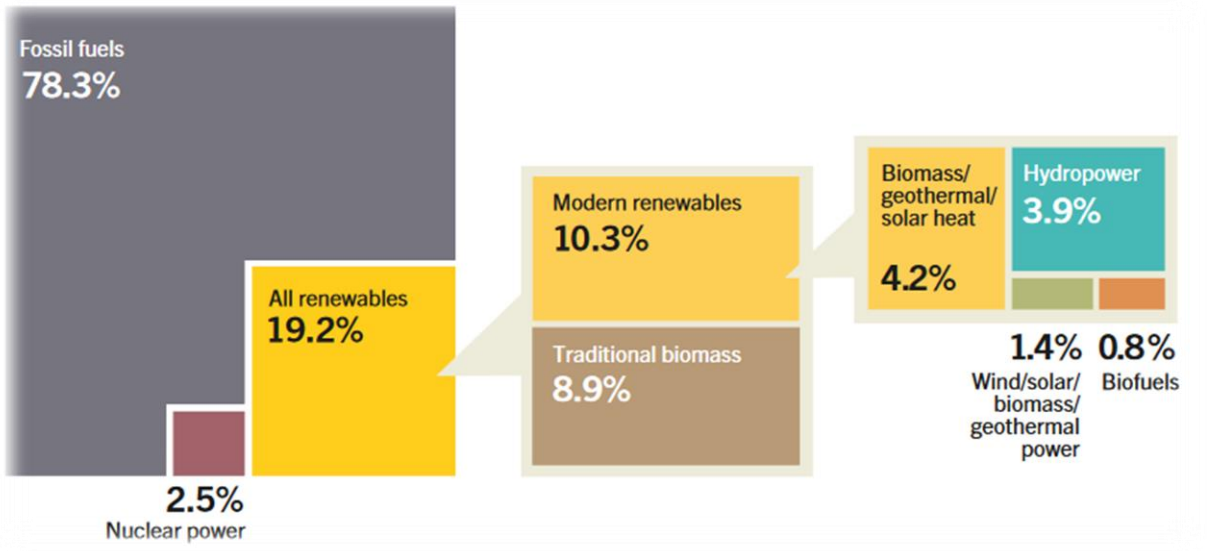

Figure 1: Estimated Renewable Energy Share of Global Final Energy Consumption, 2014.

Source: Renewables 2016 Global Status Report (2016, p. 28)

Renewables accounted for the majority (77%) of new European Union countries generating capacity for the last eighth consecutive year, and the region continued to decommission more capacity from conventional sources than it installed. Between 2000 and 2015, the share of renewables in the EU's total power capacity increased 20% and become 44%, and, as of 2015, renewable sourses were Europe's largest source of electricity. In Scotland, renewables met over half of electricity demand, a year ahead of an established target; throughout the United Kingdom, output from renewables hit a record high, passing coal for the first time in the fourth quarter of 2015. In Germany, renewable power output increased by 20% in 2015, and the share of renewables in electricity consumption was 32.6% this is hiher 27.4% in 2014. Even so, in most European countries' markets have slowed, due to diminished levels of financial support and to a growed focus on the integration of renewable energy sourses generation.

In world, the largest employers are the wind, solar photovoltaic (PV) and solid biomass industries. In 2014, a total of 7.7 million jobs (direct and indirect ones) were related to renewable energies globally (Renewable Energy in Europe 2016).

Employment in the renewable energy sector increased by 5% in 2015, to 8.1 million jobs (direct and indirect), as estimated by The International Renewable Energy Agency (IRENA). (Table 1) Solar PV and wind power remained the most dynamic markets, while solar PV and biofuels provided the largest numbers of jobs. In addition, large-scale hydropower accounted for another 1.3 million direct jobs in 2015.

Renewable energy markets and employment were characterized by favorable policy frameworks in several countries, regional shifts in investment and increased labor productivity.

Table 1: Estimated Direct and Indirect Jobs in Renewable Energy Worldwide, by Industry (2015)

	World	**China**	**Brazil**	**United State**	**India**	**Japan**	**European Union**		
							Germany	**France**	**Rest of EU**
	THOUSAND JOBS								
Solar power	3725	2395	45	408	178	377.7	48.7	27	108
Wind power	1081	507	41	88	48	5	149	20	162
Hydropower (small-scale)	204	100	12	8	12		12	4	31
Geothrmal energy	160			35		2	17	31	55
Total	5170	3002	98	539	238	384.7	226.7	82	356

Source: Renewables 2016 Global Status Report (2016, p. 41)

1.1.1 Solar energy

Solar enegy can be converted in thermal energy or photovoltic energy, to be used as electric energy. Solar energy has the highest potential in order to keep clean, safe and reliable the usage of energy.The solar radiation that reaches on the Earth is estimated to be 200 times more then the total energy constuption which humans are using at the present (New and Renewable Energy Resources, 1998).

Solar systems has may be based in two types of energy conversion; photovoltaic (PV) and solar thermal technology system.

Solar photovoltaics energy market expansion in most of the world is due largely to the increasing competitiveness of the conversion systems. In addition, the rising demand for electricity has been improving the awareness of solar PV's potential, because countries are searchingthe ways to minimize pollution and greenhouse gas emissions.

Until recently, demand was concentrated in rich countries, but now, emerging countries' markets have begun to increase significantly their consumption, with solar PV taking off.

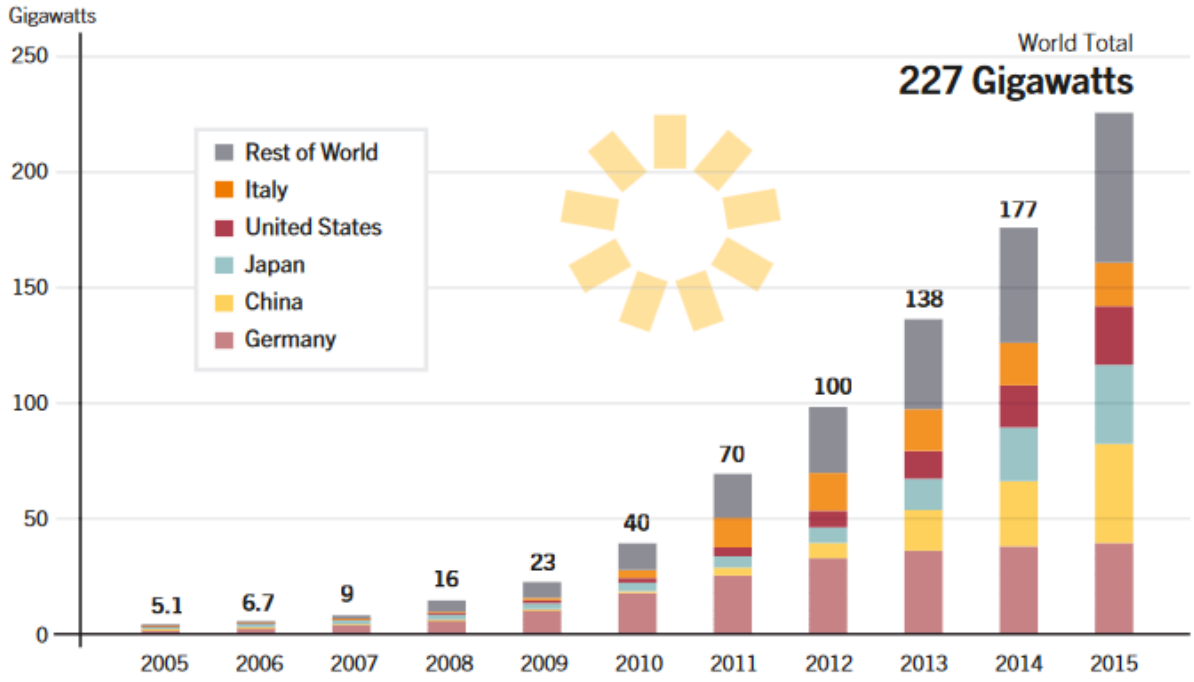

Figure 2: Solar PV Global Capacity, by Country/Region, 2005–2015.

Source: Renewables 2016 Global Status Report (2016).

Asia eclipsed all other markets since 2012 year, accounting for about 60% of global additions. In the top three of solar PV markets are China, Japan and the United States (Figure 2). Other countries which are after in the top 10 for additions were India, Germany, the Republic of Korea, Australia, France and Canada. By the end of 2015 year, every continent (except Antarctica) had installed at least 1 GW, and at least 22 countries had 1 GW or more of capacity. The leaders for solar PV per inhabitant were Germany, Italy, Belgium, Japan and Greece.

Regarding solar thermal technology, it is used widely in all regions of the world for affordable hot water, to heat and cool spaces, and to provide higher-temperature heat for industrial processes.

In 2015 global capacity of glazed and unglazed solar thermal collectors continued to rise .For the same year the 18 largest markets are spread across all continents and present 93–94% of total the year's global additions. Their newly installed capacity totalled decreas 14% from the 43.4 GW to 37.2 GW installed by these countries in 2014.The continued slowdown in 2015 was due primarily to shrinking markets in China and Europe.

The top countries for new installations in 2015 were China, Turkey, Brazil, India and the United States, and the top five for cumulative capacity at year-end were China, the United States, Germany, Turkey and Brazil (Figure 3). Of the top 18 installers, the leading countries for average market growth between 2010 and 2015 were Denmark (34%), Poland (14%) and Brazil (8%); the most significant market decline over this period was seen in France (-17%), Austria (-14%) and Italy (-14%).

China again was the largest market by far in 2015, with gross additions of 30.45 GW.

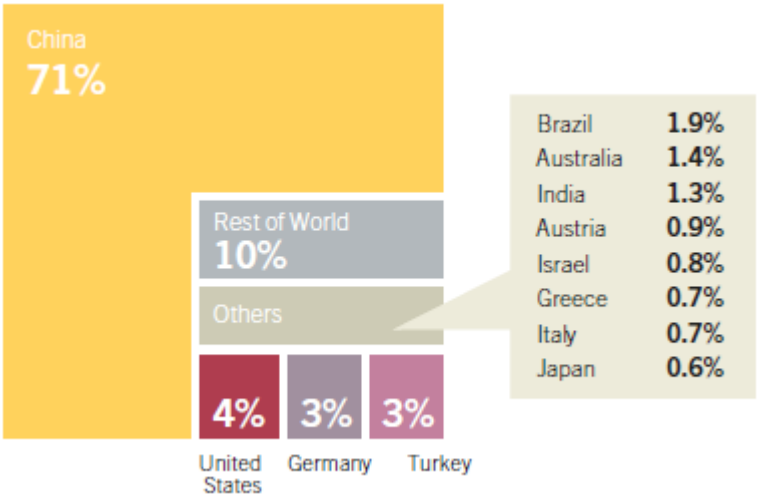

Figure 3: Solar Water Heating Collectors Global Capacity, Shares of Top 12 Countries and Rest of World, 2014.

Source: Renewables 2016 Global Status Report (2016, p. 71)

1.1.2 Wind Energy

Wind speed has a significant role in the wind power generation cost, If the wind speed doubles, the wind power increases eight times. This means that, the higher the wind's speed is more easily and cheep is the captured energy (Environmental Impacts of Wind power, 2013).

Unlike solar energy, wind energy works well on cloudy days and rainy season also but, in the other hard, it has an intermittent characteristic.. The location of wind turbines is a very important factor, which influences the performance of the overall conversion system. The windmills are generally located at heights of approximately 30 m.

Wind passing over the blades is converted in to mechanical power, which is fed through transmission to an electrical generator. Wind turbines will not work in winds below 13 km per hour. When wind speed average is 22 km per hour conversion system are able to work the point of maximum effeciency.

Wind power was the leading source of new power generating capacity in Europe and the United States in 2015, and the second largest in China. Globally, a record of 63 GW was added to a total of about 433 GW. Non-OECD countries were responsible for the majority of installations, led by China, and new markets emerged across Africa, Asia and Latin America. Corporations and other private entities continued turning wind energy reliable and low-cost power.

In some of the largest markets increase was driven by uncertainty about future policy changes; however, wind deployment also was driven by wind power's cost-competitiveness and by environmental and other factors.

Wind has become the least-cost version for new power generating ability in an increasing number of markets. At the end of 2015, the leading countries for total wind power capacity per inhabitant were Denmark, Sweden, Germany, Ireland and Spain. Wind power experienced another record year in 2015, with more than 63 GW added – a 22% increase over the 2014 market – for a global total of around 433 GW (Figure 4). More than half of the world’s wind power capacity has been added over from 2010.

New power generating capacity of wind energy was the leading source in Europe and the United States and placed second in China, wind supplied more new power generation worldwide than any other technology in 2015.

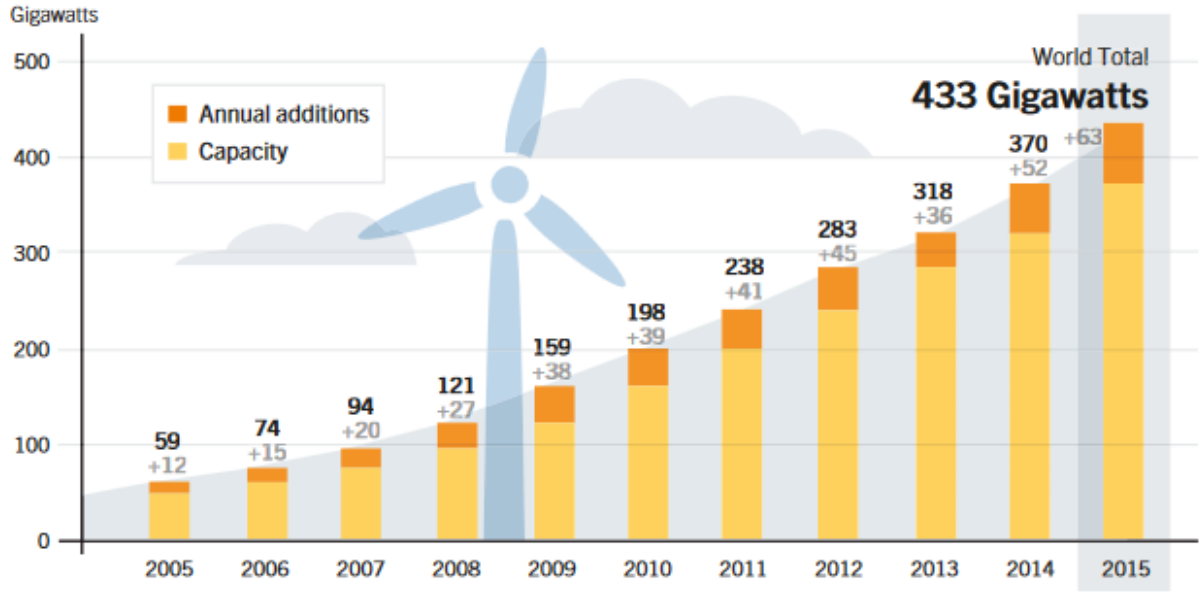

Figure 4: Wind Power Global Capacity and Annual Additions, 2005–2015.

Source: Renewables 2016 Global Status Report (2016, p. 77)

Wind power is playing a major role in power supply in an increasing number of countries. In the EU, capacity in operation at the end of 2015 was enough to cover an estimated 11.4% of electricity consumption in a normal wind year.

During 2015 year here was a strong increase in the offshore sector with an estimated 3.4 GW connected to grids, mostly in Europe, for a world total exceeding 12 GW. Wind power is playing a major role in meeting electricity demand in an increasing number of countries, including Denmark (42% of demand in 2015), Germany (more than 60% in four states) and Uruguay (15.5%) (REN21, global status report, 2016).

Most wind turbine manufacturing takes place in China, the EU and the United States, and the majority is concentrated among relatively few players. In 2015, by some estimates, Goldwind (China) surpassed Vestas (Denmark) to become the world's largest supplier of wind turbines.

1.1.3 Geothermal Energy

Geothermal energy is produced from the Earth's heating. This type of energy, when available, is clean and constant. Geothermal energy resource range from the shallow ground to hot water and stone found a few miles beneath the surface of the Earth, being characterized by extremely high temperatures as deeper the sources are.

Almost everywhere, the small ground or upper 3 meters of the Earth's surface, there is a nearly invariable temperature between 10°C and 16°C. Geothermal heat pumps can tap into this resource to heat and cool buildings. A geothermal heat pump system consists of a heat pump, an air delivery system, and a heat exchanger, a system of pipes buried in the shallow ground near the building. In the winter time, the heat pump removes heat from the heat exchanger and pumps it into the indoor air supply system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water (Renewable energy news and information: Geothermal energy, 2017).

In Europe, renewed calls were made to policy makers to support geothermal energy development, primarily through technology-neutral policy measures such as improved data collection in the heat sector; the provision of financing that is directed towards renewable heat and cooling; and a formal examination of the potential for dispatch able renewable energy resources to complement rising shares of intermittent renewables. Another requirement that is specific to geothermal energy is public risk insurance to mitigate geologic risk. In that context, the French government announced a new USD 54.6 million (EUR 50 million) geothermal risk fund in 2015 that will facilitate the initiation of new exploration efforts that carry the greatest risk profiles (REN21. Global status report, 2017).

At the end of 2015, the countries with the largest amounts of geothermal power generating capacity were the United States (3.6 GW), the Philippines (1.9 GW), Indonesia (1.4 GW), Mexico (1.1 GW), New Zealand (1.0 GW), Italy (0.9 GW), Iceland (0.7 GW), Turkey (0.6 GW), Kenya (0.6 GW) and Japan (0.5 GW).

Turkey continued its relatively rapid build-up of geothermal power capacity, with 10 units completed in 2015, adding 159 MW for a total of at least 624 MW. Turkey is on its right way to meeting its goal of having 1 GW of geothermal power capacity in place by 2023.9 In 2015, the country generated 3.37 TW with geothermal energy, up 50% over 2014.

In late 2015, another binary plant was completed in Bavaria in Germany, supplying 5.5 MW of power generating capability in addition to 12 MW of thermal output. As of early 2016, Germany had a concentration of several small geothermal plants around Munich that take advantage of local low-temperature geothermal resources to provide both heat and power (Figure 5).

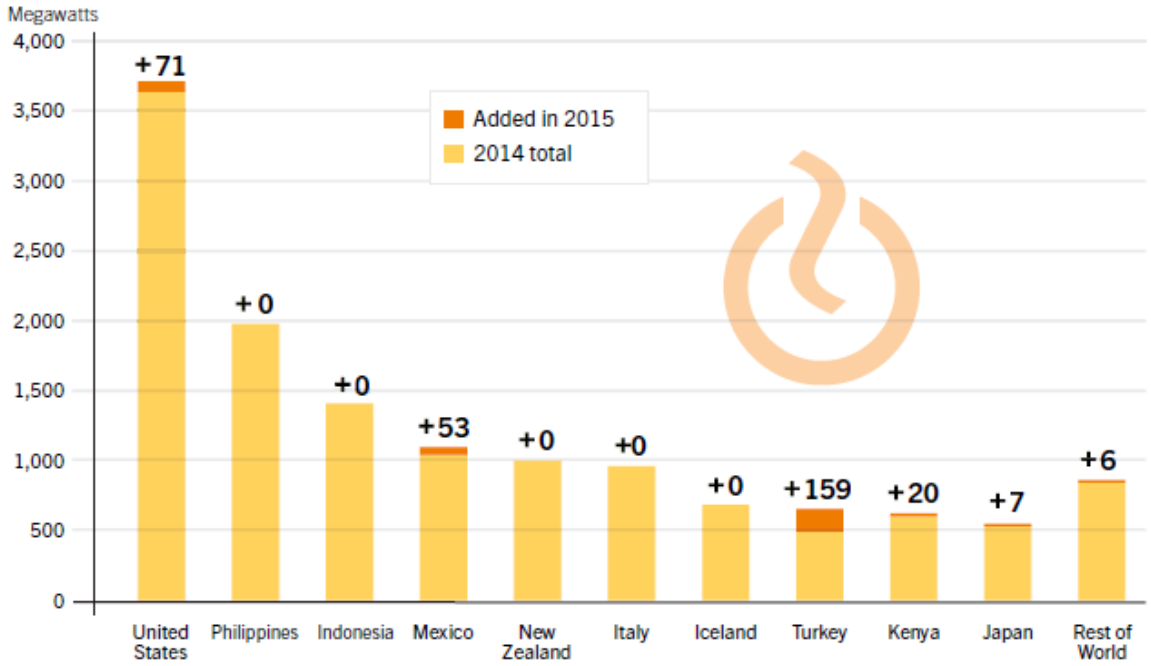

Figure 5: Geothermal Power Capacity and Additions, Top 10 Countries and Rest of World, 2015.

Source: Renewables 2016 Global Status Report (2016, p. 51)

1.1.4 Hydropower

Hydropower became a source for generating electric power in the end of 19th century. Hydropower uses the energy of kinetic and/or potential energy of water. Rain or melted snow, usually originating in mountains, create streams and rivers that finnaly run to the ocean. The energy of that moving water can be substantial (IEA, 2017).

Hydropower is a versatile, flexible technology that can be used to power a single home, as pico or micro power plants, or, as the largest hydropower station which can supply power in the range of giga watts with renewable electricity on a national and even regional scale (Hydropower status report, 2017).

Hydropower plants can be constructed in a variety of sizes and with different characteristics. In addition to the importance of the head and flow rate, hydropower schemes can be put into the following categories

- *Run-of-river* hydropower projects have a very little storage capacity behind the dam and generation is dependent on the timing and size of river flows;

- *Reservoir* (storage) hydropower schemes, which have the ability to store water behind the dam in a reservoir in order to de-couple generation from hydro inflows;
- *Pumped storage* hydropower schemes, using off-peak electricity to pump water from a reservoir located after the tailrace to the top of the reservoir, so that the pumped storage plant can generate at peak times and provide grid stability, balancing the production and the consumption (Dolf, 2012).

As in the past several years, the most significant share of new hydropower capacity was commissioned in China, which accounted for about one-half of the global total. Other countries with substantial additions in 2015 included Brazil, Turkey, India, Vietnam, Malaysia, Canada, Colombia and Lao PDR (Figure 6).

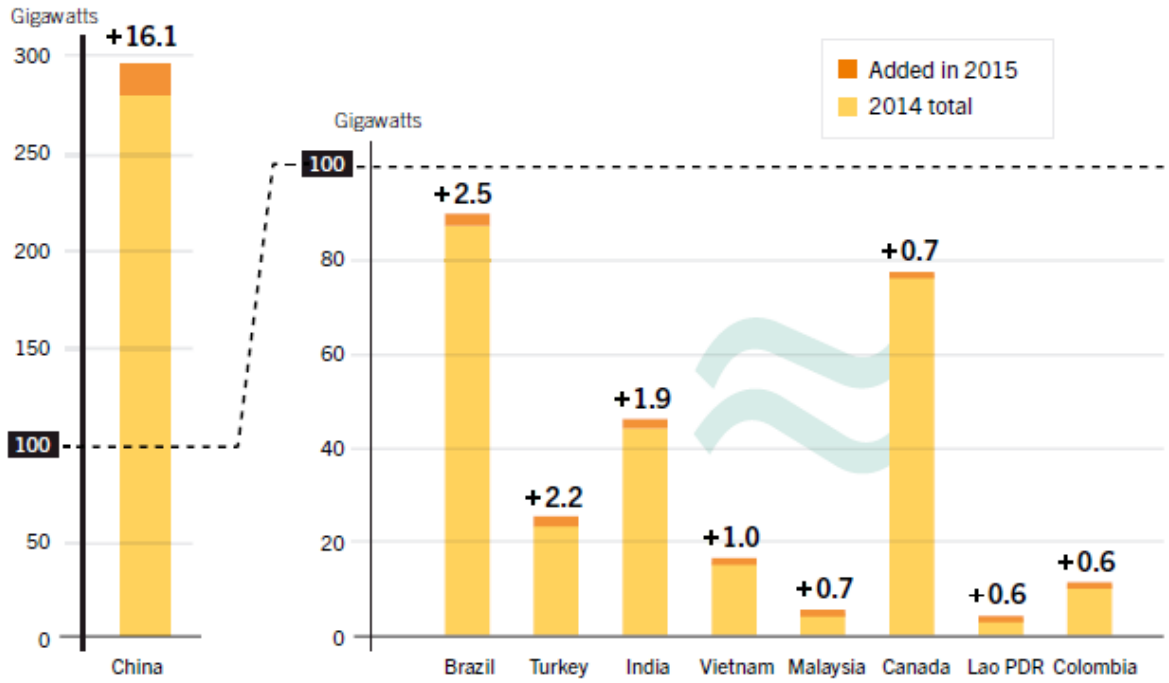

Figure 6: Hydropower Capacity and Additions, Top Nine Countries for Capacity Added, 2015.

Source: Renewables 2016 Global Status Report (2016, p. 55)

China commissioned 16 GW of new hydropower projects (a 26% decline relative to 2014) for a year-end total of 296 GW; in addition, the country has 23 GW of pumped storage capacity. Hydropower generation in China increased for the second consecutive year, up by more than 5% in 2015 (at 1,126 TW). Hydropower infrastructure investment declined sharply for the second year in a row, down 17% to USD 12 billion, following a 21.5% drop in 2014.

Hydropower capacity in Brazil increased in 2015 by 2.5 GW (2.8%), including 2.3 GW of large-scalei hydro (>30 MW) capacity, for a year-end total of 91.7 GW. Despite the increase in capacity, hydropower output, at 382 TW, dropped again (2.7% relative to 2014) due to continuing drought conditions. Between 2011 and 2015, Brazil's hydropower output declined about 15%, even as capacity expanded by about 11%.

1.2. Assessment of the actual state of art of renewable energy in Republic of Armenia

Armenia does not have any fossil fuel or coal reserves, and is therefore entirely dependent on imported fuel for transportation, electricity generation, and heat production. While surrounded by countries that possess significant hydrocarbon reserves, Armenia's fossil fuel reserves are limited to a small number of lignite or brown coal mines located in the vicinity of Gyumri and Spitak. Oil drilling results have shown that while some oil reserves exist, they are located too deep to be economically viable for extraction (R2E2, 2011).

The energy industry of Armenia is based on three components: nuclear, natural gas, and water resources. In Armenia energy are traditional sub atomic energy (because in Armenia has atomic station) and thermal energy which are problematic and stable operation due to various external factors. Too many inhibiting factors for the development of hydropower are coming here and everything is clear (Maruhyan & Hovhannisyan, 2009).

Renewable energy in Armenia is not the most developed, but it is the most promising direction for the development of the energy industry.

Despite the great potential, the share of renewable energy in the energy sector is still small and does not play a major role, exept the energy from small hydroelectric power plants [Manukyan, 2013].

Renewable energy development has been slow in the past, but its application throughout the world is accelerating. Policies to stimulate a faster deployment of clean energy technologies are necessary and will, in turn, create a level playing field by addressing market barriers, creating transparent pricing structures, and facilitating access to infrastructure financing. Because the renewable energy industry is not yet at the same level of development as the more traditional energy industries, it needs a more favorable regulatory environment in the near term for its development, survival, and transformation to a mainstream energy resource. In particular, small hydropower plant (SHPP) have been a major renewable energy deployment success story in Armenia over the last decade.

Some renewable energy technologies—such as hydro, biomass, and wind—are close to becoming commercial and should be the first to be deployed on a massive scale. While other renewable energy

technologies exhibit promising potential, they are less mature and require long-term vision, government encouragement, and favorable regulations to flourish. The U.S. and European Union have implemented effective support policies for renewable energy development, which have resulted in the acceleration of renewable energy technology deployments in recent years, which should also be implemented in Armenia (Simonyan, 2011).

The main body for all energy policy matters and issues in Armenia resides with the Ministry of Energy and Natural Resources (2016), which is responsible for overseeing and managing all aspects of the energy sector. The main quasi-governmental organization that is heavily involved in renewable energy research and financing is the Renewable Resources and Energy Efficiency Fund (R2E2, 2013) of Armenia.

General energy-related issues in Armenia are regulated by the Energy Law, and specific issues related to renewable energy are regulated by the Law on Energy Saving and Renewable Energy. The main purpose of the latter is to define the state policy on the development of energy saving and renewable energy. The idea is to strengthen the economic situation and energy independence of Armenia by increasing the level of indigenous renewable energy production (Babayan & al, 2011). Figure 7 presents the penetration of renewable energy in Republic of Armenia in thousands toe from 2000 till 2015.

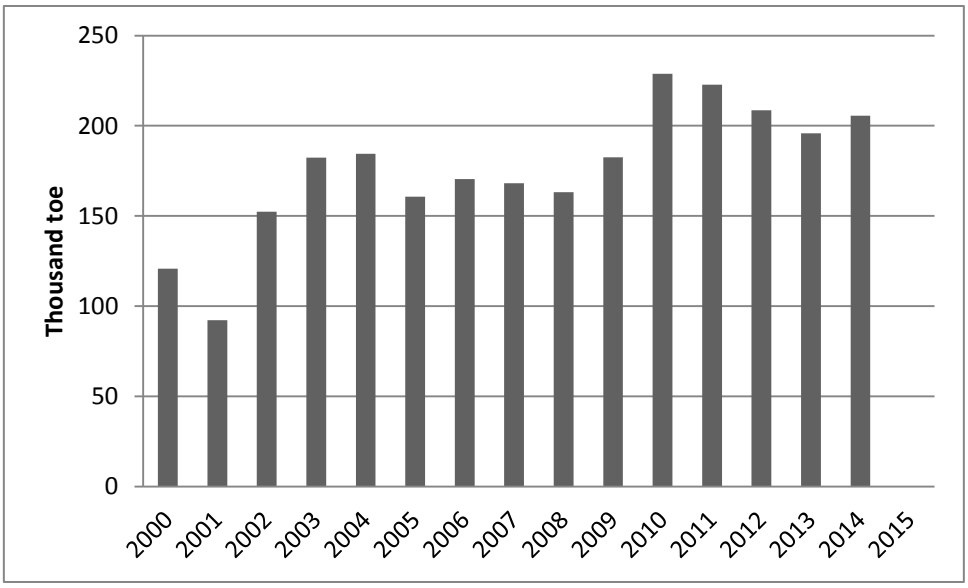

Figure 7: Renewable energy total in Armenia, Thousand toe, 2000 – 2015.

Source: Adapted from OECD Data (2017)

1.2.1 Solar energy in Armenia

The Sun is the most widely used source of clean and inexhaustible energy. Over the past years the companies developing solar energy have become profitable, competing with those dealing with conventional energy both in terms of economic returns and in terms of safety. Solar energy has been broadly used both in water heating systems to generate thermal energy and electric power through photoelectric converters.

Armenia has a significant advantage in terms of solar energy: the country is situated in the proximity of subtropical zone; most provinces have favorable climatic conditions that make wide use of solar energy possible (21-st century, 2008).

Armenia has a significant solar energy potential. The average annual amount of solar energy flow per square meter of horizontal surface is about 1720 kWh (the average European is 1000 kWh). One fourth of the country's territory is endowed with solar energy resources of 1850 kWh/m^2/year.

In Armenia solar thermal energy is rapidly developing. In fact, the private sector is importing parts for solar water-heating systems, with a view to their subsequent assembly, as complete sets. Currently, the use of solar water-heating systems in Armenia is not only to ensure energy savings, but also has become cost-effective. In the framework of deferent charitable programs of International financial companies, solar water heating systems have been installed in many settlements such as nurseries, residential houses and medical facilities.

In Armenia solar water heating collectors with total surface area of 1,38 - 4,12m^2 are produced. The collector with 2, 75 m^2 total surface area produces 120-160 liters hot water per day (Ministry of energy infrastructures and natural resources of RA, 2017).

1.2.2 Wind Energy Program in Armenia

In 2003, the Wind Energy Resource Atlas of Armenia was drawn. According to it, economically reasonable wind power potential is estimated at 450 MW total installed capacity and at electric power output of 1.26 billion kWh/year. The main promising locations are the Zod (Sotk) Pass, Bazum Range, Pushkin and Qarakhach Passes, Jajur Pass, Geghama Range, Sevan Pass, Aparan Region, Sisian-Goris Hills and Meghri Area (Maqur Energia, 2013) .

In December 2005, for the first time in Armenia and in the Caucasus a grid-connected wind-power plant with capacity of 2.6 MW was put into operation at Pushkin Pass. In the future it is foreseen to enlarge the wind power plant capacity up to 50 MW.

Within the European Union program a monitoring in the Semenovka Pass in Sevan region was organized and a preliminary feasibility study for the construction of a wind power plant with a total installed capacity of 35 MW was compiled.

Within the framework of wind energy program of Armenian - Italian private company “Ar Energy”, a monitoring was completed at Qarakhach Pass in Shirak region, for the construction of 140 MW wind power plant.

The company "Zod Wind" has completed the monitoring within the framework of wind energy program near Zod Pass in Gegharkunik region, for the construction of 20 MW wind power plant.

The private companies “Ar Energy” and “Zod Wind” are negotiating with various companies to attract investments for the construction of “Qarakhach-1” and “Zod” wind power plants.

Summarizing the legislative acts, it should be mentioned that the Republic of Armenia has created numerous mechanisms, promoting the use of renewable energy sources, for example:

With the “Law on Energy” of RA, it is guaranteed the purchase of the whole electricity generated by renewable energy sources according to the established order -15 years for SHPPs, and 20 years for solar, wind, biomass and geothermal.

In accordance with the above-mentioned procedure, in the end of every year the tariff for the wind energy is indexed due to the fluctuations in the national currency of Armenia against the USD for a certain period of time and due to the changes of consumer prices in the Republic of Armenia (Ministry of Energy Infrastructures and Natural Resources of RA, 2017).

1.2.3 Hydropower in Armenia

The most advanced use of renewable energy technology application in Armenia today is hydropower, both in the use of large-scale power (e.g.- waters of Lake Sevan) and the more recent installation of small, run-of–the-river hydropower plants (SHPPs) throughout the country.

Utilization of the whole hydro potential will be obtained by using the existing two major HPPs cascades (Sevan-Hrazdan HPPs Cascade and Vorotan HPPs Cascade), construction of three new middle size HPPs and utilization of small HPPs potential (Manukyan, 2013).

Sevan-Hrazdan Cascade

Sevan-Hrazdan HPPs Cascade includes 7 HPPs: Sevan's (34 MW), Hrazdan's (81 MW), Argel's (224 MW), Arzni's (70 MW), Kanaker’s (102 MW), Yerevan-1 (44 MW) and Yerevan-3 (5 MW) HPPs with 560 MW total installed capacity and 2.32 billions kWh annual generation of electricity. The HPPs are

placed on the River Hrazdan and at present they use irrigation water flow from Lake Sevan and streams waters of the Hrazdan River.

Vorotan HPPs Cascade

Vorotan HPPs cascade consists of 3 hydro power plants, placed on the River Vorotan in the territory of Syunik region, and they use both the river and streams waters. HPPs Cascade consists of Spandaryan (76 MW), Shamb (171 MW) and Tatev (157 MW) HPPs with 404 MW total installed capacity and 1.16 billions.kWth annual generation of electricity.

Small HPPs in Armenia

Construction of SHPP in Armenia is a leading course of action towards development of renewable energy sector and securing of energy independence in Armenia. The majority of SHPPs designed; under construction and/or operation in RA are derivational stations on natural water flows. As of the 1st of January 2017, electricity was generated by 178 SHPPs, with about total 328 MW installed capacity and 880 million kWh annual average electricity actual supplies. In 2016 the generation of the electricity from small HPPs was around 957 million kWh, which is about 13% of the total generated electricity in Armenia (7315 million kWh). As of the 1st of January, 2017 and according to the provided licenses, 39 additional SHPPs are under construction, with about total projected 74 MW capacities and 260 million kWh electricity annual supplies.

By the decision of the Public Services Regulatory Commission the procedure for determining the electricity tariff produced by the power plants using the renewable energy sources was approved. According to it, the tariff for the hydro energy is set on an annual basis. According to the decision of the Public Services Regulatory Commission N 128-N dated 25 May, 2016 the tariffs for electricity are presented in Table 2.

Table 2: Feed-in-tariffs for renewable energy system from SHPPs, 2016 (excluding VAT)

	Feed-in Tariff	
Renewable energy technology	AMD/kWh	Euro/kWh
Small hydro-power built on "Natural water system"	23.753	0.05
Small hydro-power built on irrigation systems	15.832	0.03
Small hydro-power built on "drinking water supply systems"	10.556	0.02

Source: Armenian Renewable Resources and Energy Efficiency Fund (2016)

In accordance with the above-mentioned procedure, in the end of every year the tariff for the hydro energy is indexed due to the fluctuations in the national currency of Armenia against the Euro for a certain period of time and due to the changes of consumer prices in the Republic of Armenia (Ministry of Infrastructures and Natural Resources of the RA, 2016).

1.3. The impact of renewable energy on the environment

Nowadays, fossil fuels are the main energy sources from which electric power has been produced. These resources are not renewable, that is, primary sources will end, which means they should be replaced by renewable energies. But all kind of energy sources have some impact on the environment. Fossil fuels (coal, oil, and natural gas) present more damage than renewable energy sources. However the renewable sources types and quantity of environmental effects are different from fossil fuel sources. Using renewable resources does not mean that their impacts are equal zero. An understanding of the relative environmental impacts of the different energy power sources is important to the development of rational energy policy (Environmental impacts of RE technologies, 2014).

Intensity of environmental impact of renewable energy sources is different depending on the technology in use, the geographic location, and a number of other factors. Renewable energy sources' impact can be analyzed by air and water emissions, waste generations, noise generation, and global warming emissions. For instance, a wind farm, when installed on agricultural land, has one of the lowest environmental impacts of all energy sources: it occupies less land area per kilowatt hour (kW) of electric power generated than any other energy conversion system, separately from rooftop solar energy. Wind farm generates the energy used in its construction in just 3 months of operation, yet its operational lifetime is 20–25 years. Additionally greenhouse gas emissions and air pollution produced by its construction are very declining.

There are no emissions produced by its operation. In substituting for base-load (mostly coal power) wind power produces a net decrease in greenhouse gas emissions and air contamination, and a net increase in biodiversity; modern wind turbines are almost silent and rotate so slowly that they are rarely a hazard to birds (Wind Farms, The facts and the fallacies, 2006). Wind turbines may create shadow flicker on nearby residences when the sun passes behind the turbine.

Birds can directly break up into moving or even stationary turbine blades, crash into towers, and collide with local distribution lines. These risks are exacerbated when turbines are placed on ridges and upwind slopes or built close to migration routes. Some species, such as bats, face additional risks from the rapid reduction in air pressure near turbine blades. (Environmental impacts of RE technologies, 2014).

The sun provides a tremendous resource for generating clean and sustainable electricity without toxic pollution or global warming emissions.

The potential of solar power environmental impacts associated with land use and water use, and the use of dangerous materials in manufacturing and can vary much depending on the technology, which includes two broad categories: photovoltaic (PV) solar cells or concentrating solar thermal plants (CSP).

The scale of the system, ranging from small, apportioned rooftop PV arrays to large utility-scale PV and CSP projects, also plays a big role in the level of environmental impact.

Depending on their location, larger utility-scale solar facilities can raise trusts about land degradation and land loss. Unlike wind facilities, there is less opportunity for solar projects to share land with agricultural uses. However, land impacts from utility-scale solar systems can be minimized by siting them at lower-quality locations such as brownfields, abandoned mining land, or existing transportation and transmission corridors (www.ucsusa.org, 2017).

Geothermal power is a relatively good source of energy. For the most part, the geothermal power's impacts are positive. Worldwide geothermal energy utilization yearly increases because it is an attractive alternative to burning imported and domestic fossil fuels.

Electric power generation from geothermal resources include much lower greenhouse gas (GHG) emission rates than that from fossil fuels. In the International Atomic Energy Agency (IAEA), replacing one kilowatt hour of fossil power with a kilowatt hour of geothermal power reduces the estimated global warming impact by approximately 95% [Five lectures on environmental effects of geothermal utilization, 2001].

However, geothermal development could have certain negative impacts if appropriate softening actions and monitoring plants are not in place. Any large-scale construction and drilling operation will produce visual impacts on the landscape, create noise and wastes and affect local economies. Some countries have strong environmental regulations regarding some of the impacts related with geothermal development. Environmental issues are usually addressed during the development of geothermal fields including air quality, water quality, waste disposal, geologic hazards, noise, biological resources and land use issues (Environmental Effects of Geothermal Power, 2012).

Although hydropower has no air quality impacts, construction and operation of hydropower emission can significantly affect natural river systems as well as fish and wildlife populations. Assessment of the environmental impacts of a specific hydropower facility requires a case-by-case review. Negative impact of dams are as follows:

- In flat basins, large dams cause flooding of large tracts of land, destroying local animals and habitats; people have to be displaced causing change in life style and customs.
- Large numbers of plant life are submerged and decay anaerobically; the migratory template of river animals like salmon and trout are affected; dams restrict sediments that are responsible for the fertile lands downstream.
- Salt water intrusion into the deltas means that the saline water cannot be used for irrigation.

- Large dams are breeding grounds for mosquitoes and cause the spread of disease; dams serve as a heat sink, and the water is hotter than the normal river water, and this warm water when emitted into the river downstream can affect animal life (Sanguri, 2013).

1.4. Solutions for developing renewable energy sector in Republic of Armenia

Armenia faces a number of barriers to the further development of renewable energy. Scaling up the renewable energy program (SREP) funding can be instrumental in helping to remove or at least weaken a number of these barriers.

One of the most significant barriers to renewable energy in Armenia is the high cost of investment relative to the currently low cost electricity generation mix in the country. Tariffs are low because many of the thermal power plants generating electricity are fully depreciated and need only to recover variable costs. This will change as new generation plants are brought online and tariffs are raised to reflect their capital costs. In the meantime, however, the low cost of generation makes it difficult for consumers to understand the need for higher-cost renewable energy generation which will satisfy –at least initially only a small portion of demand. This is a barrier of perception which, as described below, Government can overcome with SREP's assistance.

There are also legitimate concerns about affordability. The global economic crisis increased the already high incidence of poverty in Armenia. Between 2008 and 2010, the poverty incidence increased from 27.6 % to 35.8 % of the population, and severe poverty grew from 12.6 % to 21.3 % of the total population. Energy poverty, in which households spend more than 10 % of their budgets on energy, affects nearly 30 % of Armenian households. The poorest quintiles of the population allocate a relatively higher share of their budgets to electricity than rural households. These households are likely to experience more significant pressures on their budgets as a result of increased energy tariffs. A recent World Bank study has estimated that, when a new thermal plant is built, tariff increases could result in increases in poverty of 1-8 %, depending on the sources of financing used, the gas price, and the technology (nuclear or gas) built first (Manukyan, 2013). Higher tariffs also have environmental consequences in Armenia. The historical experience in Armenia is that poorer, rural households have switched, at least temporarily, to traditional fuels (mostly firewood, collected illegally) when electricity and gas tariffs increase. Armenia's forests shrunk by roughly half during the years of energy crisis, and now the forests cover only roughly 10 % of total area of the country.

Another important barrier is the lack of experience with many renewable energy technologies. There is no experience building and operating utility scale solar PV or geothermal in the country. The lack of experience creates, or reinforces several other barriers, namely:

- **The absence of regulatory incentives for certain technologies.** The Law on Energy guarantees cost recovery through tariffs, but feed-in tariffs were never set for some renewable energy technologies because of perceptions about cost and the absence of long-term financing opportunities. Solar PV, for example, was not initially thought to be commercially viable, and so was not, until recent years, a priority in Armenia.
- **Limited capacity for equipment acquisition and installation.** Limited experience with certain technologies limits the expansion of solar PV and large scale geothermal. It also substantially raises the costs of doing first projects in these technologies.
- **A lack of technical capacity among local financiers.** The success of the SHPP program is owed, in part, to the good quality of technical assessments completed by local commercial banks in programs supported by the World Bank, European Bank for Reconstruction and Development (EBRD) and Germany's Kreditanstalt für Wiederaufbau (KfW). Local commercial banks do not, however, currently have capacity to assess other types of RE projects.
- **A lack of confidence in certain technologies.** The lack of experience with RE technologies makes potential developers, property owners and energy users skeptical of these technologies and inclined to take the risk of being the first to use them.
- **Underdeveloped local markets for certain technologies.** The lack of experience in certain technologies also means that there are no markets for services or expertise required to develop projects using certain technologies. Whereas the technologies themselves are typically imported, project development requires local expertise in engineering design, procurement and installation. The market for such services is extremely thin in Armenia.

These barriers do not exist for all technologies, nor do all of the barriers listed above affect any single technology. There is some experience, for example, with small hydro, wind, and biomass (SREP, 2014).

In 2007, the public services regulator commission of the Republic of Armenia (PSRC) set renewable energy feed-in tariffs to stimulate private investment in renewable energy. New generating plants sign 15-year power purchase agreement (PPA) under which ENA is obliged to pay the generator for all the power produced.

PART II: Economic and Financial Performance of Companies of Renewable Energy Sector

2.1. Literature review on financial performance of renewable energy industries

Electric power industry is under pressure for increase clean energy production. However, the renewable energy can improve the utilities' environmental performance for every company, not only the companies that are making renewable energies (IRENA; Rethinking energy, 2014). Electric utilities play a main role in energy provision system to renewable energy process of change, because they represent the backbone of the power supply infrastructure. On the other hand, even though the adoption of renewable energy can be seen as a way to improve environmental efficiency, a main question is if it also pays in economic terms.

Contemporary research highlights multiple societal and environmental benefits in addition to potential economic advantages associated with renewable energy (RE) utilization. As federal and state incentives for investments in RE technologies become more prevalent, RE sources represent increasingly viable alternatives to established fossil fuel energy. RE utilization is recognized as a key component of “green” product innovation that helps firms reduce the environmental impact of production processes and diminish their ecological footprints and energy consumption. Yet, despite consistent evidence that corporate sustainability initiatives are favourably associated with firm performance, the limited research that examines associations between RE initiatives and firm performance yields mixed results and an explicit link has yet to be established. Drawing on the natural resource-based view of the firm, we examine the association between RE utilization and firm financial

performance over time. Annual ROI, ROE and operating margin for large OECD countries' firms identified (Shin et al; 2016).

Our research advances current knowledge about the influence of RE utilization by demonstrating that top RE user firms consistently generated superior financial performance compared to their industry competitors. As such, the study findings lend credence to the existence of a business case that complements the societal and environmental benefits of using RE (Shin et al; 2016).

The discussion about if an increase of renewable energy capacity may affect the financial performance of electric utility industry can be seen as a part of the large discussion about corporate environmentalism and its profitability. Indeed, despite the studies that exist for more than two decades, the question of, if renewable energy capacity pays to be green is far from being settled. A slight majority of the researches present a positive relationship between environmental performance and financial performance while the rest show either a negative or neutral relationship. Some authors supporting a natural-resource-based view of the company have reason that companies can attain a competitive advantage or superior performance by implementing proactive environmental strategies. This kind of strategies lead to the development of capabilities that have implications for a firm's performance in terms of lower costs, improved reputation, and strategic alignment with ongoing changes in the business environment (Deloitte, 2015).

Over the last 15 years, the power sector has been privatized in numerous developed and developing countries though it remains highly regulated. The growth of renewable energy production in the industry has been mainly driven by policy mechanisms such as feed-in tariffs and renewable quota obligation (Seng & Vithessonthi, 2017). The new reality is that the cost of generating power from renewable energy sources has reached parity or dropped below the cost of fossil fuels for many technologies in many parts of the world. Biomass, hydropower, geothermal and onshore wind are all competitive with or cheaper than coal, oil and gas-fired power stations, even without financial support and despite falling oil prices. These low prices are making the business case for renewable energy stronger than ever (RE Global Status Report, 2016). Renewable energy is not just about saving the environment any more. It is now also about stimulating the economy, creating jobs, generating new sources for growth, increasing income and improving trade balances (RE thinking energy, 2017).

2.2. Research design

In this chapter, we will present the objectives, research questions, sample and data collection as well as the methodology to test the questions. This exploratory research relies in five case studies. It applies the descriptive analysis of the five case studies and, thus, it cannot do inferential analysis.

2.2.1 Objectives, research questions and sample

After describing some of renewable energy sources and analysed the evolution of this market in the last decade (one of the objectives of this dissertation), this part of dissertation has two main objectives. First objective is to analyse the behaviour of the market in terms of stock prices, stock returns and volatility of those companies comparing them. The second one is to analyse the profitability (financial performance) based on financial ratios for these renewable energy companies.

Related to the objective of first part of dissertation it is postulated that the renewal energy market is increasing along time in the OECD countries and all over the world. In line with the first objective of 2nd part, the research questions (RQ) are as follow:

RQ1a – Are the renewable energy companies profitable (that is, do they have positive return based on stock prices)?

RQ1b – Are the beta of these companies lower than one (that is, are these companies less risky than the market, using the beta coefficient as indicator of market risk)?

Related to second objective, the research questions (RQ) are as follow:

- RQ2a: Have Renewable Energy companies in OECD countries increased the return on assets in the last five years?
- RQ2b: Have Renewable Energy companies in OECD countries increased the return on equity in the last five years?
- RQ2c: Have Renewable Energy companies in OECD countries increased sales return in the last five years?

To test the research questions of second main objective, because of the short time was selected only five companies, from different OCDE countries (Portugal, France, Spain, Italy and Germany). The companies are from different countries for seeing their evolution and financial changes not only for one country. All companies are listed in stock exchanges and have publicly data, namely their financial statements and reports. These companies produce both kind of energy, using renewable and no-renewable sources. The companies in the sample are:

- EDF group, listed in Paris Euronext Stock Exchange (France);
- EDP- Energia de Portugal, listed in Lisbon Euronext Stock Exchange (Portugal);
- Iberdrola, listed in Madrid Stock Exchange (Spain);
- ENEL, listed in Milan Stock Exchange (Italy):
- EOn, SE, Listed in Frankfurt Stock Exchange (Germany).

2.2.2 Data, Variables and analysis methods

For the companies in the sample, it was collected financial and non-financial data for period of 2011 to 2016. Therefore, from their official websites, it was gathered the financial reports and compiled these data in an excel file to compute some ratios that are commonly used to analyse the financial position of the company. It was compiled the Balance Sheet and Income Statement for each year from 2011 to 2016. These data will allow calculating the variables, and therefore, the most used ratios (such as return on equity (ROE) , return on assets (ROA), net sales return, current ratio, debt ratio, debt to equity ratio etc.) to validate the research questions.

It was also collected historical market prices of companies' stocks under analysis, as well as historical prices of major indexes of these markets. For each company, market data were collected for the year 2000 (or since the year of inception) until 2017. These data were gathered from the website Yahoo!Finance. Common stock is a residual income security. The stockholders have a claim on any income remaining after the payment of al obligations, including interest on debt. If the company prospers, stockholders are the chief beneficiaries; if it fails, they are the chief losers. The amount of money a stockholder receives annually debts on the dividends the company choses to pay, and the board of directs, which make this decision quarterly, is under no obligation to pay any dividend at all (Higgins; 2007). Therefore it will be analysed the stock return over this period.

To analyse the performance of these companies it will be applied the ratio analysis, using financial data collected from its annual financial reports. A ratio can be computed from any couple of numbers. Given the large quantity of variables included in financial statements, a very long list of meaningful ratios can be derived. A standard list of ratios or standard computation of them does not exist (Brealey, Myears & Allen, 2011). Ratio analysis becomes a very personal or driven by company's process. Ratios "are just a convenient way to summarize large quantities of financial data and to compare firms' performance" (Brealey, et al., 2011, p.704). Brealy et al (2011), as Ross, Westerfield and Jordan (2010), suggest some ratios based on accounting data (reported in firm's financial statements) to measure the performance, the efficiency, leverage and liquidity.

Although the main goal of this dissertation is to analyse the renewable energy companies' performance, leverage and liquidity is also important to consider in this analysis. In this sense, thereafter, is presented a set of financial variables and some common used ratio to analyse all these dimensions. Starting with variables and ratios for performance analysis, the main variables that it has to be considered are Total Income (or total sales); Earnings Before Interest and Taxes (EBIT); Net Income and Net Operating Profit After-Tax (NOPAT). These variables can be obtained from the income statement. Other variables also needed to calculate performance ratios are Total Assets, Total Equity

and Total Long-term Capital or just Total Capital. These are obtained from Balance Sheet. The Table 3. (below) presents the most common ratios used to measure firm´s performance or profitability.

The measures presented in Table 3 are not market measures but accounting measures, i.e. they are book rates of return (Ross et al, 2010). As stated by Brealey et al (2011, p.712), “unlike market-value-based measures, they show current performance and are not affected by the expectations about future events that are reflected in today’s stock market prices”. It is also relevant to point out that some of these ratios may be affected by capital structure and leverage. That is why some analysts use slightly different specifications (for instance for ROA instead using net income, they use NOPAT and use total long-term capital invested instead of total net assets). As these ratios are usually intended to measure performance over a prior period, namely ROE and ROA, it makes a certain amount of sense to base them on average equity and average assets, respectively (Ross et al., 2010).

Table 3: Common used ratios to measure firms' performance.

Ratio	Computation	Interpretation (information Provided)	Source
Economic Added Value (EVA)	$= ROC - WACC * IC$ (1) where, ROC is return on capital; WACC is the average cost of capital IC is total invested capital (long-term debt plus equity)	It is the profit after deducting all costs, including the cost of capital. The firm creates value for investors only if it can earn more than its cost of capital, that is, more than its investors can earn by investing on their own.	Brealey et al (2011)
Return on capital (or ROC)	$= \frac{NOPAT}{Total\ Capital}$ (2) where, $NOPAT = After\ tax\ interest + Net\ Income$ $Total\ Capital = Long\ term\ Debt + Total\ Equity$	It measures the total profits that the company has earned for its debt and equity holders, divided by the amount of money that they have contributed.	Brealey et al (2011)
Return on Equity (ROE)	$= \frac{Net\ Income}{Equity}$ (3) Or $= \frac{Net\ Income - Preferred\ dividends}{Average\ common\ shareholders'\ equity}$ (4) Note: some authors uses the average Equity	Measures income to shareholders per dollar invested. Because benefiting shareholders is Firm's goal, ROE is, in an accounting sense, the true bottom-line measure of performance. It is a measure of the *efficiency* with which a company employs owners' capital.	Brealey et al (2011); Higgins (2012); Ross et al (2010);
Return on Assets (ROA)	$= \frac{NOPAT}{Total\ Assets}$ (5)	Measures the income available to debt and equity investors per dollar of the firm's total assets. Total assets (which equal total liabilities plus shareholders' equity) are greater than total capital because total capital does not include current liabilities. It measures a company's success in using assets to earn a profit. ROA is a basic measure of the efficiency with which a company allocates and manages its resources.	Brealey et al (2011); Higgins (2012); Horngren, Harrison & Oliver (2012)
(Net) Profit Margin	$= \frac{Net\ Income}{Total\ Sales}$ (6)	Measures the proportion of sales that finds its way into Profits. It reflects companies' pricing strategy and operating managers' ability to control operating costs.	Brealey et al (2011); Higgins (2012)
Operational Profit Margin	$= \frac{Net\ Income + After\ tax\ interest}{Total\ Sales}$ (7)	Measures the profitability of each sales monetary unit above operating costs. When firms use debt it is better to apply Operational profit margin than just Profit Margin to compare with other firms independently the capital structure.	Brealey et al (2011); Higgins (2012)

In order to understand the reasons for the company's success, and the factors that contribute to a firm's overall profitability is commonly also to analyse de efficiency ratios (turnover ratios) and liquidity ratios as well as leverage ratios (see Table 4).

Table 4: Common used ratios to measure firms' efficiency, leverage and liquidity.

Ratio	**Computation**	**Interpretation (information Provided)**	**Source**
Asset turnover ratio or sales-to-assets ratio	$= \frac{Net\ Sales}{Average\ Total\ Assets}$ (9)	It shows how much sales are generated by each monetary unit of total assets, and therefore it measures how hard the firm's assets are working. It measures how efficiently the business is using its entire asset base. This ratio measures asset intensity, with a low asset turnover signifying an asset-intensive business and a high turnover the reverse.	Brealey et al (2011); Higgins (2012)
Inventory Turnover	$= \frac{Cost\ of\ goods\ sold}{Average\ inventory}$ (10)	This measure give some indication of how fast we can sell product. Indicates the number of times a company sells its average level of inventory during a year	Brealey et al (2011); Horngren et al (2012)
Accounts receivable turnover	$= \frac{\text{Net credit sales}}{\text{Average net accounts receivable}}$ (11)	Measures ability to collect cash from customers	Brealey et al (2011); Higgins (2012);
Fixed assets Turnover	$= \frac{Net\ Sales}{Total\ net\ fixed\ assets}$ (12)	Indicates the amount in monetary units, for every monetary units in fixed assets, generated in sales.	Ross et al (2010)
Net Working Capital (NWC) Turnover	$= \frac{Net\ Sales}{NWC}$ (13) Where, $NWC = Total\ Current\ Assets - Total\ Current\ Liabilities$	This ratio measures how much "work" we get out of our working capital.	Ross et al (2010)
Current Ratio	$= \frac{Current\ Assets}{Current\ Liabilities}$ (14)	Measures ability to pay current liabilities with current assets. A high current ratio indicates that the business has sufficient current assets to maintain normal business operations. This is a major measure of liquidity.	Brealey et al (2011); Horngren et al (2012)
Total debt ratio	$= \frac{Total\ Debt}{Total\ Assets}$ (15) or $= \frac{Total\ Assets - Total\ Equity}{Total\ Assets}$ (16)	It takes into account all debts of all maturities to all creditors. The higher the debt ratio, the higher the company's financial risk. This is one of leverage or solvency measures.	Brealey et al (2011); Horngren et al (2012)
Debt-equity ratio	$= \frac{Total\ Debt}{Total\ Equity}$ (17)	Shows the proportion of total liabilities relative to the proportion of total equity that is financing the company's assets. Thus, this ratio measures financial leverage. If the debt to equity ratio is greater than 1, then the company is financing more assets with debt than with equity. The higher the debt to equity ratio, the higher the company's financial risk.	Horngren et al (2012)

Notice that receivables turnover ratio and inventory turnover ratio may help to highlight particular areas of inefficiency, but they are not the only possible indicators (Higgins, 2012). Also is important to retain that the nature of a company's products and its competitive strategy strongly influence asset turnover (Higgins, 2012, p.43).

As there is some relations between these ratios, it is commonly used to apply the Du Pont System or also known as Du Pont Identity to analyse return on assets (ROA) and return on equity (ROE). This methodology allows breaking down the book ROA or ROE into drivers of performance (Brealey et al, 2011; Higgins, 2012; Ross et al, 2010).

Du Pond System for Return on Asset (ROA):

$$ROA = \frac{Net\ Sales}{Total\ Assets} \times \frac{Net\ Income + After-tax\ Interest}{Net\ Sales} \Leftrightarrow$$

$$ROA = Assets\ Turnover \times Operational\ Profit\ Margin \quad (18)$$

The Du Pont formula helps to identify the constraints that firms face (Brealey et al, 2011). For ROA, the two relevant drivers are Assets Turnover and Operational Profit Margin.

Du Pond System for Return on Equity (ROE):

$$ROE = \frac{Net\ Income}{Net\ Sales} \times \frac{Net\ Sales}{Total\ Assets} \times \frac{Total\ Assets}{Shareholder's\ Equity} \Leftrightarrow$$

$$ROE = Profit\ Margin \times Assets\ Turnover \times Financial\ Leverage \quad (19)$$

In an extended version:

$$ROE = \frac{Total\ Assets}{Shareholder's\ Equity} \times \frac{Net\ Sales}{Total\ Assets} \times \frac{Net\ Income + afer\ tax\ interest}{Net\ Sales} \times \frac{Net\ Income}{Net\ Income + afer\ tax\ interest} \Leftrightarrow$$

$$ROE = Financial\ Leverage \times Assets\ Turnover \times Operational\ Profit\ Margin \times "Debt\ Burden"$$
(20)

As referred by Higgins (2012, p. 47), "the third lever by which management affects ROE is financial leverage. A company increases its financial leverage when it raises the proportion of debt relative to equity used to finance the business". In extended version, the drivers of ROE are ROE are the financial

leverage, the return on assets (as the 2 components of middle are the ratios driven ROA) and the last term, which is called “debt burden,” measures the proportion by which interest expense reduces net income (Brealey et al, 2011).

Therefore, ratio analysis is used to analyse financial statement data for many reasons. Ratios provide information about a company’s performance and are best used to measure a company against other firms in the same industry and to denote trends within the company. Ratios tell users about a company’s liquidity, solvency, profitability, and asset management. No one ratio can provide the whole picture a decision maker needs (Horngren et al, 2012, p. 744). This methodology only makes sense if the analyst, compares the ratios with a benchmark. That can be using company’s ratios time trend analysis or peer group analysis. This last alternative may have some difficulties, as the company under analysis is a conglomerate conglomerates, owning more or less unrelated lines of business. The consolidated financial statements for such firms do not fit any neat industry category to analyse the market data.

2.3. Data Analysis Results

On this section is present the results of ratios analysis and market data on the companies under analysis, starting with a short profile of the companies, then performance ratios and other relevant ones (to implement Du Pont System analysis) are presented and, finally, it is analysed companies stock prices return (using daily closing prices).

2.3.1 Short profile of the companies in the sample

The sample has five companies with headquarters in five OECD countries, privately owned energy suppliers on two kinds of energies: traditional and renewable energy. As the financial statements are consolidated, it is hard to separate the data for each type of energy. Therefore, it is not possible to compare the subsectors and which is more profitable.

2.3.1.1. About the EDF group

EDF is the France electricity company. EDF Energy first called for an investigation into the energy market in 2011, seeing it as an opportunity for an independent examination to ensure that the industry acts fairly and in the interests of consumers.

Part of the EDF Group, one of Europe's largest energy groups, and EDF generate around one fifth of the UK's electricity and has 37.6 million customer accounts worldwide. The number of employees is

around 15,000 people. EDF energy group supply electricity and gas to millions residential and business customers, making EDF group one of the biggest suppliers of electricity in Europe. Achieving of EDF group mission means driving progress for people; being a successful and responsible long-term energy business, trusted by customers and powering a thriving society and a healthy environment. EDF Energy is committed to being open and transparent and to having high standards of integrity, behaviour and business practice. These objectives are reflected in our ambitions:

- to achieve Zero Harm to people
- to be the best and most trusted for customers
- to deliver safe, secure and responsible nuclear electricity
- to achieve strong financial and ethical performance
- to power society without costing the Earth
- to empower our people to be a force for good

The information about EDF Group was taken from the company's official webpage, which is https://www.edfenergy.com.

2.3.1.2. About the EDP – Energias de Portugal, S.A.

EDP- Energias de Portugal, S.A present in 14 countries and has 9.8million electricity customers, 1.5 million is the gas customers and more than 12 thousand employees around the world. This is a listed company, whose ordinary shares are publicly traded in «Eurolist by NYNE Euronest Lisbon, Mercado de Contacões Oficiais». EDP is established in Portugal.

Today, EDP operates one of the most balanced generation portfolios in the Iberian Peninsula, considering the substantial weight of hydroelectric generation, the operating efficiency of its coal power stations and the importance of its natural gas combined cycle power plants. EDP's presence in Spain through HC Energía makes it the first company to own significant electricity generation assets in both Portugal and Spain. EDP is one of the largest wind power operator worldwide with windfarms for energy generation in the Iberia Peninsula, the United States, Canada, Brazil, France, Belgium, Italy, Poland, Romania and Mexico and is developing wind project in Unites Kingdom. Addition, EDP generates solar photovoltaic energy in Portugal, Romania and the United States. In Brazil, EDP in the fifth largest private operator in electricity generation, has two electric power distribution concessions and is the fourth largest private supplier in the Iberan list market. On December 31 2016, EDP had an installed capacity of 25 GW and generated 70GW during 2016, of which 65% from renewable sources.

The information about EDP- Energias de Portugal, S.A was taken from the company's official webpage, which is http://www.edp.pt.

2.3.1.3. About Iberdrola Company

Iberdrola is a Spanish public multinational electric utility company. The company has undergone a major transformation over the last 15 years, staying clearly ahead of the energy transition in order to tackle the challenges posed by climate change and the need for clean electric power. Iberdrola is today one of the largest electric utilities in the world and a benchmark for renewable energies. The company produces and supplies electricity to around 100 million people in the countries in which it operates. The company has also positioned itself as leader in clean energies — Iberdrola is the top renewable producer in Europe and the USA. It is outstanding as the cleanest electricity company, with almost zero emissions. It is a pioneer in the deployment of smart grids, focused on the development of innovative and intelligent products and services for customers, has an energy storage capacity of 4.5 GQ, sufficient to meet the supply of 2.5 million domestic customers, and has workforce of around 31300 employees. This is the result of the combination of its corporate vision, which in 2001 led the company to look ahead to future trends in the sector, the strategy to follow to make this vision a reality, its successful implementation and the ethical values that have always guided all the Group's actions.

The information about Iberdrola was taken from the company's official webpage, which is http://www.inerdrola.com.

2.3.1.4. About Enel Group SpA

Enel group is a multinational energy company and one of the world's leading integrated electricity and gas operators. It works in more than 30 countries across 4 continents, generating energy with a net installed capacity of around 83 GW and distributing electricity and gas across a network spanning about 2.1 million km. With more than 65 million end users around the world, we have the biggest customer base among our European competitors. The Enel Group made up of nearly 62,000 people from around the world whose brilliant work is based on our values of Responsibility, Innovation, Trust and Proactivity. Together we are working on the same goal of "Open Power" in order to tackle some of the world's greatest challenges. Enel group's portfolio of power stations is highly diversified, running on hydroelectric, wind, geothermal, solar, thermoelectric, and nuclear and other renewable sources of power. Almost half of the energy generated by Enel is produced with zero carbon dioxide emissions, making the group one of the leading producers of clean energy. For more than 50 years, Enel has brought progress to people around the world. Since the day Enel was founded in 1962, and has worked hard to enable businesses, nations and individuals to thrive by connecting them to electricity, gas and the right services for their needs. In order to achieve this we have constantly embraced new

technologies to make our energy more reliable, more affordable and more sustainable, from the introduction of the first smart meter to becoming the world's largest producer of renewable energy.

The information about ENEL Group SpA was taken from the company's official webpage, which is https://www.enel.com.

2.3.1.5. About E.ON SE

E.ON was formed in June 2000 from the merger of two of Germany's largest industrial groups VEBA and VIAG each with an impressive history in its own right. E.ON is an international privately-owned energy supplier which is focused on renewables, energy networks and customer solutions, which are the building blocks of the new energy world. It operates in over 30 countries and serves over 33 million customers. The political developments in countries in which E.ON is active constituted a key overarching topic of our discussions. Alongside the macroeconomic and economic-policy situation in the individual countries, E.ON primarily on the developments in European and German energy policy and their respective consequences for E.ON's various business areas.

The information about E.ON SE was taken from the company's official webpage, which is http://www.eon.com.

2.3.2 Analysis of companies' stock prices return

Analysis of companies' stock price return have done by daily analysis from companies' stock market and the index stock market. For each company daily analyses have done from 2001 or 2002 until 2016, only EDF have done from 2011 until 2016.

In the financial services industry, standard deviation is one of the key fundamental risk measures that analysts, portfolio managers, wealth management advisors and financial planners use. Investment firms report the standard deviation of their mutual funds and other products. A large dispersion indicates how much the return on the fund is deviating from the expected normal returns. Because it is easy to understand, this statistic is often reported to the end clients and investors on a regular basis.

Table 5 presents daily standard deviation for all companies and index stock markets for all period. EDP company and Portuguese stock market PSI20 has the highest standard deviation. A high standard deviation indicates that the data points are spread out over a wide range of values and indicates the total risk of a stock or asset. EDF and France stock market CAC40 has the lowest total risk. There are calculating standard deviations for all years and yearly for each company in all period, which have present in appendix.

Table 5: Daily standard deviation for every company and all period.

Company/Index	Company	Index
EDP/PSI20	0.022398	0.019687
EDF/CAC40	0.011913	0.013285
Iberdrola /IBEX35	0.016676	0.015139
E.ON/DAX	0.022721	0.015209
ENEL/FTSE	0.01715	0.012076

The annualized total return is the geometric average amount of money earned by an investment each year over a given time period. It is calculated as a geometric average to show what an investor would earn over a period if the annual return was compounded. An annualized total return provides only a snapshot of an investment's performance and does not give investors any indication of its volatility. To calculate annualized return and annualized standard deviation we used daily data and multiply by 252 days (as one financial year, depending on weekends and public holidays, have about 252 days), in the case of annualized return, or multiply by standard root of 252 if it is the annualized standard deviation. These results indicate that three companies positive annualized average return but EDP and EDF presented negative returns. By this way the answer to RQ 1a is only partially positive. Table 6 shows these results. It can be seen that in the case of EDP, the index return is lower than company's return and both are negative. The EDF also shows negative stock return but CAC40 has positive return. Another interesting result is that E.ON presents positive return and the highest but index return (DAX return) is negative for the analysed period.

Table 6: Annualized return and standard deviation for all companies during all periods.

Company/Index	**Annualized return**		**Annualized standard deviation**	
	Company	Index	Company	Index
EDP/PSI20	-4.03%	-9.14%	35.56%	31.25%
EDF/CAC40	-6.89%	5.96%	18.91%	21.09%
Iberdrola /IBEX35	6.76%	2.76%	26.47%	24.03%
E.ON/DAX	12.16%	-0.95%	36.07%	24.14%
ENEL/FTSE	1.19%	3.53%	27.22%	19.17%

Systematic risk is measured by Beta of a security or a portfolio in comparison to the market as a whole. The beta is roughly the slope of the linear regression that relates market stock's return (as measured by closing prices return of a stock) with global market (as measure by market index return). Beta can be computed by using descriptive statistics (covariance between stock and index returns divided by variance of index return).

From the Table 7 it is observed that EDP has the highest market risk, what is a little less than 1. This means that if some changes in Portuguese stock market (PSI20) occur, it is will have higher impact in EDP's market price, than it can happened with another companies when the index change. EDF has the lower beta coefficient. This means that the changes in stock market may not affects too much the company's stock price.

The answer to RQ 1b, as can be observed on table 7, that the systematic risk (measured by beta) is positive for all companies and lower than one. Only EDP's beta is near the one nevertheless not above it. All companies presents p-values smaller than 0.05 that mean that we reject the null hypothesis that there is no difference between the means and concludes that a significant difference does exist. If the p-value is larger than 0.05, we *cannot* conclude that a significant difference exists.

Table 7: Systematic risk for all companies in all period.

Company/Index	Coefficient	t stat	p-value
EDP/PSI20	0.966542	103.3971	< ,001
EDF/CAC40	0.231706	10.71858	< ,001
Iberdrola /IBEX35	0.780325	64.5712	< ,001
E.ON/DAX	0.894105	48.43743	< ,001
ENEL/FTSE	0.861929	48.2024	< ,001

Because in 2007-2008 there was crisis in Europe, we split the time horizon in two subsamples for each companies: before and after crisis. Because EDF data are from 2011 until 2016 we cannot apply this methodology as we designed for the other companies.

A t-test is an analysis of two populations' means through the use of statistical examination; a t-test with two samples is commonly used with small sample sizes, testing the difference between the samples when the variances of two normal distributions are not known. As it can be seen in Table 8, for EDP, Iberdrola, E.on and ENEL, the null questions is rejected, thus there is statistically significant differences on mean returns before and after crises period.

Table 8: T-test period two samples for means for all companies from 2001-2008 and 2008-2016.

Company/ Index	Questionized Mean Difference	df	t Stat	P(T<=t) one-tail	t Critical one-tail	P(T<=t) two-tail	t Critical two-tail
EDP/PSI20	0	2061	-0.47843	0.316198	1.645593	0.632397	1.961116
EDF/CAC40	-	-	-	-	-	-	-
Iberdrola /IBEX35	0	2099	0.842938	0.199679	1.64558	0.399359	1.961095
E.ON/DAX	0	2045	0.736021	0.230901	1.645599	0.461802	1.961125
ENEL/FTSE	0	1927	-304.574	<0.001	1.645645	<0.001	1.961196

2.3.3 Analysis of profitability based on Financial Ratio

Working capital is a measure of both a company's efficiency and its short-term financial health. When is working capital is negative it is mean that current liabilities is higher than current assets. As we can see in Figure 8, ENEL has negative working capital in 2011, 2015 and 2016. It is also observed that Iberdrolas's working capital is going negative from 2013, and decreasing until 2016. EDF has positive working capital and it increasing from 2012. EDP also has negative working capital, but it not too much and it keeping the same position. The E.ON's working capital during 2011 and 2015 is positive and the average for those years is 6000 million euro, but in 2016 the working capital is decrease a lot and it because the company has been unable to reduce the cost of goods sold, selling, general and administrative expenses and interest paid (all as a percentage of sales).

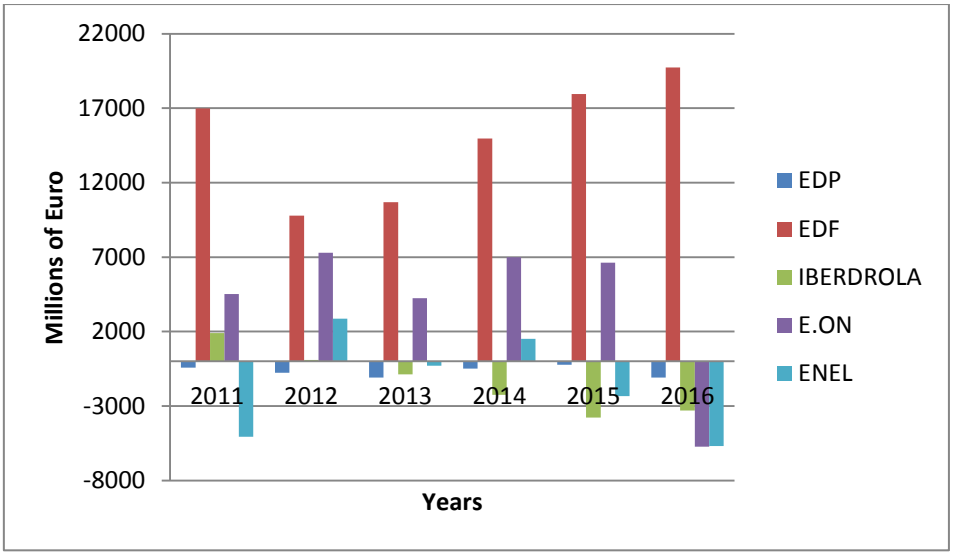

Figure 8: Working Capital for EDP, EDF, Iberdrola, E.ON and ENEL companies in millions of euros (2011-2016).

The current ratio is a liquidity ratio that measures a company's ability to pay short-term and long-term obligations. As shown in Figure 9, EDF and E.ON have a higher current ratio what are indicates liquidity, but it also may imply an inefficient use of cash and other short-term assets. To creditors (such as suppliers), the higher the current ratio, the better. In general, the companies a current ratio are about 1 what are normal for companies. Because of negative working capital some companies a current ratio are less than 1.

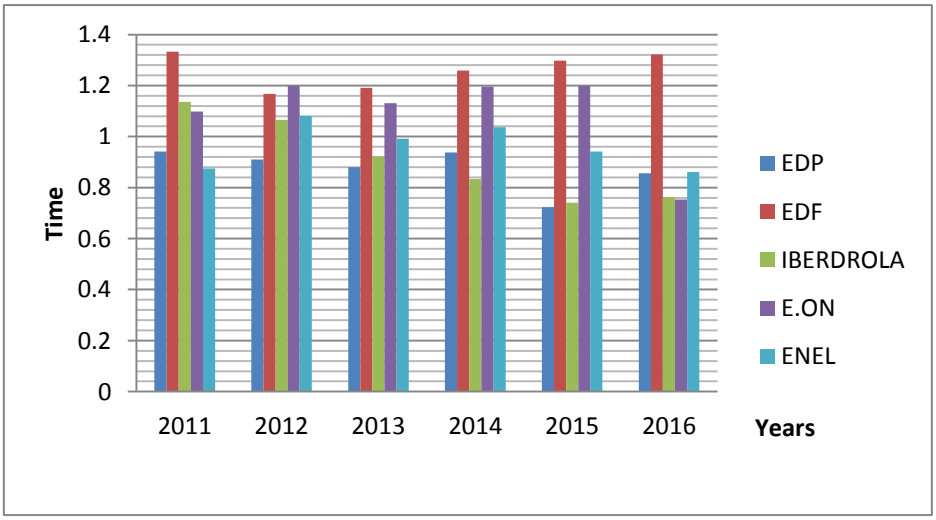

Figure 9: Current Ratio for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

ROE is more than a measure of profit; it is a measure of efficiency. A rising ROE suggests that a company is increasing its ability to generate profit without needing as much capital. From Figure 10, we can see that only E.ON has negative ROE and only in 2012 and 2013 has positive. Other companies have positive ROE and ENEL has highest ROE ratio. This means that ENEL manage more efficiently the available resources in its equity base. This measurement is important to stockholders and potential investors because it compares earnings to owners' investments. Iberdrola had big increase in 2014 and again decrease in 2015.

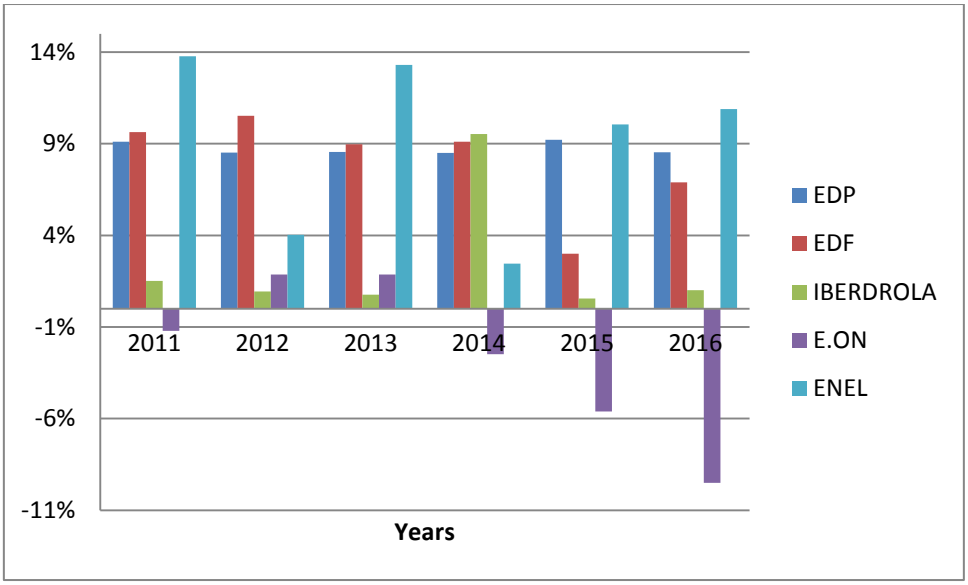

Figure 10: Return on Equity for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

According the Figure 11, we can say that EDF has the highest and constant debt ratio. Therefore EDF has more leverage, implying greater financial risk. At the same time, leverage is an important tool that companies use to grow, and many businesses find sustainable uses for debt. Nevertheless, in 2015 E.ON is crossing and above the EDP and become over the 1. ENEL and EDP are keeping constant their position during all period around 0.7. Iberdrola has the lowest debt ratio and in the 2012 decreased more but then increased and kept it constant and start increasing from 2015 to 2016.

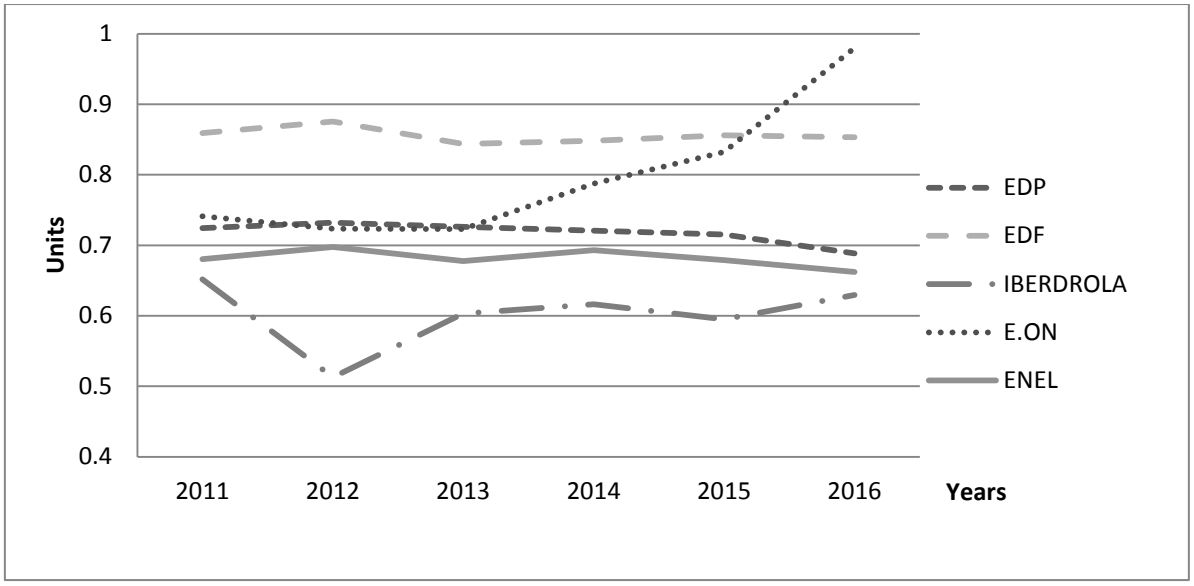

Figure 11: Debt Ratio for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

According to Figure 12, EDF has the highest cash turnover. It is the highest and growing one what is really good for that company. Because the cash turnover ratio measures how many times per year it replaces its cash balance with its sales revenue, nonetheless from another side too high might mean you have a low cash balance, which suggests financial trouble. This is also related with *Cash distributions*. Some entities routinely eliminate excess balances by issuing dividends or buying back shares. If so, their cash turnover ratios will appear much higher than those of competing businesses whose managers prefer to retain excess cash in the organization. About *Gross margins*, if a business is contemplating selling new goods or services that have lower gross margins than its existing product mix, this will require a higher proportion of cash to fund the additional sales. This is because the cost of goods sold will be higher than is currently the case. On the other side, Iberdrola has the lowest cash turnover, which is less than one. EDP, E.ON and ENE have more or less a constant and normal cash turnover.

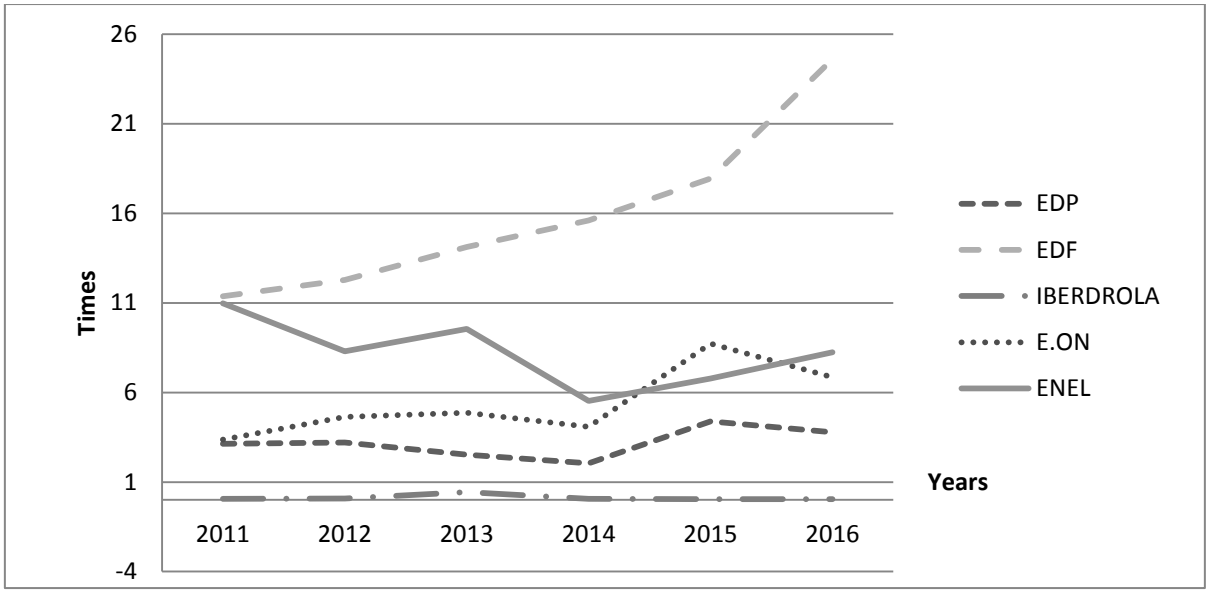

Figure 12: Cash turnover for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

According the Figure 13, ENEL has the highest assets turnover that means that as higher asset turnover ratio is the better for the company performance, since higher ratios imply that the company is generating more revenue per euro of assets. Yet, this ratio can vary widely from one industry to the next. The lowest assets turnover has E.ON but in the end of 2014 it is had a big increase and in 2015 it decrease a little. EDP has lower assets turnover but it is constant.

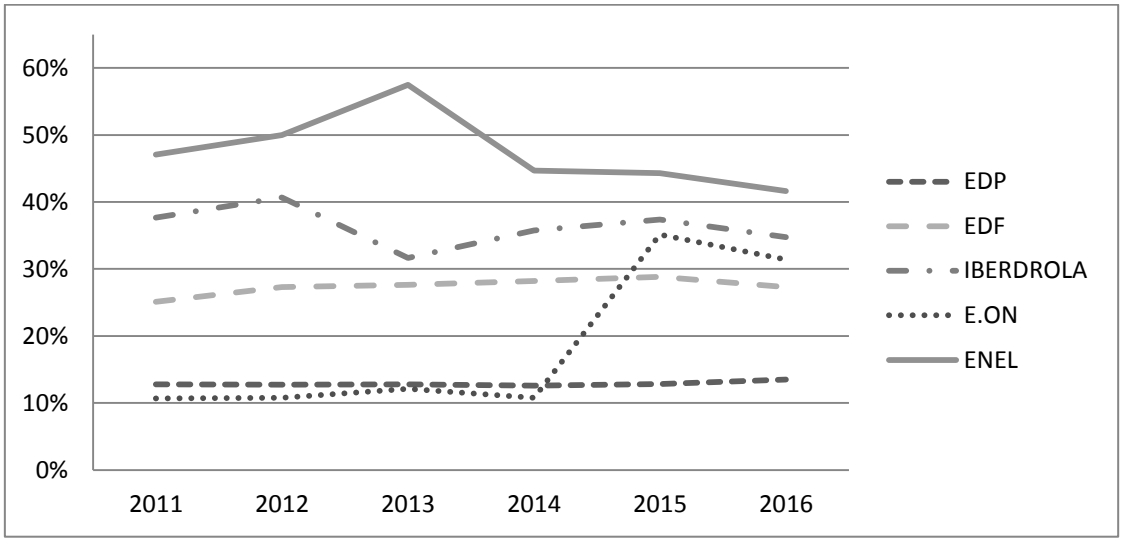

Figure 13: Assets Turnover Ratio for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

In accordance of Figure 14, five companies have non-current liabilities higher than current liabilities, which means that all companies have long-term financial obligations listed on a company's balance sheet that are not due within the present accounting year, such as long-term borrowing, bonds payable and long-term lease obligations. Iberdrola has the highest non-current liabilities and ENEL is the lowest. After the decrease in 2012, company's current liabilities start increase.

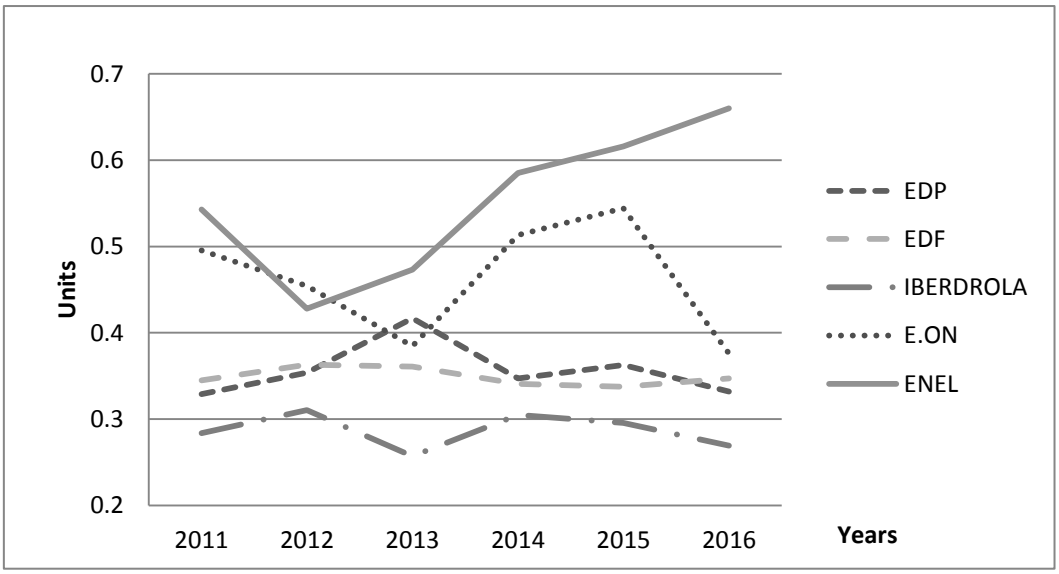

Figure 14: Current to Non-Current Liabilities for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

According to Figure 15, Iberdrola has the highest equity ratio and kept it constant during all period under analysis. The higher equity ratios are typically favorable for companies. This is usually the case for several reasons. Higher investment levels by shareholders shows potential shareholders that the company is worth investing in since so many investors are willing to finance the company. A higher ratio also shows potential creditors that the company is more sustainable and less risky to lend future loans.

EDP has high level of equity ratio but, in 2014, it has decreased a lot. Then, in 2015, it is again increasing it because of the portfolio comprises 7 wind farms of which 0.6 GW of assets have been in operations since 2008 and 0.4 GW that are expected to be operational in 2015. All of the wind farms have long-term power purchase agreements in place. With this transaction, EDPR will complete, two years in advance, the asset rotation program of €700 million included in its strategic agenda for the 2014-2017 period by raising proceeds totaling €800 million. By outpacing its €700 million target, EDPR can further invest in its growth strategy based on the development of competitive projects with long-term visibility. ENEL and EDF are keeping their constant position in the all period, which is present in Figure 15. E.ON was normal and constant equity ratio until 2013 but after that it started to decrease.

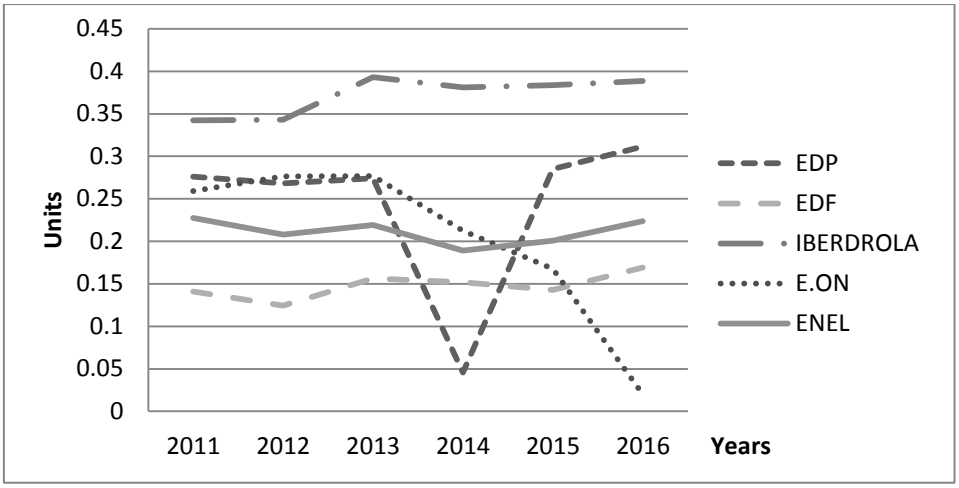

Figure 15: Equity Ratio for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

Since the return on sales equation measures the percentage of sales that are converted to income, it shows how well the company is producing its core products or services and how well the management teams are running it. You can think of ROS as both an efficiency and profitability ratio because it is an indicator of both metrics. It measures how efficiently a company uses its resources to convert sales into profits.

As can be seen in Figure 16, EDP has highest ratio and this means that the company converts about 15 percent of his sales into profits. In other words, EDP spends 85 percent of the money collects from customers to run the business. ENEL and EDF are keeping their position near the 5 percent. Iberdrola has the constant position but in 2013 it is has big increase and after it is decrease again becoming the same position. E.ON's only in 2012 and 2013 has positive return on net sales. The lowest return on equity is in 2016 it is about -34 percent, what is mean that company did not convert the sales into the profit.

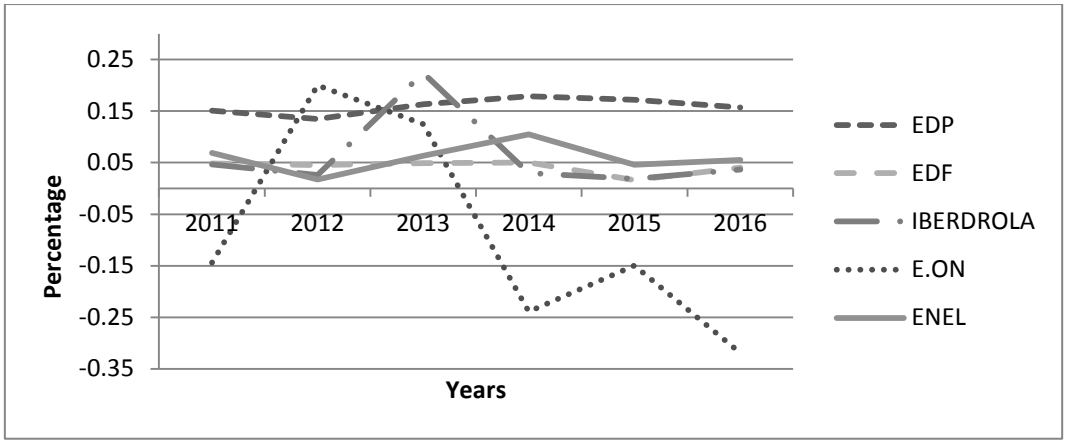

Figure 16: Rate of return on net sales, as %, for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

ROA tells you what earnings were generated from invested capital (assets). ROA for public companies can vary substantially and will be highly dependent on the industry. This is why when using ROA as a comparative measure, it is best to compare it against a company's previous ROA numbers or the ROA of a similar company. In Figure 17 shows that the highest ROA has Enel group and the lowest has E.ON.

For example EDF ROA shows about 25%, what means that the company produces 1 euro of profit for every 4 euro it has invested in its assets. You can see that ROA gives a quick indication of whether the business is continuing to earn an increasing profit on each dollar of investment. Investors expect that good management will strive to increase the ROA - to extract greater profit from every euro of assets at its disposal.

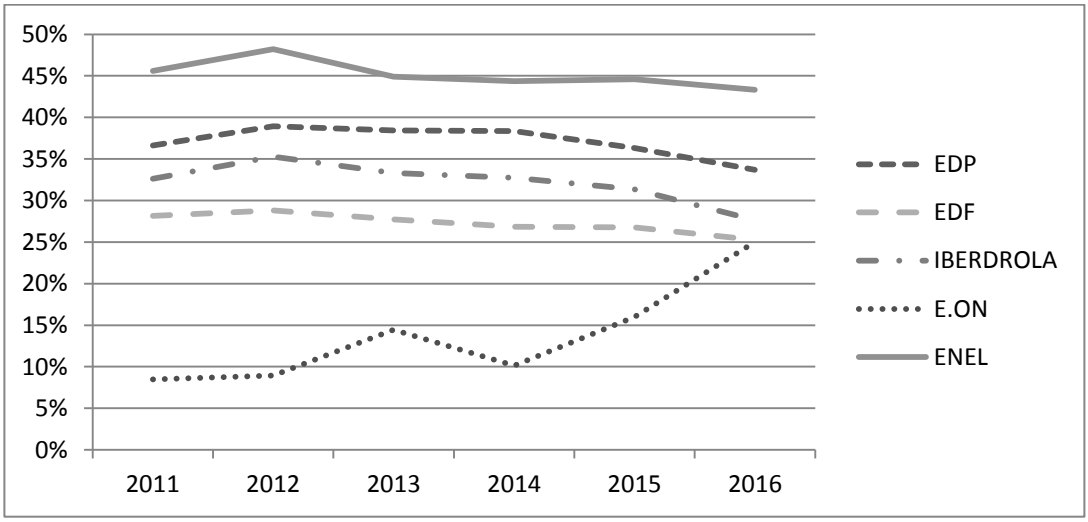

Figure 17: Return on Assets for EDP, EDF, Iberdrola, E.ON and ENEL companies (2011-2016).

It was defined five research questions and the main findings are as follow:

The first research question that all companies have positive annualized average return is three companies (Ibredrola, E.ON and ENEL) have positive results; EDF and EDP have a negative result. However, on this period, when EDP has negative result (-4.03%) the Portuguese index (PSI20) had lower return (-9.14%), what is mean that EDP is not so bad situation.

In research questions (RQ1b) that all five companies' systematic risk (beta) is less than 1 is positive, because all companies are less than one. Nevertheless, the EDP is near to one (0.9665), which means that the company can change the prices, when stock market changes it. E.ON (0.894), ENEL (0.862) and Iberdrola (0.78), continue the list after EDP.

The research question (RQ2a) is positive, because all companies are stable or increasing in this period of time.

Research questions (RQ2b) is negative, because none of the five companies are increasing in return on equity. For example, the E.ON is from 2014 start to decrease and get negative results, in 2016 it is reach about -9%, on the same time ENEL increase and reach to 12%.

In the last research question; EDP, EDF, Iberdrola and ENEL have a constant return on net sale and they are increasing but not a lot, but again in this ratio E.ON has decrease and has negative result, from 2012 it is start decrease and in 2014 reach the negative result.

Conclusions, Limitations and Future Research Lines

From all finding above in this dissertation, it is clear to say that renewable energy plays a role more important with every passing day to both human beings and environment. By abundance renewable energy is becoming an important solution to the world's energy need. Besides, renewable energy also brings many positive impacts to protecting environment, decreasing effects of global warming or pollutions.

To answer to the research questions for the second part of this dissertation, it was selected five companies from different OCED countries (Portugal, France, Spain, Germany and Italy). The companies are producing renewable and non-renewable energies. Research for financial part have done for 5 years (2011-2016) and for data analysis use daily data from each company and the stock market index (for every company use their countries index) from year 2001 or 2002 until 2016.

The research questions RQ1a and RQ1b have a positive answer.

RQ2a all 5 companies have stabile or increasing ROA. This means that this research question is positive too.

For research question RQ2b and RQ2c 4 companies are positive (EDP, EDF, Iberdrola, ENEL) only E.ON is decreasing.

According to all these analysis, we cannot be sure about the profitability of renewable energy, because of short time and that not all companies have published financial statements, the analysis have done on the companies which is producing both energies. As suggestion for further research, it is suggested that should be included more companies publish their renewable energy's financial statements and reports separated from the non-renewable energy sources.

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Appendix

Table A1: Descriptive statistics for E.ON stock price and DAX index for all period (2001-2016)

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	18.81744	19.03629	18.57655	40.12799	18.81204	11306902.8	6646.454	6698.059	6589.851	6646.382	6646.382	19595075.87
Standard Deviation	8.302933	8.39434	8.219172	31.94381	8.307042	6532783.12	2363.606	2371.305	2355.703	2363.976	2363.976	31013642.07
Median	17.2167	17.3708	17.0068	25.6575	17.2198	9963873	6249.92	6293.09	6197.96	6247.52	6247.52	0
Skewness	0.910602	0.91497	0.916034	1.02078	0.911161	3.75916172	0.51592	0.51979	0.513144	0.517196	0.517196	2.014776559
Kurtosis	0.377134	0.38907	0.396096	0.117618	0.383204	28.0808271	-0.53178	-0.53041	-0.53121	-0.52954	-0.52954	4.914551468
Extreme values												
Minimum	6.04	6.076	5.993	6.035	6.035	0	2203.97	2319.65	2188.75	2202.96	2202.96	0
0.50%	6.30236	6.3903	6.21424	6.28048	6.28048	0	2567.136	2601.337	2519.457	2569.853	2569.853	0
1%	6.465	6.5329	6.36154	6.464254	6.464254	0	2668.37	2723.665	2604.559	2667.628	2667.628	0
5%	7.479437	7.567711	7.372056	7.469393	7.469393	5113649.2	3321.844	3361.718	3270.275	3320.789	3320.789	0
95%	36.8554	37.17024	36.373	110.2229	36.74097	21714735.3	11146.94	11230.89	11057.27	11172.6	11172.6	88373420
99%	41.04843	41.45887	40.64115	123.5598	41.18661	38442184.8	12031.92	12087.31	11965.38	12035.35	12035.35	121006366
99.50%	43.34023	43.83019	42.81271	129.9893	43.32976	43181413.2	12219.37	12242.75	12177.11	12217.1	12217.1	141369791
Maximum	46.004	46.5568	45.6173	138.4833	46.1611	100132514	12758.48	12783.23	12703.96	12749.12	12749.12	249585100

Table A2: Descriptive statistics for E.ON stock price and DAX index for 2016

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	17.54797	17.78149	17.28775	52.67507	17.55836	7580736.72	5309.815	5368.848	5243.493	5311.652	5311.652	0
Standard Deviation	0.745829	0.716442	0.782722	2.24078	0.746926	3461413.92	585.2046	574.3806	595.4667	581.6466	581.6466	0
Median	17.4826	17.7243	17.253	52.5204	17.5068	7318680	5219.75	5280.32	5172.04	5222.12	5222.12	0
Skewness	0.085959	0.173863	-0.17473	0.086439	0.08644	2.30566722	-0.11566	-0.08056	-0.17365	-0.10865	-0.10865	0
Kurtosis	-0.10861	-0.31017	0.427024	-0.25924	-0.25924	13.0372716	-0.71457	-0.76613	-0.59257	-0.6938	-0.6938	0
Extreme values												
Minimum	15.377	15.7848	14.5915	46.9011	15.6337	0	3792.86	3826.05	3539.18	3787.23	3787.23	0
0.50%	15.7093	15.98228	15.1541	47.31873	15.77291	0	3861.538	4070.728	3782.144	3863.521	3863.521	0
1%	15.8153	16.25159	15.19691	47.86904	15.95635	0	4025.691	4123.972	3876.981	4025.088	4025.088	0
5%	16.39471	16.7455	15.99628	49.19052	16.39684	3622310.5	4311.745	4401.56	4182.889	4351.144	4351.144	0
95%	18.72393	18.88676	18.398	55.9779	18.6593	12037907	6183.681	6229.196	6138.407	6182.612	6182.612	0
99%	19.31021	19.46919	19.14401	57.89345	19.29782	20585507.3	6254.763	6299.886	6198.395	6256.604	6256.604	0
99.50%	19.3945	19.4855	19.19969	58.30841	19.43614	25448535.6	6268.776	6305.64	6207.993	6268.948	6268.948	0
Maximum	19.4312	19.5157	19.2136	58.4565	19.4855	31580533	6281.14	6337.47	6245.65	6278.9	6278.9	0

Table A3: Descriptive statistics for E.ON stock price and DAX index for 2015

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	14.67862	14.91816	14.3812	44.01154	14.67051	10530528.8	3625.698	3681.565	3552.424	3615.657	3615.657	0
Standard Deviation	2.170146	2.129662	2.207405	6.732835	2.244278	5554637.06	881.6607	877.0336	880.5766	877.5727	877.5727	0
Median	14.62925	15.0265	14.14585	43.76085	14.58695	9894689.5	3325.265	3390.9	3271.705	3320.815	3320.815	0
Skewness	-0.04806	-0.09435	0.025856	-0.04704	-0.04704	1.35075421	0.569282	0.548454	0.613248	0.580532	0.580532	0
Kurtosis	-1.28888	-1.29305	-1.29746	-1.26684	-1.26684	5.09765694	-0.94808	-0.97031	-0.89753	-0.9285	-0.9285	0
Extreme values												
Minimum	10.6098	10.8756	10.3047	30.9957	10.3319	0	2203.97	2319.65	2188.75	2202.96	2202.96	0
0.50%	10.86503	11.16134	10.43017	31.53698	10.51233	0	2306.444	2349.731	2218.439	2311.591	2311.591	0
1%	10.95852	11.29951	10.70558	32.26485	10.75495	0	2341.156	2403.955	2295.299	2342.433	2342.433	0
5%	11.3288	11.60418	11.04843	33.69504	11.23168	1598064	2530.288	2575.142	2479.439	2535.21	2535.21	0
95%	17.74919	17.91989	17.59182	53.53315	17.84439	19739767.1	5225.191	5265.889	5163.529	5196.783	5196.783	0
99%	18.02563	18.12451	17.78393	54.3693	18.1231	28668516.2	5350.26	5378.914	5299.872	5330.455	5330.455	0
99.50%	18.0768	18.1372	17.84171	54.37592	18.12531	34043412.3	5355.883	5412.627	5339.917	5383.136	5383.136	0
Maximum	18.1261	18.1412	17.8723	58.1031	19.3677	40685551	5379.64	5424.52	5350.26	5397.29	5397.29	0

Table A4: Descriptive statistics for E.ON stock price and DAX index for 2014

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	13.87762	14.04936	13.72586	41.74399	13.91466	10619615.4	3466.357	3503.298	3433.592	3472.307	3472.307	0
Standard Deviation	1.196565	1.160166	1.206473	3.646371	1.215457	4707635.43	443.5954	434.308	450.8104	440.9584	440.9584	0
Median	13.66105	13.75765	13.53265	40.99215	13.66405	10233762.5	3486.64	3522.3	3456.115	3489.23	3489.23	0
Skewness	0.481026	0.59474	0.456914	0.635046	0.635046	2.04102157	-0.27196	-0.26588	-0.2639	-0.26965	-0.26965	0
Kurtosis	-0.43494	-0.41926	-0.45686	-0.01709	-0.01709	10.3704695	-0.81471	-0.82366	-0.81415	-0.80503	-0.80503	0
Extreme values												
Minimum	11.1808	11.64	11.0327	34.2402	11.4134	0	2426.24	2473.94	2395.72	2423.87	2423.87	0
0.50%	11.30367	11.67574	11.2183	34.32041	11.44014	0	2474.904	2529.753	2413.331	2468.206	2468.206	0
1%	11.51247	11.77088	11.31101	34.79066	11.59689	0	2527.188	2585.577	2472.155	2534.88	2534.88	0
5%	12.30003	12.5976	12.12893	37.17021	12.39007	4957866	2707.216	2776.701	2671.688	2725.449	2725.449	0
95%	16.11724	16.2967	15.97285	48.46229	16.1541	16915678	4110.653	4132.91	4090.845	4111.178	4111.178	0
99%	16.49617	16.59527	16.28692	49.76816	16.58939	29812856.3	4141.59	4160.649	4122.464	4140.709	4140.709	0
99.50%	16.52474	16.65017	16.3541	49.90066	16.63355	35935320.3	4143.484	4169.646	4129.202	4148.019	4148.019	0
Maximum	16.6911	16.9358	16.6307	55.0125	18.3375	37986995	4152.09	4175.48	4130.86	4151.83	4151.83	0

Table A5: Descriptive statistics for E.ON stock price and DAX index for 2013

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	18.27406	18.42296	18.13635	54.86856	18.28952	10200457.1	4012.233	4035.942	3987.361	4011.964	4011.964	171153.9683
Standard Deviation	1.468536	1.460435	1.465509	4.400231	1.466744	4330709.15	176.7007	173.2694	181.3113	177.5295	177.5295	1917367.621
Median	17.9146	18.0203	17.8104	53.7438	17.9146	9547012.5	3998.36	4016.775	3968.745	3998.265	3998.265	0
Skewness	0.320352	0.336218	0.28755	0.310938	0.310938	1.90634244	0.263883	0.25996	0.266724	0.270346	0.270346	11.1574205
Kurtosis	-0.72417	-0.71545	-0.74193	-0.74082	-0.74082	9.41265617	-0.77442	-0.79662	-0.77978	-0.77996	-0.77996	123.467904
Extreme values												
Minimum	15.3165	15.5522	15.2863	46.2306	15.4102	0	3643.08	3662.78	3618.58	3646.99	3646.99	0
0.50%	15.5176	15.56661	15.30525	46.37021	15.45674	0	3657.756	3704.665	3622.199	3663.414	3663.414	0
1%	15.54933	15.67792	15.38122	46.64449	15.54816	0	3687.715	3714.95	3634.75	3684.734	3684.734	0
5%	16.15353	16.35638	16.0298	48.4419	16.1473	4934112.2	3731.207	3790.268	3712.984	3729.046	3729.046	0
95%	20.81027	20.95478	20.65391	62.4158	20.80527	16681134.7	4308.56	4332.295	4293.05	4319.464	4319.464	0
99%	21.4335	21.65912	21.28544	64.4096	21.46987	25288646.8	4379.777	4392.28	4358.008	4378.745	4378.745	0
99.50%	21.51153	21.66517	21.3388	64.63883	21.54628	28422566	4391.143	4397.26	4369.233	4387.443	4387.443	16066223
Maximum	21.6576	21.7211	21.3646	64.9821	21.6607	38770782	4395.37	4409.09	4377.3	4402.03	4402.03	21565400

Table A6: Descriptive statistics for E.ON stock price and DAX index for 2012

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	2.288728	2.321333	2.271329	6.905246	2.301749	4910941.64	417.9887	421.0585	416.1941	419.8444	419.8444	0
Standard Deviation	22.7845	22.9869	22.4914	68.4894	22.8298	10036617	4860.21	4887.46	4839.77	4864.25	4864.25	0
Median	0.519453	0.527815	0.543826	0.53279	0.53279	1.9616164	0.253296	0.251223	0.252253	0.256482	0.256482	0
Skewness	-0.45718	-0.44436	-0.46173	-0.4737	-0.4737	6.20854808	-0.94215	-0.93816	-0.94583	-0.9352	-0.9352	0
Kurtosis												
Extreme values	19.3677	19.6366	19.3043	58.4565	19.4855	0	4160.26	4208.32	4157.51	4178.1	4178.1	0
Minimum	19.48007	19.71288	19.32869	58.57065	19.52355	0	4174.017	4211.998	4159.715	4180.237	4180.237	0
0.50%	19.58244	19.72139	19.38113	58.65658	19.55219	1634950.2	4206.753	4217.586	4159.912	4187.014	4187.014	0
1%	19.76646	19.9163	19.5973	59.33748	19.77916	5386633.6	4253.048	4270.476	4229.524	4249.462	4249.462	0
5%	27.04414	27.41572	26.90334	81.79212	27.26404	19123580.4	5532.338	5550.84	5515.898	5539.118	5539.118	0
95%	28.08382	28.47909	27.82101	84.45909	28.15303	31803507.6	5686.946	5738.418	5646.591	5687.264	5687.264	0
99%	28.27374	28.58322	27.94065	84.62504	28.20835	32576987.3	5720.826	5745.02	5682.713	5720.014	5720.014	0
99.50%	28.3673	28.7691	28.0954	84.7212	28.2404	33601985	5738.5	5760.63	5696.02	5743.68	5743.68	0

Table A7: Descriptive statistics for E.ON stock price and DAX index for 2011

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	28.59272	28.8781	28.28072	85.83241	28.6108	13184422.5	6028.381	6061.451	5993.542	6031.738	6031.738	1347964.844
Standard Deviation	1.699891	1.714727	1.708868	5.128746	1.709582	8271990.92	392.7408	389.7295	401.098	396.185	396.185	12436848.65
Median	28.4957	28.7389	28.19815	85.4553	28.4851	11163328.5	5933.96	5961.08	5902.055	5929.32	5929.32	0
Skewness	0.24339	0.308786	0.239522	0.234361	0.234361	4.79734826	0.495941	0.524386	0.47397	0.487467	0.487467	9.206107214
Kurtosis	0.522765	0.686282	0.429744	0.397485	0.397485	37.8702255	-0.6572	-0.65979	-0.68321	-0.6694	-0.6694	83.91566773
Extreme values												
Minimum	24.6213	24.8388	24.4853	74.45281	24.8176	0	5298.62	5332.08	5243.71	5292.14	5292.14	0
0.50%	24.8388	24.89031	24.52476	74.5164	24.8388	1227004.08	5332.46	5365.359	5280.984	5325.246	5325.246	0
1%	24.85706	25.08589	24.60948	74.5164	24.8388	4713761.05	5365.813	5442.037	5349.499	5380.008	5380.008	0
5%	25.7035	26.04415	25.31455	77.15145	25.71715	6434711	5474.063	5509.512	5421.685	5462.848	5462.848	0
95%	31.2252	31.54243	30.98655	93.93382	31.31127	23866406	6724.775	6761.605	6704.227	6735.598	6735.598	0
99%	33.39727	33.78169	32.96151	99.98336	33.32779	43929741.2	6888.098	6911.792	6865.036	6890.071	6890.071	48320550
99.50%	33.61642	33.84481	33.02623	100.3153	33.43845	48863322.2	6891.65	6922.694	6879.852	6906.773	6906.773	109931000
Maximum	33.642	34.3549	33.4909	101.1888	33.7296	93926759	6911.24	6928.98	6890.64	6915.56	6915.56	126801000

Table A8: Descriptive statistics for E.ON stock price and DAX index for 2010

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	36.90899	37.33468	36.53225	110.853	36.95101	15447013.8	7507.066	7557.53	7453.482	7508.574	7508.574	0
Standard Deviation	4.022206	4.099862	4.006921	12.07137	4.023789	8486811	437.7301	430.5289	445.6155	437.8104	437.8104	0
Median	36.85785	37.1811	36.46665	110.3606	36.78685	13084991	7572.935	7633.645	7511.34	7586.085	7586.085	0
Skewness	0.069529	0.088414	0.088028	0.070667	0.070667	2.95280411	-0.65621	-0.64764	-0.67254	-0.65965	-0.65965	0
Kurtosis	-0.64338	-0.63008	-0.63468	-0.64494	-0.64494	12.0844892	-0.7205	-0.73835	-0.67542	-0.70372	-0.70372	0
Extreme values												
Minimum	28.5516	29.3491	28.5486	87.0504	29.0168	3156555	6495.85	6563.45	6384.4	6439.21	6439.21	0
0.50%	29.19961	29.45203	28.71832	87.40765	29.13588	5505884.33	6521.719	6574.69	6425.258	6471.589	6471.589	0
1%	29.28993	29.72028	28.93271	87.58745	29.19582	6129203.8	6554.939	6601.843	6441.348	6559.485	6559.485	0
5%	30.03642	30.34457	29.686	90.1908	30.0636	7876874.25	6703.9	6750.4	6631.355	6712.937	6712.937	0
95%	43.6823	44.22915	43.3719	131.4232	43.80772	32582091	8040.997	8070.21	7982	8036.643	8036.643	0
99%	45.28754	45.99746	44.89177	135.9473	45.31577	47917901.8	8089.762	8124.714	8056.834	8083.285	8083.285	0
99.50%	45.55083	46.40277	45.05907	137.2255	45.74182	54770625.9	8098.362	8131.452	8063.366	8092.143	8092.143	0
Maximum	46.004	46.5568	45.6173	138.4833	46.1611	72595742	8101.89	8151.57	8074.97	8105.69	8105.69	0

Table A9: Descriptive statistics for E.ON stock price and DAX index for 2009

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	32.35273	32.85876	31.74991	66.67548	32.27797	12444014.7	5855.528	5921.82	5771.963	5848.184	5848.184	20303031.89
Standard Deviation	6.429648	6.368753	6.598617	43.36712	6.464932	6837528.08	980.7304	961.2903	1000.047	980.8879	980.8879	31597266.85
Median	35.49385	35.9606	35.26425	35.60865	35.57245	11147688	6306.525	6366.275	6239.665	6304.705	6304.705	0
Skewness	-0.42731	-0.44113	-0.41009	0.185739	-0.42138	2.45754429	-0.42719	-0.43204	-0.41259	-0.4146	-0.4146	2.092082285
Kurtosis	-1.38923	-1.35584	-1.4409	-1.93076	-1.39146	9.45389084	-1.4528	-1.44721	-1.46984	-1.46886	-1.46886	5.622304562
Extreme values												
Minimum	19.9115	20.129	19.5127	19.8843	19.8843	0	4143.45	4222.01	4014.6	4127.41	4127.41	0
0.50%	20.06111	20.61152	19.61623	20.10195	20.10195	0	4166.24	4260.611	4042.33	4185.835	4185.835	0
1%	20.43368	20.75653	19.81235	20.38124	20.38124	0	4186.944	4286.628	4065.24	4210.392	4210.392	0
5%	22.39338	23.02281	21.72593	22.27333	22.27333	5838185.75	4314.368	4384.274	4214.146	4325.663	4325.663	0
95%	40.38144	40.78001	39.69161	120.3486	40.11618	22688658.7	7040.807	7081.35	6997.482	7041.67	7041.67	87847700
99%	41.14247	41.5888	40.68001	123.7002	41.2334	39597439.3	7115.698	7169.052	7082.619	7106.994	7106.994	127546637
99.50%	41.2152	41.63439	40.7343	123.9077	41.30257	47842104.4	7164.313	7201.46	7107.081	7146.467	7146.467	146899440.5
Maximum	41.3818	41.6567	40.8441	124.5987	41.5329	51283401	7188.07	7231.86	7165.44	7225.94	7225.94	197821900

Table A10: Descriptive statistics for E.ON stock price and DAX index for 2008

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	23.35808	23.67746	23.0177	23.33729	23.33729	9412866.22	5188.814	5243.013	5136.15	5190.918	5190.918	30695764.96
Standard Deviation	2.465174	2.418861	2.497834	2.436364	2.436364	4472684.45	616.6047	608.3039	623.1269	614.1732	614.1732	9310949.9
Median	23.863	24.35915	23.6092	23.83125	23.83125	8271361.5	5395.17	5453.69	5323.785	5392.77	5392.77	29461950
Skewness	-0.80666	-0.82511	-0.83259	-0.82552	-0.82552	2.7477036	-0.72974	-0.75111	-0.74378	-0.75405	-0.75405	1.632101363
Kurtosis	-0.01869	0.054952	0.02931	0.053072	0.053072	11.2954567	-0.45667	-0.43169	-0.41752	-0.39452	-0.39452	7.367125465
Extreme values												
Minimum	16.685	17.0657	16.105	16.4857	16.4857	4026677	3677.07	3706.32	3588.89	3666.41	3666.41	0
0.50%	16.85196	17.23478	16.47771	16.80491	16.80491	4069703.15	3703.824	3759.391	3645.913	3691.067	3691.067	9726122
1%	17.08652	17.65277	16.58384	17.29074	17.29074	4256560.99	3720.657	3797.135	3674.999	3693.864	3693.864	10778885
5%	18.22573	18.6245	17.75083	18.40207	18.40207	5258890.5	3970.508	4028.342	3890.677	3949.757	3949.757	20119295
95%	26.51731	26.736	26.20466	26.4912	26.4912	16336379.2	5964.55	5988.462	5924.902	5949.799	5949.799	45008010
99%	26.89203	27.40544	26.60428	27.04778	27.04778	30360767.6	6035.68	6054.224	5999.031	6035.872	6035.872	67680006
99.50%	27.14347	27.52629	26.80895	27.0955	27.0955	31877462.4	6042.734	6057.368	6011.841	6039.734	6039.734	76975371.5
Maximum	27.2797	27.6151	26.9172	27.1257	27.1257	37463879	6057.93	6094.26	6031.14	6048.3	6048.3	80596500

Table A11: Descriptive statistics for E.ON stock price and DAX index for 2007

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	21.7709	21.94247	21.52843	21.71897	21.71897	10530470.4	6364.964	6408.666	6319.77	6366.653	6366.653	34643996.03
Standard Deviation	1.824113	1.842408	1.79871	1.818734	1.818734	8047819.49	438.5611	432.3593	444.8875	439.4275	439.4275	14736091.21
Median	21.01265	21.1282	20.80875	20.8994	20.8994	8997418	6231.83	6269.695	6184.21	6221.965	6221.965	31078550
Skewness	0.845826	0.856522	0.878901	0.862566	0.862566	7.07945015	0.573946	0.57961	0.572342	0.584665	0.584665	2.58448009
Kurtosis	-0.26388	-0.20182	-0.24883	-0.22497	-0.22497	11.3202952	-0.8826	-0.87717	-0.86083	-0.84668	-0.84668	8.410071404
Extreme values												
Minimum	16.685	17.0657	16.105	16.4857	16.4857	4026677	3677.07	3706.32	3588.89	3666.41	3666.41	0
0.50%	16.85196	17.23478	16.47771	16.80491	16.80491	4069703.15	3703.824	3759.391	3645.913	3691.067	3691.067	9726122
1%	17.08652	17.65277	16.58384	17.29074	17.29074	4256560.99	3720.657	3797.135	3674.999	3693.864	3693.864	10778885
5%	18.22573	18.6245	17.75083	18.40207	18.40207	5309755.35	3970.508	4028.342	3890.677	3949.757	3949.757	20399945
95%	26.51731	26.736	26.20466	26.4912	26.4912	16290482	5964.55	5988.462	5924.902	5949.799	5949.799	44671895
99%	26.89203	27.40544	26.60428	27.04778	27.04778	30360767.6	6035.68	6054.224	5999.031	6035.872	6035.872	67680006
99.50%	27.14347	27.52629	26.80895	27.0955	27.0955	31877462.4	6042.734	6057.368	6011.841	6039.734	6039.734	76975371.5
Maximum	27.2797	27.6151	26.9172	27.1257	27.1257	37463879	6057.93	6094.26	6031.14	6048.3	6048.3	80596500

Table A12: Descriptive statistics for E.ON stock price and DAX index for 2006

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	16.77534	17.01185	16.51921	16.75843	16.75843	12912157.9	6507.479	6571.017	6433.164	6503.448	6503.448	37005420
Standard Deviation	2.521744	2.465853	2.562643	2.504312	2.504312	8000176.3	720.236	699.3332	739.1569	717.1202	717.1202	14877762.13
Median	16.1911	16.4222	15.8739	16.2364	16.2364	10810530	6557.85	6667.98	6483.39	6539.85	6539.85	34499500
Skewness	0.385685	0.404894	0.350596	0.383635	0.383635	3.06058891	-0.18303	-0.17891	-0.18654	-0.17656	-0.17656	1.189891126
Kurtosis	-0.66803	-0.62811	-0.67517	-0.65855	-0.65855	12.1370036	-1.45585	-1.45421	-1.45629	-1.46351	-1.46351	4.023258344
Extreme values												
Minimum	11.8454	11.8816	11.3288	11.6687	11.6687	2828909	5063.59	5126.52	4965.8	5072.33	5072.33	0
0.50%	11.99065	12.08786	11.89275	11.9008	11.91699	12.0389175	12.1218	12.14098	12.18622	12.19512	12.23911	12.1218
1%	12.28951	12.52118	12.13784	12.16736	12.18447	12.238228	12.32992	12.35996	12.44144	12.5251	12.59283	12.5251
5%	13.0109	13.25133	12.96334	12.97218	12.9792	13.150665	13.4178	13.59366	13.73865	13.8257	13.8755	13.96612
95%	21.17282	21.26734	21.19052	21.17712	21.1712	13170076.1	12005496	11357825	10678169	9991124	9648987	32977800
99%	22.3902	22.4763	22.4147	22.40298	22.38911	24560931.3	21063612	20276585	19493693	19030845	17863579	49840134
99.50%	22.45854	22.5468	22.48902	22.4763	22.46743	37683938.4	35018562	32679711	27679952	25928486	24666599	63241848.91
Maximum	22.5262	22.6576	22.2905	22.4401	22.4401	63410931	7570.86	7600.41	7527.64	7527.64	7527.64	103186200

Table A13: Descriptive statistics for E.ON stock price and DAX index for 2005

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	14.77676	14.92466	14.5905	14.76132	14.76132	10712221.8	7015.048	7062.199	6964.716	7016.448	7016.448	29480135.77
Standard Deviation	1.68288	1.697235	1.686508	1.702254	1.702254	6143539.37	476.0727	469.5755	487.5868	479.7898	479.7898	9122866.484
Median	15.2735	15.44345	15.09905	15.28255	15.28255	9478482.5	7012.18	7054.485	6948.305	7006.625	7006.625	28602500
Skewness	-0.30477	-0.3354	-0.27198	-0.30555	-0.30555	5.00278836	-0.12799	-0.14272	-0.12865	-0.14605	-0.14605	2.148928313
Kurtosis	-1.17053	-1.18495	-1.1832	-1.17809	-1.17809	41.3777733	-0.94308	-0.91083	-0.98584	-0.93493	-0.93493	12.84221651
Extreme values												
Minimum	11.3379	11.4919	11.2563	11.3379	11.3379	3755314	5976.46	6011.56	5914.43	5969.4	5969.4	0
0.50%	11.44298	11.56078	11.26614	11.38903	11.38903	4132478.65	6008.267	6051.935	5958.319	5999.488	5999.488	3425835
1%	11.52078	11.64123	11.33507	11.46176	11.46176	4428036.08	6060.379	6127.4	6003.526	6076.073	6076.073	13121630
5%	12.04072	12.0901	11.75817	11.97881	11.97881	5405558.65	6253.638	6259.351	6131.249	6225.603	6225.603	19003975
95%	17.08043	17.27915	16.98915	17.08363	17.08363	18804538.4	7737.779	7767.857	7689.234	7732.8	7732.8	42871530
99%	17.53342	17.68958	17.36488	17.59392	17.59392	31685645.3	7830.502	7859.686	7779.105	7833.16	7833.16	61495582
99.50%	17.72558	17.83073	17.51316	17.67498	17.67498	37083116.7	7851.633	7864.626	7795.651	7844.092	7844.092	75212972
Maximum	17.8089	17.8904	17.5914	17.691	17.691	72411734	7859.83	7871.79	7831.72	7857.97	7857.97	93000000

Table A14: Descriptive statistics for E.ON stock price and DAX index for 2004

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	11.98361	12.09515	11.85603	11.98097	11.98097	11355789.3	8596.223	8642.179	8544.808	8598.117	8598.117	60704648.47
Standard Deviation	0.554804	0.568292	0.551413	0.561495	0.561495	5171626.2	626.6237	624.343	628.4045	627.4939	627.4939	36479318.04
Median	12.03345	12.1263	11.893	12.01305	12.01305	10250503.5	8417.525	8438.095	8363.785	8413.245	8413.245	58950150
Skewness	-0.2367	-0.21657	-0.32085	-0.26797	-0.26797	1.8147403	0.266589	0.281341	0.232416	0.246122	0.246122	0.82056887
Kurtosis	-0.5373	-0.52453	-0.56065	-0.56483	-0.56483	4.50492342	-1.15293	-1.16399	-1.16646	-1.15217	-1.15217	1.755042483
Extreme values												
Minimum	10.8575	10.9663	10.708	10.8213	10.8213	2910417	7477.03	7531.09	7418.36	7459.96	7459.96	0
0.50%	10.8839	10.9708	10.748	10.86442	10.86442	3366788.55	7498.025	7543.811	7437.006	7475.066	7475.066	0
1%	10.9139	10.97355	10.76965	10.89679	10.89679	4030656.55	7518.262	7622.229	7440.472	7493.311	7493.311	0
5%	10.9844	11.07523	10.8666	10.97553	10.97553	6028183.9	7712.568	7767.375	7645.861	7693.236	7693.236	18098725
95%	12.78745	12.90985	12.67402	12.80879	12.80879	20729087.3	9640.36	9681.957	9592.807	9656.941	9656.941	120823565
99%	13.16588	13.31921	12.99615	13.12049	13.12049	31533411.5	9727.564	9754.51	9687.213	9724.014	9724.014	150424470
99.50%	13.24676	13.36976	13.01945	13.20517	13.20517	33172277.8	9749	9782.49	9707.258	9732.684	9732.684	165012475
Maximum	13.3045	13.522	13.1006	13.3317	13.3317	34737459	9752.11	9794.05	9714.02	9742.96	9742.96	249585100

Table A15: Descriptive statistics for E.ON stock price and DAX index for 2003

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	12.60745	12.72251	12.47357	12.60316	12.60316	10102644.2	9818.321	9880.864	9749.761	9822.999	9822.999	68358200
Standard Deviation	0.548017	0.543994	0.566799	0.546034	0.546034	4563219.64	684.9609	688.8729	689.2444	697.2616	697.2616	45395836.67
Median	12.5523	12.6475	12.4345	12.5704	12.5704	8887226	9697.46	9732.78	9617.59	9666.34	9666.34	73981000
Skewness	0.185495	0.195895	0.136891	0.192191	0.192191	1.83658322	1.346096	1.417092	1.279138	1.353388	1.353388	0.112170919
Kurtosis	-0.63113	-0.62051	-0.58479	-0.5791	-0.5791	5.22113104	1.725906	1.867461	1.562595	1.674865	1.674865	0.414918169
Extreme values												
Minimum	11.4194	11.6097	11.0841	11.3786	11.3786	3475203	8623.28	8662.86	8354.97	8571.95	8571.95	0
0.50%	11.47968	11.64872	11.23367	11.4466	11.4466	3891306.2	8648.33	8838.666	8565.537	8623.358	8623.358	0
1%	11.50462	11.71668	11.36684	11.56898	11.56898	4160843	8699.534	8849.302	8622.194	8760.39	8760.39	0
5%	11.791	11.9088	11.6007	11.7955	11.7955	5391730	9008.6	9077.89	8913.27	9009.32	9009.32	0
95%	13.5447	13.6852	13.4631	13.5447	13.5447	18752089	11408.28	11455.08	11301.34	11401.66	11401.66	131077400
99%	13.7668	13.89726	13.72324	13.77944	13.77944	25076782.8	11947.62	12045.79	11859.43	11946	11946	196643640
99.50%	13.83659	13.95524	13.726	13.84832	13.84832	27221947	11988.31	12163.19	11929.44	12021.81	12021.81	206266770
Maximum	13.88	14.0114	13.7577	14.0114	14.0114	36288946	12163.08	12219.05	11955.33	12167.72	12167.72	224468500

Table A16: Descriptive statistics for E.ON stock price and DAX index for 2002

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	9.565243	9.701367	9.403216	9.534817	9.534817	13698934.7	10684.45	10773.46	10574.72	10667.88	10667.88	0
Standard Deviation	2.030776	2.017439	2.039696	2.037534	2.037534	7111571.21	842.2891	838.9685	847.1734	845.919	845.919	0
Median	8.66789	8.82287	8.53104	8.66608	8.66608	12089957	10770.16	10850.58	10691.63	10752.1	10752.1	0
Skewness	0.466507	0.485508	0.459677	0.4753	0.4753	2.55386754	-0.04773	-0.05644	-0.05893	-0.05872	-0.05872	0
Kurtosis	-1.29898	-1.2709	-1.32019	-1.28368	-1.28368	10.0958237	-1.07184	-1.08958	-1.03492	-1.05573	-1.05573	0
Extreme values												
Minimum	6.43113	6.74743	6.413	6.46376	6.46376	0	8854.4	8899.57	8699.29	8752.87	8752.87	0
0.50%	6.69441	6.785583	6.487321	6.624171	6.624171	4612017.2	8902.917	8989.827	8785.747	8905.833	8905.833	0
1%	6.707734	6.824102	6.573238	6.667498	6.667498	4897958	8963.618	9093.884	8851.578	8974.62	8974.62	0
5%	7.32565	7.45979	7.0166	7.20602	7.20602	6266449	9420.51	9498.57	9319.1	9393.36	9393.36	0
95%	12.8831	13.0462	12.7426	12.8922	12.8922	22868451	11984.79	12047.38	11858.23	11966.17	11966.17	0
99%	13.2656	13.40692	13.03808	13.24202	13.24202	43038412	12225.65	12331.61	12194.52	12229.1	12229.1	0
99.50%	13.27467	13.4314	13.12644	13.2701	13.2701	45438739.1	12282.55	12373.63	12214.72	12306.51	12306.51	0
Maximum	13.3227	13.4541	13.1777	13.3544	13.3544	58343188	12357.27	12390.75	12326.71	12374.73	12374.73	0

Table A17: Descriptive statistics for E.ON stock price and DAX index for 2001

	E.ON						DAX					
	Open	High	Low	Close	Eon_Adj Close	Volume	Open	High	Low	Close	DAX_Adj Close	Volume
Average	7.285666	7.372904	7.194193	7.280771	7.280771	12221833.1	10730.93	10796.43	10674.03	10741.41	10741.41	28535103.1
Standard Deviation	0.710325	0.73148	0.705077	0.720362	0.720362	6333803.14	759.5264	744.565	770.0039	759.385	759.385	44152680.43
Median	7.3305	7.366	7.23887	7.305	7.305	10773429.5	10574.64	10656.79	10515.6	10592.79	10592.79	0
Skewness	0.171109	0.182952	0.165231	0.175484	0.175484	2.35984345	0.35125	0.382171	0.348884	0.354971	0.354971	1.200508318
Kurtosis	-0.90092	-0.93783	-0.89279	-0.92108	-0.92108	7.83607985	-0.95593	-0.96882	-0.96515	-0.96452	-0.96452	0.294825556
Extreme values												
Minimum	6.04	6.076	5.993	6.035	6.035	2698452	9237.62	9507.91	9214.1	9268.66	9268.66	0
0.50%	6.05228	6.11	6.007855	6.047135	6.047135	4574357.19	9405.102	9537.379	9248.34	9386.233	9386.233	0
1%	6.06142	6.12653	6.01057	6.06355	6.06355	4810909.56	9444.367	9570.353	9352.483	9435.025	9435.025	0
5%	6.20085	6.27735	6.1234	6.15565	6.15565	5620680.5	9595.501	9692.506	9522.989	9624.172	9624.172	0
95%	8.49025	8.640563	8.411494	8.5082	8.5082	24199385.4	11998.42	12059.54	11951.58	12012.49	12012.49	106344920
99%	8.704328	8.75766	8.584169	8.657401	8.657401	37685974.1	12206.52	12244.34	12189.22	12225.97	12225.97	155763256
99.50%	8.734444	8.782218	8.60989	8.683188	8.683188	41557319.9	12235.61	12297.64	12221.67	12256.98	12256.98	177553215.5
Maximum	8.75036	8.81108	8.63435	8.69598	8.69598	47839725	12368.82	12375.58	12256.94	12312.87	12312.87	187435700

Table A18: Descriptive statistics for EDP stock price and PSI20 index for all period (2001-2016)

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.767304	2.794059	2.739354	2.766816	2.766816	8122511	7367.23	7411.468	7316.258	7363.518	7363.518	0
Standard Deviation	0.6631	0.671057	0.657274	0.664173	0.664173	7380983	2077.764	2083.1	2072.363	2077.367	2077.367	0
Median	2.704	2.73	2.68	2.705	2.705	6219171	7210.76	7254.34	7157.41	7202.49	7202.49	0
Skewness	0.499902	0.502032	0.505423	0.501804	0.501804	4.49966	1.014258	1.016352	1.012606	1.013415	1.013415	0
Kurtosis	-0.08594	-0.06878	-0.09128	-0.08832	-0.08832	42.42754	0.564885	0.575242	0.55488	0.561196	0.561196	0
Extreme values												
Minimum	1.38	1.38	1.38	1.38	1.38	0	4313.23	4380.77	4175.28	4260.13	4260.13	0
0.50%	1.51	1.5162	1.4962	1.51	1.51	0	4432.344	4464.331	4403.104	4435.494	4435.494	0
1%	1.5324	1.55	1.53	1.54	1.54	0	4502.844	4528.922	4459.648	4491.18	4491.18	0
5%	1.72	1.732	1.69	1.7152	1.7152	777623.6	4765.358	4805.72	4722.596	4760.188	4760.188	0
95%	4.088	4.12	4.06	4.09	4.09	20383307	11865.2	11893.26	11804.92	11845.88	11845.88	0
99%	4.4676	4.5276	4.44	4.4976	4.4976	37592501	13198.12	13263.25	13137.22	13187.49	13187.49	0
99.50%	4.61	4.6676	4.58	4.61	4.61	43068446	13393.26	13471.92	13333.15	13379.91	13379.91	0
Maximum	4.9	5	4.8	4.91	4.91	1.32E+08	13703.6	13729.8	13672.6	13702	13702	0

Table A19: Descriptive statistics for EDP stock price and PSI20 index for 2016

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.951708	2.98107	2.919665	2.94935	2.94935	6452637	4739.529	4770.422	4703.569	4735.058	4735.058	0
Standard Deviation	0.142255	0.14021	0.141812	0.141322	0.141322	2654724	216.0499	219.3516	210.4477	214.8885	214.8885	0
Median	2.957	2.978	2.923	2.958	2.958	5906081	4702.62	4735.6	4674.33	4699.93	4699.93	0
Skewness	-0.13655	0.013842	-0.27315	-0.1719	-0.1719	1.237423	0.326639	0.335995	0.246886	0.305083	0.305083	0
Kurtosis	-0.28525	-0.32836	-0.33638	-0.39104	-0.39104	1.797735	-0.70462	-0.78862	-0.64784	-0.70123	-0.70123	0
Extreme values												
Minimum	2.55	2.66	2.486	2.568	2.568	1991264	4313.23	4380.77	4175.28	4260.13	4260.13	0
0.50%	2.62488	2.69668	2.56916	2.63556	2.63556	2302064	4339.011	4390.826	4270.049	4341.742	4341.742	0
1%	2.64728	2.70716	2.61588	2.63924	2.63924	2470703	4368.394	4397.398	4318.176	4360.504	4360.504	0
5%	2.6998	2.7258	2.6744	2.699	2.699	3170863	4419.686	4438.016	4386.814	4415.988	4415.988	0
95%	3.2	3.2218	3.15	3.1778	3.1778	11988736	5102.258	5148.902	5058.056	5113.614	5113.614	0
99%	3.23	3.28388	3.20052	3.21976	3.21976	15157834	5200.646	5231.998	5152.492	5191.28	5191.28	0
99.50%	3.25304	3.31484	3.20716	3.22776	3.22776	15224553	5239.953	5264.647	5164.004	5209.263	5209.263	0
Maximum	3.321	3.35	3.217	3.267	3.267	16818707	5274.38	5278.53	5176.64	5231.14	5231.14	0

Table A20: Descriptive statistics for EDP stock price and PSI20 index for 2015

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	3.368355	3.403625	3.330883	3.369746	3.369746	6867477	5519.14	5563.443	5472.619	5519.21	5519.21	0
Standard Deviation	0.178696	0.177779	0.178448	0.181254	0.181254	2992939	375.1097	372.5575	376.2364	375.5915	375.5915	0
Median	3.3905	3.4185	3.3475	3.385	3.385	6374896	5481.055	5516.12	5438.995	5494.83	5494.83	0
Skewness	-0.24944	-0.23517	-0.18807	-0.26451	-0.26451	3.046042	0.108873	0.116714	0.089063	0.089709	0.089709	0
Kurtosis	-0.99801	-1.02218	-0.97269	-0.95839	-0.95839	20.2719	-0.70254	-0.70885	-0.70227	-0.68263	-0.68263	0
Extreme values												
Minimum	3.009	3.033	2.951	2.975	2.975	704212	4650.1	4679.09	4602.48	4606.25	4606.25	0
0.50%	3.013025	3.0692	2.9718	2.99935	2.99935	2389715	4683.027	4711.696	4643.093	4652.921	4652.921	0
1%	3.02265	3.07775	3.00215	3.0262	3.0262	2619643	4690.594	4739.771	4651.616	4695.419	4695.419	0
5%	3.0645	3.101	3.0305	3.0595	3.0595	3301182	4995.375	5047.505	4934.11	4977.495	4977.495	0
95%	3.61325	3.64	3.588	3.618	3.618	11443792	6123.038	6150.83	6090.398	6123.643	6123.643	0
99%	3.7057	3.72195	3.6665	3.7003	3.7003	15705418	6300.917	6325.704	6222.304	6300.761	6300.761	0
99.50%	3.714075	3.7425	3.674175	3.70945	3.70945	19599934	6310.066	6342.536	6266.952	6311.863	6311.863	0
Maximum	3.72	3.749	3.695	3.731	3.731	31941136	6329.76	6348.46	6287.73	6324.88	6324.88	0

Table A21: Descriptive statistics for EDP stock price and PSI20 index for 2014

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	3.302063	3.338918	3.269867	3.306345	3.306345	5767110	6382.488	6428.377	6319.094	6372.291	6372.291	0
Standard Deviation	0.248502	0.251132	0.246048	0.248314	0.248314	2894307	911.4841	912.9868	912.5551	916.2293	916.2293	0
Median	3.336	3.36	3.285	3.331	3.331	5196612	6691.13	6734.63	6581.33	6689.19	6689.19	0
Skewness	-0.72712	-0.78135	-0.65595	-0.70756	-0.70756	3.039074	-0.24255	-0.2453	-0.24108	-0.23721	-0.23721	0
Kurtosis	0.027416	0.063501	-0.04119	0.032214	0.032214	14.87912	-1.44344	-1.45365	-1.436	-1.4547	-1.4547	0
Extreme values												
Minimum	2.65	2.684	2.634	2.643	2.643	206711	4703.45	4751.81	4613.35	4691.33	4691.33	0
0.50%	2.67351	2.70324	2.64826	2.68343	2.68343	1413864	4741.576	4771.996	4682.621	4737.807	4737.807	0
1%	2.6857	2.7282	2.67924	2.717	2.717	2487501	4818.047	4826.914	4736.695	4772.347	4772.347	0
5%	2.8007	2.818	2.7706	2.7994	2.7994	3021734	4968.917	5045.01	4904.127	4947.664	4947.664	0
95%	3.66	3.688	3.6296	3.664	3.664	10254246	7538.382	7566.254	7464.887	7516.902	7516.902	0
99%	3.70598	3.73636	3.67734	3.70874	3.70874	17804114	7659.028	7719.098	7631.343	7675.047	7675.047	0
99.50%	3.7203	3.74719	3.69373	3.73433	3.73433	20530950	7703.346	7739.041	7646.071	7704.966	7704.966	0
Maximum	3.749	3.749	3.706	3.748	3.748	26445967	7770.29	7790.56	7669.67	7734.95	7734.95	0

Table A22: Descriptive statistics for EDP stock price and PSI20 index for 2013

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.542173	2.562129	2.519678	2.542247	2.542247	5776574	6035.122	6075.313	5993.112	6036.022	6036.022	0
Standard Deviation	0.147023	0.144802	0.151983	0.147583	0.147583	3623559	280.2786	274.1793	284.1259	279.8011	279.8011	0
Median	2.538	2.565	2.519	2.541	2.541	5154706	6046.75	6076.09	6001.46	6040.94	6040.94	0
Skewness	-0.16448	-0.21509	-0.14066	-0.17081	-0.17081	5.30459	-0.36002	-0.32083	-0.39608	-0.38107	-0.38107	0
Kurtosis	-1.28724	-1.28061	-1.32812	-1.30607	-1.30607	45.70963	-0.08272	-0.11254	-0.09472	-0.1467	-0.1467	0
Extreme values												
Minimum	2.222	2.255	2.215	2.227	2.227	1728541	5186.61	5256.61	5136.22	5236.49	5236.49	0
0.50%	2.2404	2.27524	2.22208	2.24635	2.24635	1771486	5342.808	5412.79	5289.865	5310.701	5310.701	0
1%	2.26094	2.2921	2.22986	2.2662	2.2662	1896941	5346.465	5437.129	5315.581	5386.961	5386.961	0
5%	2.3117	2.339	2.2887	2.3101	2.3101	2624198	5512.289	5566.126	5464.714	5526.357	5526.357	0
95%	2.7293	2.7415	2.7131	2.7259	2.7259	10518643	6448.055	6493.779	6402.539	6450.978	6450.978	0
99%	2.7823	2.7956	2.7673	2.78246	2.78246	18320244	6582.881	6650.31	6529.32	6582.724	6582.724	0
99.50%	2.78719	2.80392	2.77803	2.78446	2.78446	23119456	6635.71	6674.886	6591.369	6615.035	6615.035	0
Maximum	2.805	2.818	2.788	2.799	2.799	42823043	6675.76	6681.22	6629.68	6644.32	6644.32	0

Table A23: Descriptive statistics for EDP stock price and PSI20 index for 2012

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.076406	2.096352	2.045445	2.071387	2.071387	5427857	5204.809	5238.559	5162.158	5201.997	5201.997	0
Standard Deviation	0.180885	0.179841	0.181695	0.181692	0.181692	3324101	364.796	363.7692	367.6677	365.0586	365.0586	0
Median	2.1	2.116	2.0715	2.0985	2.0985	4802772	5301.13	5326.29	5255.41	5300.045	5300.045	0
Skewness	-0.295	-0.31327	-0.36305	-0.3273	-0.3273	4.301378	-0.53477	-0.543	-0.55897	-0.55522	-0.55522	0
Kurtosis	-0.59055	-0.57571	-0.6101	-0.63099	-0.63099	30.29807	-0.89387	-0.90404	-0.87633	-0.88684	-0.88684	0
Extreme values												
Minimum	1.653	1.675	1.628	1.659	1.659	772043	4393.38	4447.57	4371.74	4408.73	4408.73	0
0.50%	1.658025	1.68275	1.640275	1.66385	1.66385	1362856	4430.83	4474.733	4400.691	4437.92	4437.92	0
1%	1.66765	1.701	1.64595	1.6773	1.6773	1776051	4447.87	4494.909	4412.799	4450.562	4450.562	0
5%	1.74925	1.76225	1.71575	1.738	1.738	2211428	4544.423	4577.745	4488.663	4535.533	4535.533	0
95%	2.34125	2.3505	2.29475	2.32525	2.32525	9825654	5657.938	5700.693	5632.275	5659.525	5659.525	0
99%	2.4525	2.47395	2.39855	2.4292	2.4292	14091703	5719.654	5756.633	5691.664	5707.2	5707.2	0
99.50%	2.4719	2.4829	2.434375	2.462175	2.462175	27116376	5723.413	5764.58	5695.605	5725.437	5725.437	0
Maximum	2.473	2.484	2.448	2.47	2.47	32156468	5738.95	5770.88	5710.7	5746.47	5746.47	0

Table A24: Descriptive statistics for EDP stock price and PSI20 index for 2011

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.503588	2.536549	2.471366	2.503089	2.503089	6712872	6853.959	6908.56	6789.69	6845.053	6845.053	0
Standard Deviation	0.209959	0.206703	0.219362	0.213397	0.213397	3847053	943.31	937.2797	953.2147	945.5138	945.5138	0
Median	2.467	2.49	2.433	2.465	2.465	5876236	7110.61	7142.17	7031.02	7107.1	7107.1	0
Skewness	0.128947	0.177602	0.065983	0.1218	0.1218	2.785549	-0.26969	-0.27928	-0.23908	-0.25598	-0.25598	0
Kurtosis	-1.15472	-1.20428	-1.13249	-1.15911	-1.15911	11.33013	-1.53478	-1.51598	-1.57557	-1.54046	-1.54046	0
Extreme values												
Minimum	2.069	2.13	1.984	2.065	2.065	1728174	5178.64	5215.73	5126.58	5185.1	5185.1	0
0.50%	2.08488	2.14912	2.01052	2.08392	2.08392	1938771	5235.352	5281.384	5190.907	5212.621	5212.621	0
1%	2.12416	2.1756	2.04788	2.09456	2.09456	2229330	5244.654	5320.788	5234.432	5248.531	5248.531	0
5%	2.1998	2.234	2.1574	2.2	2.2	2957303	5370.064	5427.062	5324.52	5352.964	5352.964	0
95%	2.822	2.8554	2.7992	2.8234	2.8234	13314477	7967.442	8010.858	7913.226	7968.562	7968.562	0
99%	2.87604	2.89776	2.84372	2.87584	2.87584	21937025	8064.516	8115.288	8010.276	8072.914	8072.914	0
99.50%	2.8886	2.9072	2.851	2.89136	2.89136	25953439	8099.186	8131	8035.939	8114.276	8114.276	0
Maximum	2.91	2.92	2.859	2.91	2.91	31369099	8109.59	8169.79	8064.45	8126.06	8126.06	0

Table A25: Descriptive statistics for EDP stock price and PSI20 index for 2010

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.659345	2.682903	2.628143	2.654748	2.654748	9226224	7643.469	7698.839	7577.015	7634.957	7634.957	0
Standard Deviation	0.193801	0.192463	0.190536	0.189106	0.189106	7556760	437.1583	421.179	440.9899	430.5542	430.5542	0
Median	2.5935	2.618	2.564	2.5915	2.5915	7740577	7588.74	7657.37	7535.995	7582.22	7582.22	0
Skewness	0.883586	0.842763	0.984929	0.920684	0.920684	8.37996	0.332804	0.437838	0.285415	0.351247	0.351247	0
Kurtosis	-0.1838	-0.24197	0.034623	-0.08741	-0.08741	101.2595	0.068245	0.073749	0.001406	0.05275	0.05275	0
Extreme values												
Minimum	2.389	2.412	2.376	2.399	2.399	219080	6606.32	6678.08	6566.04	6624.29	6624.29	0
0.50%	2.401425	2.41357	2.381285	2.4	2.4	1472780	6645.641	6835.554	6607.27	6666.791	6666.791	0
1%	2.40671	2.42013	2.382	2.40513	2.40513	2417550	6733.363	6871.373	6669.265	6791.095	6791.095	0
5%	2.4294	2.44685	2.4157	2.42985	2.42985	3749114	6941.984	7095.559	6860.372	7008.41	7008.41	0
95%	3.0413	3.0506	3.0018	3.02225	3.02225	18654489	8378.023	8405.281	8291.179	8338.867	8338.867	0
99%	3.14443	3.162	3.12286	3.13501	3.13501	28181885	8794.884	8816.25	8706.427	8750.204	8750.204	0
99.50%	3.155725	3.17344	3.136155	3.146865	3.146865	30509753	8817.903	8836.581	8725.537	8805.164	8805.164	0
Maximum	3.184	3.185	3.149	3.178	3.178	1.05E+08	8851.95	8877.6	8810.85	8839.75	8839.75	0

Table A26: Descriptive statistics for EDP stock price and PSI20 index for 2009

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.857883	2.883613	2.828246	2.855383	2.855383	7092398	7339.686	7387.202	7289.818	7338.773	7338.773	0
Standard Deviation	0.1916	0.185784	0.19761	0.19195	0.19195	5287574	894.8373	891.9424	897.3021	892.5819	892.5819	0
Median	2.81	2.8285	2.785	2.808	2.808	5951415	7229.56	7268.65	7189.26	7239.65	7239.65	0
Skewness	-0.11876	-0.10248	-0.13711	-0.15825	-0.15825	7.472154	0.069043	0.061055	0.051262	0.052027	0.052027	0
Kurtosis	-0.73045	-0.75637	-0.73955	-0.70169	-0.70169	82.10238	-1.25525	-1.2686	-1.26019	-1.26604	-1.26604	0
Extreme values												
Minimum	2.4	2.43	2.34	2.35	2.35	1736879	5740.17	5794.54	5696.46	5743.09	5743.09	0
0.50%	2.407025	2.446625	2.3811	2.398575	2.398575	2049213	5762.208	5824.787	5717.909	5750.527	5750.527	0
1%	2.43425	2.472	2.39225	2.43865	2.43865	2435431	5776.409	5856.442	5722.08	5766.618	5766.618	0
5%	2.512	2.568	2.4825	2.5115	2.5115	3009147	6014.133	6053.383	5958.733	6010.275	6010.275	0
95%	3.12375	3.14525	3.102	3.12125	3.12125	13588251	8640.293	8689.29	8564.033	8607.47	8607.47	0
99%	3.19585	3.20345	3.1728	3.1837	3.1837	16545940	8864.726	8893.913	8815.738	8845.922	8845.922	0
99.50%	3.203725	3.21125	3.186725	3.196425	3.196425	30125775	8885.72	8904.681	8831.242	8871.937	8871.937	0
Maximum	3.213	3.218	3.193	3.203	3.203	70215039	8905.31	8910.51	8844.46	8882.69	8882.69	0

Table A27: Descriptive statistics for EDP stock price and PSI20 index for 2008

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	3.480813	3.52734	3.42182	3.473023	3.473023	10842903	9171.457	9246.311	9064.446	9145.809	9145.809	0
Standard Deviation	0.630175	0.627941	0.639193	0.632723	0.632723	6311632	1938.178	1931.589	1944.5	1936.353	1936.353	0
Median	3.5175	3.55	3.46	3.5025	3.5025	9177443	8795.325	8880.75	8699.9	8796.52	8796.52	0
Skewness	-0.27363	-0.24742	-0.28931	-0.27744	-0.27744	1.840687	-0.19738	-0.20165	-0.20513	-0.20742	-0.20742	0
Kurtosis	-1.14925	-1.14596	-1.15107	-1.15633	-1.15633	4.95446	-1.21593	-1.20932	-1.24982	-1.24858	-1.24858	0
Extreme values												
Minimum	2.149	2.25	2.062	2.241	2.241	756990	5794.48	5905.66	5659.69	5801.76	5801.76	0
0.50%	2.262	2.373675	2.19155	2.2604	2.2604	1767234	5932.43	6059.974	5803.608	5824.02	5824.02	0
1%	2.3321	2.41955	2.2407	2.28685	2.28685	2091056	5966.159	6108.22	5811.739	5915.125	5915.125	0
5%	2.4615	2.50325	2.406	2.46925	2.46925	4169092	6150.913	6220.81	6074.653	6173.798	6173.798	0
95%	4.30625	4.375	4.255	4.28375	4.28375	23423980	11462.75	11547.3	11408.9	11481.8	11481.8	0
99%	4.5345	4.64	4.5	4.54	4.54	34615972	12708.26	12758.59	12580.89	12624.46	12624.46	0
99.50%	4.59075	4.669	4.5	4.60525	4.60525	39457807	12877.67	12907.83	12678.96	12728.79	12728.79	0
Maximum	4.68	4.76	4.61	4.66	4.66	41871520	13026.7	13112.6	12892.7	12892.7	12892.7	0

Table A28: Descriptive statistics for EDP stock price and PSI20 index for 2007

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	4.167804	4.208627	4.135765	4.171255	4.171255	19920079	12507.25	12568.14	12445.84	12506.06	12506.06	0
Standard Deviation	0.230208	0.242478	0.222311	0.232308	0.232308	11235022	668.0436	674.5466	658.7391	663.7711	663.7711	0
Median	4.12	4.15	4.09	4.12	4.12	17379098	12657.6	12699.7	12578.1	12643	12643	0
Skewness	1.049069	1.086691	0.941372	1.006648	1.006648	2.340385	-0.16898	-0.19468	-0.14003	-0.16886	-0.16886	0
Kurtosis	0.666463	0.762136	0.326999	0.549045	0.549045	9.180947	-1.16264	-1.17037	-1.16955	-1.17551	-1.17551	0
Extreme values												
Minimum	3.8	3.82	3.79	3.8	3.8	953099	11172.3	11248.9	11171.3	11226.7	11226.7	0
0.50%	3.8127	3.8427	3.7927	3.81	3.81	3651078	11231.66	11259.98	11219.14	11233.22	11233.22	0
1%	3.8254	3.8554	3.8	3.8154	3.8154	5444830	11236.84	11278.13	11228.17	11253.8	11253.8	0
5%	3.857	3.887	3.83	3.86	3.86	7465936	11485.91	11536.64	11453.5	11500.8	11500.8	0
95%	4.653	4.723	4.6	4.68	4.68	40814829	13469.63	13533.53	13401.98	13491.36	13491.36	0
99%	4.7776	4.873	4.7092	4.7968	4.7968	62013504	13686.13	13717.76	13634.55	13674.07	13674.07	0
99.50%	4.8538	4.9511	4.7492	4.8473	4.8473	68572012	13691.08	13723.54	13654.12	13685.2	13685.2	0
Maximum	4.9	5	4.8	4.91	4.91	92914517	13703.6	13729.8	13672.6	13702	13702	0

Table A39: Descriptive statistics for EDP stock price and PSI20 index for 2006

EDP	PSI20

	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	3.148958	3.176062	3.128919	3.153822	3.153822	15677784	9889.997	9928.034	9860.671	9898.712	9898.712	0
Standard Deviation	0.299348	0.299802	0.29963	0.300984	0.300984	12828810	604.6615	600.5491	606.3411	603.7539	603.7539	0
Median	3.1	3.13	3.08	3.1	3.1	12611751	9947.32	9980.46	9919.43	9940.43	9940.43	0
Skewness	0.496935	0.502462	0.503516	0.514505	0.514505	4.40491	-0.03845	-0.02524	-0.04543	-0.03226	-0.03226	0
Kurtosis	-0.65555	-0.65206	-0.67199	-0.66428	-0.66428	30.38245	-0.57224	-0.55694	-0.6056	-0.60063	-0.60063	0
Extreme values												
Minimum	2.6	2.62	2.58	2.6	2.6	0	8595.4	8632.31	8590.32	8602.04	8602.04	0
0.50%	2.6116	2.6529	2.6087	2.6358	2.6358	0	8635.524	8720.283	8621.773	8710.702	8710.702	0
1%	2.6458	2.6716	2.63	2.6674	2.6674	0	8729.248	8752.468	8696.745	8744.959	8744.959	0
5%	2.71	2.749	2.699	2.72	2.72	5603388	8795.282	8838.687	8773.916	8791.293	8791.293	0
95%	3.731	3.741	3.72	3.74	3.74	35206285	10828.06	10874.65	10808.05	10866.21	10866.21	0
99%	3.7884	3.85	3.7568	3.8126	3.8126	68131102	11159.2	11172.81	11091.98	11131.26	11131.26	0
99.50%	3.8284	3.85	3.7942	3.8371	3.8371	79776821	11159.2	11195.02	11097.8	11141.85	11141.85	0
Maximum	3.85	3.86	3.8	3.84	3.84	1.32E+08	11189.8	11204.7	11137.5	11197.6	11197.6	0

Table A30: Descriptive statistics for EDP stock price and PSI20 index for 2005

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.248615	2.261923	2.235115	2.249385	2.249385	9635195	7836.088	7865.184	7808.194	7840.885	7840.885	0
Standard Deviation	0.137092	0.13937	0.137671	0.139235	0.139235	4846822	245.5054	248.0289	246.6419	249.5097	249.5097	0
Median	2.23	2.24	2.22	2.23	2.23	8712403	7814.03	7836.585	7785.095	7818.5	7818.5	0
Skewness	0.972646	0.967155	0.959783	0.943423	0.943423	1.090489	0.639641	0.680111	0.666627	0.678604	0.678604	0
Kurtosis	0.793864	0.754763	0.747916	0.659014	0.659014	1.592912	0.586007	0.740011	0.669815	0.699562	0.699562	0
Extreme values												
Minimum	2.06	2.07	2.04	2.06	2.06	0	7418.69	7439.49	7377.56	7398.43	7398.43	0
0.50%	2.06295	2.08	2.05	2.06	2.06	0	7425.561	7451.474	7397.28	7423.232	7423.232	0
1%	2.07	2.08	2.05	2.0659	2.0659	1357373	7439.398	7468.537	7404.183	7428.459	7428.459	0
5%	2.08	2.09	2.07	2.08	2.08	3330421	7489.053	7510.412	7458.827	7485.102	7485.102	0
95%	2.55	2.5505	2.54	2.55	2.55	19250844	8249.556	8283.997	8230.662	8263.243	8263.243	0
99%	2.6482	2.6641	2.6241	2.6382	2.6382	25490742	8602.218	8627.47	8574.441	8600.53	8600.53	0
99.50%	2.66	2.67	2.6441	2.65705	2.65705	26808629	8605.037	8631.862	8581.38	8611.655	8611.655	0
Maximum	2.66	2.68	2.66	2.66	2.66	27455282	8620.05	8635.65	8588.7	8618.67	8618.67	0

Table A31: Descriptive statistics for EDP stock price and PSI20 index for 2004

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.275115	2.294351	2.256527	2.275687	2.275687	9149082	7358.014	7387.297	7324.924	7359.235	7359.235	0
Standard Deviation	0.084616	0.084387	0.082878	0.08451	0.08451	6418655	233.6371	232.5105	228.8163	231.1418	231.1418	0
Median	2.28	2.3	2.26	2.28	2.28	7603092	7373.825	7401.925	7341.995	7368.22	7368.22	0
Skewness	-0.60954	-0.56551	-0.61333	-0.57248	-0.57248	2.010739	-0.33981	-0.32498	-0.3858	-0.33557	-0.33557	0
Kurtosis	0.412899	0.423411	0.440811	0.41413	0.41413	5.75492	-0.37989	-0.40398	-0.36481	-0.43854	-0.43854	0
Extreme values												
Minimum	2.04	2.06	2.01	2.03	2.03	0	6739.33	6757.89	6708.77	6747.41	6747.41	0
0.50%	2.05	2.08	2.04	2.05	2.05	0	6765.168	6845.608	6743.208	6796.95	6796.95	0
1%	2.05	2.08	2.0461	2.05	2.05	556007.7	6807.303	6864.252	6793.354	6843.871	6843.871	0
5%	2.09	2.12	2.08	2.091	2.091	2555191	6984.845	7013.218	6952.69	6985.32	6985.32	0
95%	2.4	2.4195	2.38	2.4095	2.4095	21718874	7658.073	7687.47	7619.13	7657.762	7657.762	0
99%	2.43	2.4439	2.41	2.4339	2.4339	36391466	7833.617	7866.009	7788.124	7834.301	7834.301	0
99.50%	2.43695	2.4778	2.41695	2.44	2.44	38689575	7873.848	7937.925	7819.207	7867.429	7867.429	0
Maximum	2.48	2.52	2.44	2.49	2.49	40020579	7946.72	7970.15	7880.28	7952.52	7952.52	0

Table A32: Descriptive statistics for EDP stock price and PSI20 index for 2003

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	1.824943	1.838008	1.814368	1.826705	1.826705	3808701	5909.77	5941.338	5880.287	5912.196	5912.196	0
Standard Deviation	0.205719	0.208169	0.204155	0.205398	0.205398	4222405	392.047	390.1465	397.8073	394.5782	394.5782	0
Median	1.93	1.93	1.92	1.93	1.93	3153771	5870.52	5905.31	5832.13	5873.37	5873.37	0
Skewness	-0.48267	-0.48657	-0.48382	-0.47887	-0.47887	1.611652	0.318574	0.330578	0.335279	0.33875	0.33875	0
Kurtosis	-1.20047	-1.19248	-1.19572	-1.19741	-1.19741	3.604926	-0.7456	-0.75638	-0.74364	-0.75635	-0.75635	0
Extreme values												
Minimum	1.38	1.38	1.38	1.38	1.38	0	5215.43	5245.66	5193.32	5218.66	5218.66	0
0.50%	1.4	1.403	1.393	1.403	1.403	0	5228.365	5255.998	5200.5	5229.406	5229.406	0
1%	1.4	1.41	1.4	1.41	1.41	0	5233.372	5258.208	5210.678	5238.288	5238.288	0
5%	1.49	1.5	1.46	1.49	1.49	2369	5327.16	5389.98	5300.85	5343.57	5343.57	0
95%	2.07	2.09	2.05	2.07	2.07	11381112	6618.51	6642.62	6596.89	6619.41	6619.41	0
99%	2.104	2.118	2.09	2.104	2.104	19465781	6696.69	6724.494	6694.354	6719.32	6719.32	0
99.50%	2.117	2.13	2.097	2.117	2.117	21561349	6727.708	6750.816	6705.788	6737.461	6737.461	0
Maximum	2.13	2.14	2.11	2.14	2.14	22850895	6740.25	6770.53	6722.24	6747.41	6747.41	0

Table A33: Descriptive statistics for EDP stock price and PSI20 index for 2002

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	1.982797	1.997433	1.965977	1.979579	1.979579	3378032	6673.559	6712.545	6623.597	6664.561	6664.561	0
Standard Deviation	0.335695	0.336023	0.335858	0.335279	0.335279	3659891	910.968	907.3256	914.9149	910.17	910.17	0
Median	1.96	1.97	1.92	1.95	1.95	2637698	6718.74	6744.81	6657.23	6707.05	6707.05	0
Skewness	-0.00424	0.013154	0.007719	0.011349	0.011349	1.875546	-0.12856	-0.11658	-0.11542	-0.11467	-0.11467	0
Kurtosis	-1.77302	-1.77646	-1.77113	-1.77069	-1.77069	4.737782	-1.50778	-1.52008	-1.5083	-1.51191	-1.51191	0
Extreme values												
Minimum	1.5	1.52	1.47	1.51	1.51	0	5104.72	5173.91	5038.73	5083.34	5083.34	0
0.50%	1.513	1.526	1.493	1.52	1.52	0	5138.36	5186.082	5076.945	5114.824	5114.824	0
1%	1.52	1.54	1.506	1.52	1.52	0	5162.284	5216.634	5098.02	5147.646	5147.646	0
5%	1.55	1.57	1.53	1.55	1.55	0	5259.65	5320.34	5215.52	5253.67	5253.67	0
95%	2.41	2.43	2.39	2.41	2.41	10787268	7833.12	7871.37	7796.36	7840.5	7840.5	0
99%	2.44	2.46	2.424	2.444	2.444	15485726	7918.056	7961.81	7869.978	7917.75	7917.75	0
99.50%	2.44	2.467	2.437	2.457	2.457	17136080	7926.997	7965.053	7894.042	7937.759	7937.759	0
Maximum	2.45	2.5	2.44	2.46	2.46	22705680	7933	7998.5	7915.46	7958.46	7958.46	0

Table A34: Descriptive statistics for EDP stock price and PSI20 index for 2001

	EDP						PSI20					
	Open	High	Low	Close	EDP_Adj Close	Volume	Open	High	Low	Close	PSI20_Adj Close	Volume
Average	2.939655	2.970268	2.91023	2.940613	2.940613	4370342	8809.643	8863.046	8742.318	8803.475	8803.475	0
Standard Deviation	0.285943	0.287559	0.286568	0.286938	0.286938	3240543	1280.652	1277.122	1278.082	1277.91	1277.91	0
Median	2.93	2.95	2.9	2.93	2.93	3781941	8168.85	8230.07	8090.42	8152.32	8152.32	0
Skewness	0.057856	0.087992	-0.01996	0.024626	0.024626	1.841051	0.332204	0.358643	0.323958	0.352196	0.352196	0
Kurtosis	-0.45255	-0.41683	-0.53605	-0.51228	-0.51228	5.4714	-1.23139	-1.267	-1.21839	-1.24012	-1.24012	0
Extreme values												
Minimum	2.33	2.36	2.29	2.32	2.32	0	6225.99	6568.34	6191.69	6488.01	6488.01	0
0.50%	2.346	2.36	2.316	2.353	2.353	0	6445.317	6675.415	6427.559	6537.897	6537.897	0
1%	2.36	2.36	2.336	2.36	2.36	0	6634.136	6762.312	6452.774	6654.502	6654.502	0
5%	2.46	2.48	2.43	2.47	2.47	0	7229.53	7305.37	7152.51	7255.5	7255.5	0
95%	3.42	3.45	3.38	3.4	3.4	9346132	10972.31	11037.75	10889.75	10986.23	10986.23	0
99%	3.55	3.608	3.514	3.558	3.558	16959300	11143.92	11180.83	11066.93	11128.07	11128.07	0
99.50%	3.585	3.627	3.534	3.57	3.57	18949254	11152.23	11200.02	11100.43	11154.18	11154.18	0
Maximum	3.62	3.64	3.57	3.6	3.6	19974323	11208.7	11228.8	11140.72	11194.37	11194.37	0

Table A35: Descriptive statistics for EDF stock price and CAC40 index for all period (2011-2016)

	EDF						CAC40					
	Open	High	Low	Close	EDF_Adj Close	Volume	Open	High	Low	Close	CAC40_Adj Close	Volume
Average	19.35663	19.50319	19.17174	19.33726	19.33726	75598.66	4128.623	4156.813	4097.489	4128.306	4128.306	124770821
Standard Deviation	4.463281	4.469992	4.4014	4.443861	4.443861	52702.9	587.5141	586.6422	588.7513	588.1726	588.1726	46864561
Median	19.6	19.76	19.48	19.6	19.6	63400	4225.33	4249.53	4182.33	4223.04	4223.04	116978400
Skewness	-0.14635	-0.14448	-0.14596	-0.14216	-0.14216	5.031314	-0.23191	-0.21688	-0.24518	-0.22815	-0.22815	1.4146845
Kurtosis	-1.3502	-1.36055	-1.33238	-1.34683	-1.34683	58.74743	-0.72008	-0.74265	-0.69901	-0.72115	-0.72115	4.5217223
Extreme values												
Minimum	9.97	10.24	9.95	9.97	9.97	6000	2754.82	2823.97	2693.21	2781.68	2781.68	0
0.50%	10.411	10.6044	10.3666	10.411	10.411	12720	2887.387	2922.252	2828.436	2876.015	2876.015	19937794
1%	10.7564	10.9008	10.6144	10.7144	10.7144	16064	2942.771	2988.936	2909.957	2959.396	2959.396	40037328
5%	12.42	12.606	12.334	12.416	12.416	27040	3091	3126.312	3049.992	3084.926	3084.926	66742480
95%	24.988	25.01	24.86	24.998	24.998	164680	5045.34	5078.458	5006.748	5046.03	5046.03	2.14E+08
99%	25.85	26.13	25.6068	25.8268	25.8268	244652	5228.006	5256.108	5186.317	5221.661	5221.661	2.71E+08
99.50%	26.1368	26.319	25.7356	26.1012	26.1012	307956	5271.764	5292.171	5264.561	5271.086	5271.086	3E+08
Maximum	26.53	26.54	26.16	26.5	26.5	964700	5442.1	5442.1	5394.13	5432.4	5432.4	4.16E+08

Table A36: Descriptive statistics for EDF stock price and CAC40 index for 2016

	EDF						CAC40					
	Open	High	Low	Close	EDF_Adj Close	Volume	Open	High	Low	Close	CAC40_Adj Close	Volume
Average	13.88085	14.02178	13.76655	13.88829	13.88829	93403.1	4417.461	4448.627	4384.875	4418.142	4418.142	1.09E+08
Standard Deviation	1.688638	1.682955	1.686487	1.684911	1.684911	46323.59	160.0863	154.4398	168.0024	164.1594	164.1594	38015381
Median	14.18	14.335	14.07	14.14	14.14	84550	4424.425	4455.6	4393.55	4423.68	4423.68	1.05E+08
Skewness	-0.56459	-0.56289	-0.57952	-0.57326	-0.57326	1.179065	0.19815	0.243257	0.19041	0.177986	0.177986	2.649113
Kurtosis	-0.48865	-0.52176	-0.4952	-0.4767	-0.4767	1.69425	1.013	1.142209	1.165832	1.192577	1.192577	16.80814
Extreme values												
Minimum	9.97	10.24	9.95	9.97	9.97	24400	3949.16	3995.06	3892.46	3896.71	3896.71	35125700
0.50%	10.16	10.2857	10.01845	10.1742	10.1742	25412.5	4000.804	4024.827	3930.855	3995.767	3995.767	40964257
1%	10.2056	10.3	10.14	10.2657	10.2657	27200	4052.867	4105.155	3971.924	4016.213	4016.213	41933513
5%	10.6155	10.7925	10.497	10.54	10.54	39485	4126.023	4195.888	4100.303	4123.885	4123.885	62634115
95%	16.11	16.24	15.9935	16.143	16.143	181530	4784.418	4829.662	4780.586	4819.761	4819.761	1.75E+08
99%	16.5886	16.6443	16.4415	16.54	16.54	250843	4861.44	4900.237	4857.2	4889.668	4889.668	2.15E+08
99.50%	16.60715	16.6643	16.4843	16.6115	16.6115	256600	4899.19	4913.242	4877.965	4900.287	4900.287	2.49E+08
Maximum	16.67	16.68	16.6	16.65	16.65	273500	4846.14	4864.29	4840.14	4862.31	4862.31	4.16E+08

Table A37: Descriptive statistics for EDF stock price and CAC40 index for 2015

	EDF						CAC40					
	Open	High	Low	Close	EDF_Adj Close	Volume	Open	High	Low	Close	CAC40_Adj Close	Volume
Average	14.45961	14.60078	14.35306	14.47074	14.47074	74979.84	4831.918	4869.26	4791.395	4831.068	4831.068	1.26E+08
Standard Deviation	1.61369	1.602522	1.609799	1.609088	1.609088	41572.78	249.7116	243.0226	254.2506	250.8438	250.8438	38431586
Median	15.065	15.185	14.945	15.075	15.075	65750	4884.62	4917.83	4847.785	4886.13	4886.13	1.22E+08
Skewness	-0.11457	-0.10281	-0.12366	-0.11424	-0.11424	4.421664	-0.56607	-0.55595	-0.62225	-0.58651	-0.58651	0.797961
Kurtosis	-1.3351	-1.31811	-1.33524	-1.32512	-1.32512	35.99206	-0.15218	-0.18129	-0.06998	-0.11341	-0.11341	4.270036
Extreme values												
Minimum	11.55	11.78	11.41	11.62	11.62	23600	4111.73	4144.95	4076.16	4083.5	4083.5	0
0.50%	11.64845	11.83565	11.56425	11.70995	11.70995	26185.5	4143.077	4180.155	4087.811	4111.75	4111.75	4649433
1%	11.7928	11.9456	11.6513	11.7828	11.7828	26514	4187.913	4262.439	4113.373	4150.544	4150.544	18985333
5%	11.997	12.148	11.85	11.984	11.984	35125	4427.09	4469.086	4362.746	4393.21	4393.21	76345420
95%	16.87	17.023	16.763	16.846	16.846	140590	5186.748	5210.278	5139.495	5188.268	5188.268	1.88E+08
99%	17.2601	17.4643	17.1215	17.2472	17.2472	190638	5240.685	5261.623	5212.472	5246.334	5246.334	2.53E+08
99.50%	17.3715	17.47	17.15715	17.33435	17.33435	239373.5	5250.847	5267.573	5216.442	5254.285	5254.285	2.62E+08
Maximum	17.43	17.52	17.16	17.51	17.51	480500	5256.79	5283.71	5222.4	5268.91	5268.91	3.23E+08

Table A38: Descriptive statistics for EDF stock price and CAC40 index for 2014

	EDF						CAC40					
	Open	High	Low	Close	EDF_Adj Close	Volume	Open	High	Low	Close	CAC40_Adj Close	Volume
Average	18.79283	18.91531	18.62492	18.75647	18.75647	91900.39	4336.461	4359.425	4306.766	4334.586	4334.586	1.18E+08
Standard Deviation	1.455023	1.44174	1.463014	1.458127	1.458127	67763	129.8231	123.9934	139.3539	132.1508	132.1508	37649138
Median	18.76	18.84	18.59	18.725	18.725	70650	4350.965	4376.46	4323.115	4348.475	4348.475	1.12E+08
Skewness	0.318371	0.307926	0.327993	0.32521	0.32521	1.6993	-0.02223	-0.00323	-0.03135	-0.04567	-0.04567	0.773161
Kurtosis	-0.3022	-0.4103	-0.08952	-0.27071	-0.27071	12.91257	-0.11322	-0.37255	0.27264	-0.23061	-0.23061	3.886514
Extreme values												
Minimum	14.44	14.73	13.94	14.37	14.37	22800	3934.19	3987.14	3789.11	3918.62	3918.62	14317600
0.50%	14.83545	15.10685	14.43245	14.90135	14.90135	25923.5	3968.518	4033.157	3919.519	3954.403	3954.403	15508957
1%	15.214	15.457	14.954	15.0484	15.0484	32539	4000.123	4064.087	3930.227	3999.3	3999.3	38200591
5%	16.095	16.1635	15.5995	15.794	15.794	38335	4105.603	4134.449	4065.287	4108.753	4108.753	69648125
95%	20.9045	21.07	20.7445	20.873	20.873	189510	4523.952	4537.042	4508.619	4529.843	4529.843	1.89E+08
99%	21.1215	21.25	20.9086	21.0743	21.0743	438350	4571.827	4584.947	4554.969	4570.814	4570.814	2.41E+08
99.50%	21.1786	21.25715	20.9915	21.08	21.08	448830.5	4580.88	4589.526	4566.893	4586.84	4586.84	2.49E+08
Maximum	21.26	21.37	21.06	21.2	21.2	464300	4589.9	4598.65	4579.06	4595	4595	3.04E+08

Table A39: Descriptive statistics for EDF stock price and CAC40 index for 2013

	EDF						CAC40					
	Open	High	Low	Close	EDF_Adj Close	Volume	Open	High	Low	Close	CAC40_Adj Close	Volume
Average	22.13756	22.29267	21.90442	22.08736	22.08736	79908.53	3951.219	3974.343	3927.655	3952.903	3952.903	94066338
Standard Deviation	2.708225	2.715686	2.672325	2.69719	2.69719	44869.81	210.3848	206.4106	213.3595	211.122	211.122	26176787
Median	21.41	21.655	21.185	21.355	21.355	65750	3949.115	3966.82	3922.645	3946.895	3946.895	91378800
Skewness	0.102604	0.097727	0.11411	0.115606	0.115606	1.725682	0.173563	0.196177	0.176659	0.16565	0.16565	0.717117
Kurtosis	0.528354	0.624951	0.392205	0.565512	0.565512	2.097727	-0.68392	-0.65377	-0.72855	-0.692	-0.692	0.207428
Extreme values												
Minimum	17.96	18.17	17.85	18.02	18.02	10800	3600.16	3636.88	3575.17	3595.63	3595.63	18874800
0.50%	18.01425	18.21285	17.96	18.04285	18.04285	15256	3611.457	3654.147	3586.358	3599.267	3599.267	19092312
1%	22.4158	22.5916	22.1464	22.29	22.29	11206	2990.331	3030.347	2964.602	2996.059	2996.059	54193316
5%	22.51	22.79	22.329	22.51	22.51	18600	3044.071	3065.514	3006.036	3037.67	3037.67	82333980
95%	25.233	25.583	25.205	25.366	25.366	97970	3713.596	3730.158	3696.513	3709.386	3709.386	2.34E+08
99%	25.9126	26.0678	25.6278	25.87	25.87	119114	3767.904	3785.339	3751.001	3770.829	3770.829	2.74E+08
99.50%	25.9797	26.1271	25.7226	25.941	25.941	136845	3783.31	3789.688	3761.809	3780.098	3780.098	2.74E+08
Maximum	26.53	26.54	26.16	26.5	26.5	348800	4303.35	4356.28	4294.39	4320.68	4320.68	1.99E+08

Table A40: Descriptive statistics for EDF stock price and CAC40 index for 2012

	EDF						CAC40					
	Open	High	Low	Close	EDF_Adj Close	Volume	Open	High	Low	Close	CAC40_Adj Close	Volume
Average	24.01753	24.16645	23.77008	24.00027	24.00027	47110.81	3348.316	3373.126	3321.807	3348.55	3348.55	1.57E+08
Standard Deviation	0.792346	0.75232	0.800836	0.783324	0.783324	23606.03	178.1989	173.6502	182.6917	179.3567	179.3567	43709366
Median	24.25	24.4	24	24.22	24.22	41300	3399.37	3427.42	3374.1	3401.56	3401.56	1.52E+08
Skewness	-1.19221	-1.21724	-1.06324	-1.10521	-1.10521	1.291644	-0.33243	-0.37598	-0.31082	-0.34797	-0.34797	0.477329
Kurtosis	1.064927	1.09033	0.544441	0.712668	0.712668	2.332998	-0.84375	-0.82039	-0.88075	-0.84877	-0.84877	0.275887
Extreme values												
Minimum	20.76	20.99	20.76	20.88	20.88	7200	2928.91	2987.15	2922.26	2950.47	2950.47	49791000
0.50%	21.4018	21.7634	21.2941	21.7112	21.7112	8058	2974.79	3006.602	2935.71	2963.657	2963.657	53256094
1%	22.0524	22.3258	21.8866	22.115	22.115	10114	2990.331	3030.347	2964.602	2996.059	2996.059	70329168
5%	22.497	22.689	22.279	22.46	22.46	18600	3044.071	3065.514	3006.036	3037.67	3037.67	91600180
95%	24.911	24.98	24.7	24.9	24.9	95160	3643.972	3653.311	3618.67	3643.145	3643.145	2.34E+08
99%	24.9826	25.08	24.8868	25.0384	25.0384	119114	3692.254	3728.717	3670.741	3711.583	3711.583	2.74E+08
99.50%	25.0584	25.0971	24.9855	25.0871	25.0871	136845	3721.116	3732.241	3696.531	3727.453	3727.453	2.74E+08
Maximum	24.97	25.08	24.95	25.05	25.05	146000	3677	3684.16	3652.08	3674.26	3674.26	2.87E+08

Table A41: Descriptive statistics for EDF stock price and CAC40 index for 2011

	EDF						CAC40					
	Open	High	Low	Close	EDF_Adj Close	Volume	Open	High	Low	Close	CAC40_Adj Close	Volume
Average	23.9919	24.1755	23.71035	23.94519	23.94519	60219.77	3591.083	3623.365	3553.832	3588.883	3588.883	1.56E+08
Standard Deviation	0.944686	0.894694	1.045377	0.985676	0.985676	65794.13	443.8677	434.1927	454.2521	443.5958	443.5958	57485014
Median	24.35	24.48	24.055	24.305	24.305	48450	3809.01	3844.255	3774.81	3803.56	3803.56	1.46E+08
Skewness	-1.09114	-1.26524	-0.93469	-1.09016	-1.09016	10.45483	-0.34021	-0.34226	-0.32703	-0.32721	-0.32721	1.486089
Kurtosis	6.209729	17.62481	13.95259	19.78867	19.78867	18.50061	-1.20703	-1.0092	-1.03997	-0.29696	-0.29696	-0.64213
Extreme values												
Minimum	20.65	20.99	20.54	20.7	20.7	6000	2754.82	2823.97	2693.21	2781.68	2781.68	40091200
0.50%	20.8455	21.057	20.6057	20.7799	20.7799	10281.5	2821.835	2865.963	2758.03	2813.57	2813.57	46062619
1%	21.1398	21.2513	20.6656	20.994	20.994	16381	2832.791	2874.237	2770.671	2822.353	2822.353	50685094
5%	22.301	22.454	21.7965	22.21	22.21	23065	2920.816	2977.674	2890.471	2939.373	2939.373	75692940
95%	25.0015	25.033	25	25	25	110710	4085.483	4109.534	4053.871	4095.362	4095.362	2.55E+08
99%	25.0343	25.0943	25	25.0429	25.0429	194214	4144.351	4163.677	4114.227	4127.941	4127.941	3.83E+08
99.50%	25.0543	25.20725	25	25.06715	25.06715	255438.5	4158.591	4167.265	4127.259	4152.011	4152.011	4.02E+08
Maximum	25.07	26	25	25.1	25.1	964700	4164.65	4169.87	4136.17	4157.14	4157.14	4.09E+08

Table A42: Descriptive statistics for Iberdrola stock price and IBEX35 index for all period (2001-2016)

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	5.523893	5.57481	5.463934	87.37542	5.519556	30145656	9718.131	9793.772	9629.523	9715.917	9715.917	1.03E+08
Standard Deviation	1.816517	1.835991	1.793603	79.12075	1.813287	28767753	2161.35	2165.3	2156.002	2161.947	2161.947	1.36E+08
Median	5.443	5.499	5.38	51.48	5.44	23850580	9476.4	9541.9	9387.7	9469.5	9469.5	276000
Skewness	1.145805	1.162633	1.134021	1.205737	1.149059	5.139879	0.684676	0.6863	0.685293	0.684469	0.684469	0.954433
Kurtosis	1.130456	1.16246	1.117657	1.052185	1.142395	47.43757	0.25714	0.252226	0.265617	0.25925	0.25925	-0.0642
Extreme values												
Minimum	2.671	2.74	2.63	5.388	2.654	0	5294.8	5462.6	5266.9	5364.5	5364.5	0
0.50%	3.0464	3.093	2.9875	5.718	3.0457	0	5751.024	5847.282	5708.304	5764.026	5764.026	52392
1%	3.1182	3.165	3.05	5.83256	3.1014	0	5913.956	6004.924	5829.272	5942.876	5942.876	65280
5%	3.4	3.461	3.3466	6.09	3.4081	5084494	6502.92	6589.58	6421.7	6494.86	6494.86	91400
95%	9.745	9.84	9.582	266.448	9.7295	74693792	14388.66	14457.2	14311.84	14379.48	14379.48	3.45E+08
99%	10.9216	11.0108	10.8179	329.6576	10.9402	1.35E+08	15340.34	15442.62	15260.5	15325.2	15325.2	4.56E+08
99.50%	11.2379	11.34	11.10895	335.9104	11.2402	1.83E+08	15665.32	15803.33	15614.66	15723.34	15723.34	4.97E+08
Maximum	11.9	12.03	11.86	361.6	11.9	4.38E+08	15999.2	16040.4	15868.6	15945.7	15945.7	7.89E+08

Table A43: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2016

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	6.003907	6.052922	5.955821	6.156112	6.005665	25792125	8726.36	8795.054	8644.713	8719.456	8719.456	2.81E+08
Standard Deviation	0.205349	0.187187	0.198792	1.057966	0.190272	14705998	323.3281	315.4739	340.8255	338.1351	338.1351	92720251
Median	6.009	6.052	5.966	6.011	6.011	22284023	8714.5	8787	8643.6	8716.4	8716.4	2.73E+08
Skewness	-0.63621	0.201989	-0.78323	6.070283	-0.02985	1.956548	-0.19997	-0.21388	-0.33239	-0.35085	-0.35085	1.017269
Kurtosis	4.371308	0.55875	4.075136	36.32991	0.594348	6.696759	0.075639	0.067505	0.335253	0.429429	0.429429	3.098934
Extreme values												
Minimum	4.808	5.58	4.8	5.388	5.388	4444650	7836.8	7916.9	7579.8	7645.5	7645.5	81080100
0.50%	5.4578	5.62284	5.42808	5.55148	5.55148	5695042	7840.468	7917.992	7744.212	7757.892	7757.892	1.01E+08
1%	5.55724	5.63788	5.53384	5.58324	5.58324	5734716	7925.892	7987.608	7760.244	7814.188	7814.188	1.09E+08
5%	5.6618	5.732	5.6068	5.665	5.665	9983686	8147.16	8248.4	8039.1	8135.42	8135.42	1.5E+08
95%	6.3142	6.382	6.2824	6.3242	6.3242	54343110	9306.74	9352.1	9271	9332.8	9332.8	4.57E+08
99%	6.50968	6.53908	6.40364	12.87616	6.47508	70006311	9380.276	9476.792	9376.248	9434.844	9434.844	5.67E+08
99.50%	6.54216	6.54804	6.41564	12.9192	6.49516	83128233	9417.172	9532.1	9434.684	9492.88	9492.88	5.81E+08
Maximum	6.56	6.597	6.428	12.986	6.52	1.17E+08	9431.5	9452.9	9346.9	9412.8	9412.8	7.68E+08

Table A44: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2015

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	6.151461	6.202605	6.099184	12.30584	6.152922	31135038	10671.6	10750.33	10572.51	10661.21	10661.21	2.88E+08
Standard Deviation	0.268471	0.2628	0.270862	0.535506	0.267753	15059176	638.7832	632.9285	647.8895	648.9475	648.9475	85545993
Median	6.1265	6.18	6.0765	12.265	6.1325	27824465	10645.2	10745.6	10530.25	10692.8	10692.8	2.78E+08
Skewness	-0.22115	-0.20985	-0.23437	-0.24377	-0.24377	1.167413	-0.13017	-0.13673	-0.13612	-0.16291	-0.16291	1.566822
Kurtosis	-0.40335	-0.34395	-0.36488	-0.39309	-0.39309	1.71514	-1.1697	-1.17941	-1.1661	-1.13558	-1.13558	5.896319
Extreme values												
Minimum	5.469	5.51	5.35	10.932	5.466	4355402	9280.4	9456.3	9231.3	9291.4	9291.4	70619000
0.50%	5.493275	5.54365	5.4333	10.94985	5.474925	7399544	9446.29	9521.495	9288.435	9373.527	9373.527	95863008
1%	5.4973	5.5612	5.4431	10.9765	5.48825	8998082	9473.965	9550.1	9354.88	9394.065	9394.065	1.4E+08
5%	5.72475	5.78225	5.65775	11.507	5.7535	12839283	9650.3	9703.75	9522.125	9594.525	9594.525	1.85E+08
95%	6.55025	6.59875	6.4995	13.107	6.5535	59137497	11567.1	11626.2	11479.3	11575.4	11575.4	4.44E+08
99%	6.6246	6.6823	6.5795	13.2294	6.6147	83021370	11758.18	11794.92	11673.75	11741.21	11741.21	5.85E+08
99.50%	6.635525	6.69435	6.597325	13.25485	6.627425	87292461	11769.38	11849.67	11701.82	11770.4	11770.4	6.32E+08
Maximum	6.66	6.705	6.609	13.332	6.666	89076673	11798.5	11884.6	11760.8	11866.4	11866.4	7.89E+08

Table A45: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2014

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	5.258537	5.29418	5.220729	10.52044	5.26022	39916913	10461.15	10533.29	10367.2	10455.78	10455.78	2.74E+08
Standard Deviation	0.383806	0.383679	0.379785	0.761147	0.380574	40522854	353.1084	341.483	368.8154	352.9368	352.9368	88951391
Median	5.399	5.432	5.361	10.802	5.401	30939750	10440	10501.8	10342.5	10432.9	10432.9	2.64E+08
Skewness	-0.48498	-0.47468	-0.4961	-0.49998	-0.49998	5.606495	0.104883	0.144019	0.086632	0.124538	0.124538	1.171296
Kurtosis	-1.00532	-1.00331	-0.9636	-0.95993	-0.95993	40.0687	-0.74888	-0.79289	-0.66197	-0.72343	-0.72343	4.062623
Extreme values												
Minimum	4.475	4.504	4.455	8.948	4.474	8042962	9684.7	9814.2	9370.5	9669.7	9669.7	45207600
0.50%	4.48759	4.54435	4.46451	9.00496	4.50248	11226179	9730.938	9832.098	9652.099	9733.203	9733.203	90098260
1%	4.5216	4.56258	4.48804	9.0454	4.5227	12875083	9759.204	9879.836	9658.148	9756.514	9756.514	1.14E+08
5%	4.5824	4.6222	4.5314	9.1486	4.5743	15716747	9898.39	9989.23	9772.35	9893.89	9893.89	1.57E+08
95%	5.7202	5.7696	5.666	11.4448	5.7224	79504027	11079.81	11131.85	11006.36	11078.98	11078.98	4.22E+08
99%	5.90168	5.933	5.85944	11.81076	5.90538	2.32E+08	11160.7	11189.86	11094.68	11154.24	11154.24	5.22E+08
99.50%	5.92425	5.94687	5.88379	11.86364	5.93182	2.67E+08	11171.8	11209.32	11129.91	11161.67	11161.67	5.55E+08
Maximum	5.933	5.969	5.921	11.892	5.946	4.21E+08	11192.4	11249.4	11158.8	11187.8	11187.8	7.87E+08

Table A46: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2013

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	4.167969	4.208137	4.126094	20.15585	4.1702	39912029	8681.772	8747.905	8611.188	8686.247	8686.247	2.33E+08
Standard Deviation	0.282926	0.277985	0.288564	11.67881	0.286435	39315116	649.4587	645.7378	657.1582	655.0882	655.0882	73909075
Median	4.157	4.199	4.112	9.496	4.156	30316558	8508.1	8577.7	8434.9	8515.2	8515.2	2.29E+08
Skewness	0.222746	0.261605	0.200048	0.054803	0.186594	4.950802	0.609779	0.628809	0.57709	0.578931	0.578931	1.048434
Kurtosis	-0.49247	-0.48556	-0.41825	-0.40137	-0.40137	42.36727	-0.82599	-0.89017	-0.74575	-0.80938	-0.80938	5.197434
Extreme values												
Minimum	3.617	3.66	3.583	7.634	3.602	8377378	7636.6	7674.6	7508.4	7553.2	7553.2	0
0.50%	3.6257	3.68124	3.60227	7.69324	3.61913	9024241	7655.747	7744.466	7583.298	7632.675	7632.675	80045827
1%	3.6411	3.69216	3.60354	7.70632	3.63408	10073173	7725.948	7812.396	7601.714	7733.95	7733.95	83742550
5%	3.7167	3.783	3.6747	7.9378	3.7147	14596550	7855.77	7934.85	7771.34	7837.98	7837.98	1.42E+08
95%	4.691	4.7193	4.6493	33.8368	4.6895	89070225	9844.47	9915.97	9784.53	9844.75	9844.75	3.61E+08
99%	4.72784	4.7523	4.68792	34.10688	4.72192	2.83E+08	9952.902	10013.32	9897.248	9956.548	9956.548	4.63E+08
99.50%	4.73949	4.7769	4.69411	34.28696	4.72811	3.09E+08	10003.59	10047.07	9952.365	10009.9	10009.9	4.89E+08
Maximum	4.75	4.79	4.7	34.544	4.748	3.17E+08	10022.3	10063.9	9992.9	10037.8	10037.8	5.98E+08

Table A47: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2012

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	3.818605	3.872527	3.756535	30.51444	3.814305	49076496	7622.723	7699.463	7532.846	7619.504	7619.504	2.24E+08
Standard Deviation	0.537381	0.526792	0.54588	4.293625	0.536703	48738005	752.6109	732.1169	766.6361	750.8537	750.8537	80327219
Median	3.7705	3.838	3.744	30.284	3.7855	33955808	7768.35	7847.65	7697.65	7781.65	7781.65	2.15E+08
Skewness	0.146674	0.167708	0.12595	0.137906	0.137906	4.123993	-0.25583	-0.23918	-0.26877	-0.26151	-0.26151	1.026681
Kurtosis	-0.95257	-0.94384	-0.9436	-0.931	-0.931	23.28807	-1.00181	-1.01514	-1.02517	-1.00098	-1.00098	2.335603
Extreme values												
Minimum	2.671	2.74	2.63	21.232	2.654	10552084	5950.4	6093.1	5905.3	5956.3	5956.3	71586400
0.50%	2.701725	2.8465	2.6511	21.43	2.67875	11727243	5969.393	6156.88	5942.535	6021.427	6021.427	84789495
1%	2.7916	2.8955	2.66445	22.204	2.7755	12063231	6059.84	6207.83	5953.11	6078.64	6078.64	92252260
5%	3.05875	3.09975	3.0095	24.408	3.051	16504586	6402.375	6586.6	6291.125	6414.475	6414.475	1.11E+08
95%	4.6805	4.707	4.622	37.332	4.6665	1.18E+08	8724.65	8754.475	8632.225	8725.95	8725.95	3.74E+08
99%	4.71395	4.75585	4.6712	37.7168	4.7146	2.67E+08	8853.625	8872.905	8760.595	8847.98	8847.98	4.41E+08
99.50%	4.72145	4.770975	4.68725	37.8574	4.732175	3.25E+08	8858.493	8911.14	8822.515	8857.928	8857.928	4.9E+08
Maximum	4.847	4.984	4.815	39.704	4.963	4.38E+08	8879	8967.4	8868.2	8902.1	8902.1	6.2E+08

Table A48: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2011

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	5.606019	5.671669	5.529514	44.82089	5.602611	39287252	9570.119	9665.458	9455.09	9564.452	9564.452	2.32E+08
Standard Deviation	0.582617	0.571582	0.598233	4.681511	0.585189	19814731	1030.226	1015.78	1049.329	1031.518	1031.518	82060640
Median	5.81	5.915	5.694	46.32	5.79	35387776	9867.4	9930.3	9756.9	9866.2	9866.2	2.18E+08
Skewness	-0.29134	-0.28466	-0.26711	-0.27692	-0.27692	2.049876	-0.18624	-0.18908	-0.18669	-0.18381	-0.18381	1.097943
Kurtosis	-1.46049	-1.46886	-1.48804	-1.47365	-1.47365	5.753567	-1.53567	-1.53889	-1.53749	-1.54035	-1.54035	1.953573
Extreme values												
Minimum	4.486	4.512	4.285	35.344	4.418	12734647	7732.3	7778.8	7505.3	7640.7	7640.7	0
0.50%	4.49208	4.5692	4.38268	36.40896	4.55112	13240403	7772.836	7859.412	7622.704	7752.852	7752.852	77743480
1%	4.528	4.6428	4.48372	36.4768	4.5596	14401240	8084.9	8253.8	7901.08	8062.34	8062.34	1.33E+08
5%	4.713	4.7956	4.6522	37.744	4.718	19063444	10879.48	10941.78	10779.18	10862.12	10862.12	4.12E+08
95%	6.3202	6.3788	6.2576	50.5856	6.3232	76828402	11024.04	11070.71	10913.65	11026.74	11026.74	4.94E+08
99%	6.40804	6.45408	6.34936	51.21984	6.40248	1.15E+08	11054.27	11133.07	10948.79	11062.42	11062.42	5.11E+08
99.50%	6.43244	6.48352	6.38664	51.52896	6.44112	1.29E+08	0	0	0	0	0	0
Maximum	6.461	6.495	6.402	51.792	6.474	1.37E+08	11137.6	11165	10999	11113	11113	5.18E+08

Table A49: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2010

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	5.764754	5.815312	5.687781	46.00784	5.75098	26226036	10433.82	10536.83	10296.88	10421.52	10421.52	76767809
Standard Deviation	0.448168	0.439563	0.464234	3.604683	0.450585	14374201	705.2699	675.181	722.0544	695.9456	695.9456	1.11E+08
Median	5.715	5.776	5.646	45.884	5.7355	24862005	10441.4	10543.95	10298.9	10431.5	10431.5	280200
Skewness	0.157888	0.14411	0.130587	0.08748	0.08748	0.895461	0.110476	0.165447	0.078715	0.109665	0.109665	1.110427
Kurtosis	-0.35079	-0.3718	-0.44937	-0.35839	-0.35839	1.686994	0.145419	0.211709	0.112162	0.173884	0.173884	0.048634
Extreme values												
Minimum	4.535	4.702	4.501	37.056	4.632	228098	8725.9	8868.7	8563.6	8669.8	8669.8	95600
0.50%	4.7077	4.74275	4.590275	37.1902	4.648775	338851.4	8812.585	8909.168	8625.285	8815.485	8815.485	106675
1%	4.7401	4.82205	4.65725	37.6244	4.70305	482651.7	8855.56	8998.24	8690.565	8898.785	8898.785	108830
5%	5.095	5.15725	4.99325	40.582	5.07275	2606061	9227.075	9402.275	9041.325	9267.8	9267.8	147700
95%	6.54125	6.5865	6.47425	52.018	6.50225	53172720	11791.45	11816.02	11505.78	11569.88	11569.88	2.85E+08
99%	6.7245	6.74565	6.6636	53.6428	6.70535	73195148	12176.28	12231.38	12079.46	12164.48	12164.48	3.81E+08
99.50%	6.73	6.76225	6.6854	53.8378	6.729725	76964775	12209.83	12233.43	12123.33	12193.92	12193.92	3.86E+08
Maximum	6.752	6.779	6.706	53.904	6.738	77372050	12218	12240.5	12147.6	12222.5	12222.5	4.5E+08

Table A50: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2009

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	6.033795	6.072437	5.963634	48.0497	6.006213	18859961	9980.798	10077.27	9878.785	9986.176	9986.176	222466.1
Standard Deviation	0.462227	0.456558	0.473204	3.737073	0.467134	15133559	1515.922	1512.453	1530.277	1518.982	1518.982	59765.01
Median	6.06	6.1125	6.015	48.4	6.05	20997090	9682.1	9732.4	9611.85	9677.05	9677.05	216800
Skewness	-0.6648	-0.64412	-0.66478	-0.65402	-0.65402	0.437793	-0.15553	-0.15983	-0.1643	-0.16967	-0.16967	0.455348
Kurtosis	0.330193	0.308562	0.353384	0.316661	0.316661	-0.45957	-1.31065	-1.3188	-1.31081	-1.30811	-1.30811	0.144793
Extreme values												
Minimum	4.6	4.62	4.36	35.68	4.46	0	6808.1	6970	6702.6	6817.4	6817.4	92200
0.50%	4.63385	4.7106	4.5759	37.1412	4.64265	117041.6	6990.972	7104.422	6801.274	6960.485	6960.485	98224
1%	4.7	4.793	4.6306	37.3272	4.6659	171564.8	7104.777	7229.461	6949.709	7093.422	7093.422	101520
5%	5.243	5.326	5.193	41.808	5.226	628017.7	7593.04	7688.09	7519.58	7579.855	7579.855	132190
95%	6.71675	6.74175	6.63	53.416	6.677	44810549	11936.83	11980.98	11812.45	11896.1	11896.1	328580
99%	6.80115	6.8647	6.7447	54.348	6.7935	55560137	12016.07	12060.5	11956.21	12027.43	12027.43	366182
99.50%	6.850725	6.881025	6.8088	54.6188	6.82735	62342562	12025.75	12069.34	11992.92	12033.82	12033.82	401200
Maximum	6.87	6.91	6.83	54.64	6.83	67966590	12034.7	12102.6	11999.3	12035.1	12035.1	418000

Table A51: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2008

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	8.329843	8.445748	8.161614	66.27874	8.284843	33195381	11903.1	12024.97	11735.27	11880.57	11880.57	274005.5
Standard Deviation	1.62959	1.656618	1.62336	13.20424	1.65053	21728097	1817.715	1799.79	1843.68	1817.244	1817.244	87713.78
Median	8.58	8.685	8.375	68.12	8.515	30570475	12019.15	12063.2	11864.75	12023	12023	264400
Skewness	-0.49393	-0.50235	-0.48985	-0.50837	-0.50837	1.103531	-0.54737	-0.56564	-0.54646	-0.55405	-0.55405	1.198738
Kurtosis	-1.00826	-1.00493	-1.0203	-1.01224	-1.01224	1.783298	-0.80191	-0.79133	-0.80513	-0.81442	-0.81442	3.096559
Extreme values												
Minimum	5.05	5.05	4.85	39.92	4.99	167046	7977	8072.8	7737.2	7905.4	7905.4	96200
0.50%	5.13385	5.19325	4.93385	40.2968	5.0371	545899.1	8013.655	8201.03	7822.962	7978.11	7978.11	101503
1%	5.2159	5.2353	5.0742	41.12	5.14	579390.7	8121.624	8242.726	7847.595	7999.795	7999.795	111544
5%	5.5725	5.6795	5.38	43.7	5.4625	2112540	8692.235	8832.075	8422.255	8652.7	8652.7	149790
95%	10.4	10.53	10.25	82.988	10.3735	77906044	14146.63	14196.27	14014.28	14091.78	14091.78	424760
99%	10.6747	10.8	10.4599	85.0352	10.6294	99979546	14748.19	14836.2	14595.77	14668.65	14668.65	548208
99.50%	10.68735	10.8294	10.57205	85.2376	10.6547	1.1E+08	14920.57	14976.84	14743.34	14807.21	14807.21	584528
Maximum	10.79	10.85	10.6	85.6	10.7	1.18E+08	15101.9	15186	14971.4	15002.5	15002.5	708000

Table A52: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2007

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	9.850353	9.947392	9.750461	254.8179	9.851	42777466	14820.6	14906.63	14725.61	14823.77	14823.77	222723.9
Standard Deviation	1.051001	1.068401	1.036814	93.93696	1.052338	28008336	517.1351	513.5623	518.6244	516.3671	516.3671	57487.19
Median	10.08	10.2125	9.995	289.12	10.075	34345988	14792.5	14880.7	14712.2	14816.5	14816.5	213200
Skewness	-0.19684	-0.21816	-0.18995	-1.05426	-0.21413	2.276494	0.217281	0.29413	0.135502	0.225166	0.225166	0.513117
Kurtosis	-1.05779	-1.05215	-1.05889	-0.54738	-1.04356	7.850026	-0.42856	-0.44931	-0.45713	-0.42405	-0.42405	0.507938
Extreme values												
Minimum	8.0025	8.055	7.8975	83.2	7.9825	0	13594.6	13794.2	13519.1	13602.4	13602.4	55200
0.50%	8.01195	8.079575	7.9531	83.628	8.01925	0	13698.17	13824.36	13596.71	13704.84	13704.84	90532
1%	8.04425	8.1379	7.9885	83.92	8.05505	3800280	13750.88	13845.91	13630.75	13738.61	13738.61	100836
5%	8.1485	8.19125	8.08175	86.088	8.13025	16911013	13987.15	14157.26	13837.51	13980.19	13980.19	145900
95%	11.45	11.515	11.343	342.84	11.406	99544544	15762.76	15865.12	15669.95	15788.41	15788.41	327520
99%	11.6492	11.826	11.5646	357.0384	11.6984	1.44E+08	15916.94	15967.32	15756.64	15890.5	15890.5	381164
99.50%	11.7695	11.9384	11.6284	360.2864	11.8368	1.52E+08	15924.15	15979.35	15768.48	15894.08	15894.08	386066
Maximum	11.9	12.03	11.86	361.6	11.9	2.18E+08	15999.2	16040.4	15868.6	15945.7	15945.7	406800

Table A53: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2006

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	7.101602	7.164629	7.039902	227.4359	7.107373	30265215	12144.67	12202.03	12087.69	12156.31	12156.31	162663.3
Standard Deviation	1.033041	1.039996	1.019233	32.86725	1.027101	34484547	1061.125	1065.089	1059.515	1064.25	1064.25	47570.5
Median	6.705	6.74875	6.62625	214.44	6.70125	21943482	11855.8	11898	11804.7	11862.75	11862.75	158500
Skewness	0.624402	0.613627	0.626484	0.619185	0.619185	7.302663	0.808374	0.811532	0.803948	0.804147	0.804147	0.355364
Kurtosis	-0.8996	-0.90944	-0.92446	-0.91027	-0.91027	75.16053	-0.58689	-0.60976	-0.599	-0.61094	-0.61094	0.415333
Extreme values												
Minimum	5.625	5.635	5.585	179.92	5.6225	0	10642.9	10723.3	10611.1	10665.6	10665.6	0
0.50%	5.633	5.68525	5.62275	181.31	5.665938	0	10708.2	10742.6	10653.39	10709.23	10709.23	66280
1%	5.65575	5.698	5.641	181.732	5.679125	3003524	10722.74	10760.69	10683.11	10724.14	10724.14	74730
5%	5.714375	5.746875	5.681875	183.22	5.725625	9880434	10859.47	10908.2	10814.97	10865.43	10865.43	90400
95%	8.995	9.035625	8.93	287.7	8.990625	72408600	14173.02	14217.6	14116.75	14182.45	14182.45	257100
99%	9.07375	9.105625	8.99975	289.6	9.05	1.25E+08	14331.22	14355.37	14271.75	14322	14322	283160
99.50%	9.295938	9.33725	9.0025	291.34	9.104375	2.1E+08	14363.42	14386.39	14299.37	14345.19	14345.19	288095
Maximum	9.405	9.6675	9.3	305.28	9.54	4.3E+08	14388.7	14420.8	14319.8	14387.6	14387.6	295400

Table A54: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2005

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	5.265587	5.297221	5.230279	168.5957	5.268615	26818566	5.265587	5.265587	5.265587	5.265587	5.265587	5.265587
Standard Deviation	0.320018	0.324034	0.316337	10.19362	0.318551	25755038	0.320018	0.320018	0.320018	0.320018	0.320018	0.320018
Median	5.2675	5.2975	5.22625	168.52	5.26625	18714838	5.2675	5.2675	5.2675	5.2675	5.2675	5.2675
Skewness	-0.21739	-0.19252	-0.1862	-0.19288	-0.19288	3.301422	-0.21739	-0.21739	-0.21739	-0.21739	-0.21739	-0.21739
Kurtosis	-0.67148	-0.6566	-0.70167	-0.67976	-0.67976	14.23863	-0.67148	-0.67148	-0.67148	-0.67148	-0.67148	-0.67148
Extreme values												
Minimum	4.5875	4.6	4.565	147.2	4.6	0	4.5875	4.5875	4.5875	4.5875	4.5875	4.5875
0.50%	4.6	4.623975	4.5825	147.2236	4.600738	0	4.6	4.6	4.6	4.6	4.6	4.6
1%	4.601475	4.628975	4.58545	147.3272	4.603975	0	4.601475	4.601475	4.601475	4.601475	4.601475	4.601475
5%	4.64475	4.6825	4.63	149.272	4.66475	9233055	4.64475	4.64475	4.64475	4.64475	4.64475	4.64475
95%	5.748875	5.815375	5.73275	184.724	5.772625	83605310	5.748875	5.748875	5.748875	5.748875	5.748875	5.748875
99%	5.84705	5.880575	5.79705	187.1136	5.8473	1.39E+08	5.84705	5.84705	5.84705	5.84705	5.84705	5.84705
99.50%	5.858813	5.911438	5.815863	188.0184	5.875575	1.74E+08	5.858813	5.858813	5.858813	5.858813	5.858813	5.858813
Maximum	5.89	5.9475	5.875	189.52	5.9225	1.92E+08	5.89	5.89	5.89	5.89	5.89	5.89

Table A55: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2004

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	4.209303	4.233578	4.184971	134.8116	4.212863	24398505	8170.006	8208.629	8131.418	8173.81	8173.81	131618.3
Standard Deviation	0.171441	0.169179	0.174031	5.494295	0.171697	21583192	329.427	327.8455	336.9448	333.1396	333.1396	39388.99
Median	4.2125	4.2375	4.18375	134.72	4.21	17813112	8087.8	8128.9	8059.45	8099.6	8099.6	126000
Skewness	0.107821	0.102838	0.160479	0.141271	0.14127	2.932571	0.891523	0.878305	0.878062	0.866021	0.866021	0.960116
Kurtosis	0.808936	0.877493	0.808241	0.834274	0.834273	11.61878	0.437968	0.375692	0.428497	0.389895	0.389895	1.898955
Extreme values												
Minimum	3.815	3.84	3.7875	122.08	3.815	0	7567.1	7594.2	7538.7	7578.3	7578.3	44200
0.50%	3.824363	3.848263	3.791525	122.3064	3.822075	0	7577.623	7612.927	7540.591	7587.267	7587.267	50352
1%	3.841525	3.8622	3.8011	122.9328	3.84165	0	7614.715	7667.8	7559.235	7617.765	7617.765	55166
5%	3.87525	3.8975	3.8525	124.084	3.877625	6687269	7746.15	7810.34	7682.075	7728.135	7728.135	79400
95%	4.54275	4.568625	4.5045	145.56	4.54875	68613216	8865.205	8910.35	8833.19	8870.94	8870.94	198900
99%	4.661275	4.67945	4.650975	149.5512	4.673475	1.22E+08	9064.903	9086.304	9052.364	9078.543	9078.543	249672
99.50%	4.680213	4.694663	4.6664	149.6	4.675	1.26E+08	9100.063	9113.279	9075.401	9080.8	9080.8	261913
Maximum	4.69	4.7075	4.675	150	4.6875	1.63E+08	9105.4	9118.8	9080.8	9100.7	9100.7	306000

Table A56: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2003

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	3.678285	3.706695	3.648017	117.7416	3.679425	25371121	6718.065	6770.821	6665.932	6722.133	6722.133	123514.2
Standard Deviation	0.133094	0.125999	0.13383	4.035657	0.126114	24347334	503.4435	491.7594	516.1035	506.3667	506.3667	32113.67
Median	3.695	3.72	3.66	118.24	3.695	17992196	6855.7	6902.6	6812.8	6862.4	6862.4	121000
Skewness	-0.61234	-0.54989	-0.62494	-0.51384	-0.51384	2.386788	-0.29174	-0.29108	-0.28627	-0.28427	-0.28427	0.445699
Kurtosis	0.344316	0.165499	0.409984	0.114209	0.11421	6.003738	-0.77037	-0.72481	-0.77063	-0.71592	-0.71592	0.230861
Extreme values												
Minimum	3.255	3.3375	3.215	106.4	3.325	0	5509.9	5637.5	5447.7	5452.4	5452.4	49600
0.50%	3.3165	3.33975	3.2625	106.8	3.3375	0	5604.4	5658.87	5517.07	5580.5	5580.5	53780
1%	3.3305	3.36	3.289	106.944	3.342	0	5685.2	5721.88	5555.44	5644.98	5644.98	61200
5%	3.4125	3.475	3.37	110.08	3.44	5932800	5871.3	5909.5	5793.7	5870.5	5870.5	76200
95%	3.8725	3.9	3.855	123.92	3.8725	84528120	7433.9	7477.8	7404.5	7434.4	7434.4	175400
99%	3.9075	3.9275	3.903	125.024	3.907	1.21E+08	7660.26	7722.86	7653.76	7712.78	7712.78	209800
99.50%	3.91675	3.938	3.91275	125.36	3.9175	1.23E+08	7768.99	7801.32	7718.7	7737.2	7737.2	211240
Maximum	3.995	3.995	3.9175	126.16	3.9425	1.42E+08	7801.6	7818	7731	7760.4	7760.4	236000

Table A57: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2002

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	3.448439	3.481494	3.407634	110.274	3.446063	18672471	7092.351	7167.711	7002.701	7080.797	7080.797	116152.1
Standard Deviation	0.246908	0.239203	0.255161	7.896552	0.246767	29512642	948.3176	938.4653	958.4608	952.0669	952.0669	30605.45
Median	3.4575	3.485	3.43	110.4	3.45	11318076	6800	6933	6729.2	6773.6	6773.6	114100
Skewness	-0.00497	-0.00769	-0.05347	-0.02468	-0.02468	5.945499	-0.03585	-0.02538	-0.01364	-0.01591	-0.01591	0.764844
Kurtosis	-1.25873	-1.22454	-1.20776	-1.22272	-1.22272	48.31499	-1.52899	-1.54149	-1.5486	-1.54688	-1.54688	1.657377
Extreme values												
Minimum	2.9375	2.9725	2.8525	93.44	2.92	0	5294.8	5462.6	5266.9	5364.5	5364.5	42600
0.50%	2.972	3	2.89275	94.984	2.96825	0	5350.8	5486.98	5296.86	5375.29	5375.29	53140
1%	2.993	3.03	2.917	95.616	2.988	0	5456.04	5507.22	5316.76	5415.38	5415.38	60240
5%	3.07	3.1275	3.0075	97.6	3.05	0	5641.7	5716.8	5520.3	5630.6	5630.6	73600
95%	3.815	3.84	3.78	122	3.8125	70083920	8364.6	8413.5	8299	8356.9	8356.9	170400
99%	3.844	3.882	3.8135	122.928	3.8415	1.39E+08	8435.74	8511.6	8393.76	8437.48	8437.48	197160
99.50%	3.857	3.899	3.815	123.176	3.84925	1.57E+08	8455.27	8558.97	8405.44	8468.84	8468.84	198100
Maximum	3.9075	3.91	3.8175	124.4	3.8875	3.23E+08	8554.7	8608.5	8416.3	8554.7	8554.7	262600

Table A58: Descriptive statistics for Iberdrola stock price and IBEX35 index for 2001

	Iberdrola						IBEX35					
	Open	High	Low	Close	Ibdr_Adj Close	Volume	Open	High	Low	Close	IBEX35_ Adj Close	Volume
Average	3.807557	3.850096	3.764157	121.8918	3.809119	14858400	8818.321	8906.794	8714.945	8819.31	8819.31	4370798
Standard Deviation	0.218936	0.219911	0.220163	7.029222	0.219663	16028750	850.1059	842.2541	864.4252	849.4397	849.4397	4839385
Median	3.7775	3.8125	3.7325	120.8	3.775	11342128	8849.8	8893.7	8758.4	8825.5	8825.5	153200
Skewness	0.374103	0.412131	0.368169	0.398628	0.398628	5.376191	-0.42266	-0.42254	-0.47118	-0.41689	-0.41689	0.482509
Kurtosis	-0.69302	-0.79097	-0.72963	-0.76745	-0.76745	41.54142	-0.70059	-0.70947	-0.56847	-0.69016	-0.69016	-1.28415
Extreme values												
Minimum	3.3375	3.3375	3.2525	106.8	3.3375	0	6583.3	6638.8	6260.1	6498.4	6498.4	0
0.50%	3.342	3.48425	3.342	109.248	3.414	0	6712.87	6936.15	6606.49	6773.42	6773.42	0
1%	3.405	3.5205	3.3675	110.768	3.4615	0	6901.36	7025.3	6682.02	6901.36	6901.36	0
5%	3.5025	3.55	3.4625	112.08	3.5025	0	7278.4	7341	7122.2	7245	7245	63600
95%	4.1925	4.245	4.1575	134.72	4.21	36452092	9963.1	10065.4	9872.2	9955.5	9955.5	11831300
99%	4.251	4.311	4.225	135.952	4.2485	76936760	10114.68	10175.9	10009.6	10116.08	10116.08	15164960
99.50%	4.26825	4.3125	4.225	136	4.25	1.09E+08	10116.14	10200.04	10052.57	10120.96	10120.96	15780530
Maximum	4.305	4.325	4.25	137.52	4.2975	1.7E+08	10123	10219.5	10069.5	10132	10132	17344700

Table A59: Descriptive statistics for ENEL stock price and FTSE index for all period (2002-2016)

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	4.635025	4.678435	4.588376	4.634388	4.634388	42927907	5556.307	5594.659	5515.035	5555.075	5555.075	1.06E+09
Standard Deviation	1.248278	1.251189	1.247068	1.249107	1.249107	28483763	882.15	879.4695	882.7391	880.2992	880.2992	5.97E+08
Median	4.3075	4.34738	4.26	4.3075	4.3075	36596701	5692.1	5731.5	5650.8	5692.4	5692.4	1.01E+09
Skewness	0.227252	0.221858	0.233593	0.229089	0.229089	2.896375	-0.36356	-0.36329	-0.36851	-0.36657	-0.36657	-0.05121
Kurtosis	-0.91982	-0.92253	-0.92183	-0.92111	-0.92111	14.92993	-0.88239	-0.89851	-0.86231	-0.87657	-0.87657	-0.65256
Extreme values												
Minimum	2.028	2.086	2.02	2.034	2.034	0	3287	3466.4	3277.5	3287	3287	0
0.50%	2.33544	2.368	2.29386	2.326	2.326	0	3596.741	3649.248	3552.305	3596.741	3596.741	0
1%	2.366	2.402	2.3394	2.3694	2.3694	0	3684.785	3725.465	3616.02	3684.785	3684.785	0
5%	4.635025	4.678435	4.588376	4.634388	4.634388	42927907	5556.307	5594.659	5515.035	5555.075	5555.075	1.06E+09
95%	4.465688	4.507073	4.421311	4.465124	4.465124	42205700	5322.599	5358.899	5283.42	5321.337	5321.337	1.04E+09
99%	4.628475	4.671814	4.581809	4.62785	4.62785	42801283	5689.384	5728.763	5648.085	5689.654	5689.654	1.06E+09
99.50%	4.630112	4.673469	4.583451	4.629484	4.629484	42832939	5690.063	5729.447	5648.764	5690.34	5690.34	1.06E+09
Maximum	7.36041	7.39915	7.30445	7.36902	7.36902	3.62E+08	7120.3	7142.8	7087.5	7142.8	7142.8	3.76E+09

Table A60: Descriptive statistics for ENEL stock price and FTSE index for 2016

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	3.881523	3.919375	3.841805	3.882898	3.882898	39089921	6379.061	6421.445	6308.937	6354.232	6354.232	1.01E+09
Standard Deviation	0.149706	0.145136	0.160294	0.154293	0.154293	15900690	329.6074	320.8624	328.3044	320.4554	320.4554	5.26E+08
Median	3.916	3.951	3.884	3.916	3.916	35724116	6513.3	6570.95	6432.5	6463.6	6463.6	8.83E+08
Skewness	-0.45671	-0.44594	-0.55612	-0.52212	-0.52212	2.090488	-0.0018	0.069734	0.162787	0.230491	0.230491	0.315065
Kurtosis	-0.44397	-0.48282	-0.25836	-0.31261	-0.31261	8.793829	-0.52263	-0.59699	-0.1765	-0.10088	-0.10088	1.997163
Extreme values												
Minimum	3.46	3.49	3.33	3.398	3.398	16021029	5537	5672.3	5499.5	5537	5537	0
0.50%	3.4846	3.5479	3.409	3.4951	3.4951	16245276	5643.228	5709.03	5553.307	5643.228	5643.228	0
1%	3.51712	3.57508	3.45852	3.51312	3.51312	17797136	5673.015	5709.03	5643.228	5643.228	5643.228	5643.228
5%	4.635025	4.678435	4.588376	4.634388	4.634388	42927907	5865.95	5926.325	5786.5	5865.95	5865.95	0
95%	4.465688	4.507073	4.421311	4.465124	4.465124	42205700	6950.45	6981.95	6909.175	6950.45	6950.45	1.57E+09
99%	4.628475	4.671814	4.581809	4.62785	4.62785	42801283	7068.2	7109.4	7060.9	7106.1	7106.1	1.62E+09
99.50%	4.630112	4.673469	4.583451	4.629484	4.629484	42832939	7095.678	7117.302	7070.76	7116.395	7116.395	2.23E+09
Maximum	4.158	4.188	4.142	4.188	4.188	1.47E+08	7120.3	7142.8	7087.5	7142.8	7142.8	3.76E+09

Table A61: Descriptive statistics for ENEL stock price and FTSE index for 2015

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	4.102941	4.14502	4.055412	4.101208	4.101208	48636504	6591.782	6634.024	6548.039	6590.375	6590.375	6.25E+08
Standard Deviation	0.20323	0.195928	0.207477	0.204578	0.204578	20513484	330.1436	319.2595	335.9178	330.1983	330.1983	3.22E+08
Median	4.12	4.162	4.076	4.12	4.12	44785278	6664.5	6705.4	6620.1	6664.5	6664.5	6.99E+08
Skewness	-0.77843	-0.68658	-0.82804	-0.77358	-0.77358	2.400301	-0.30509	-0.24257	-0.32129	-0.29875	-0.29875	-0.5748
Kurtosis	0.794492	0.502986	1.042625	0.851616	0.851616	11.3402	-1.1398	-1.24663	-1.12397	-1.15258	-1.15258	0.674062
Extreme values												
Minimum	3.426	3.508	3.362	3.442	3.442	0	5874.1	5958.9	5768.2	5874.1	5874.1	0
0.50%	3.47962	3.55708	3.41	3.44978	3.44978	15366750	5901.681	6017.136	5872.494	5901.681	5901.681	0
1%	3.4948	3.56864	3.42728	3.46864	3.46864	20334322	5923.564	6046.906	5875.72	5923.564	5923.564	0
5%	3.7402	3.8104	3.6822	3.748	3.748	26915549	6056.67	6113.28	5973.89	6056.67	6056.67	0
95%	4.3906	4.413	4.354	4.3972	4.3972	84540731	7034.62	7068.43	6996.22	7034.62	7034.62	1E+09
99%	4.44	4.46584	4.40228	4.44168	4.44168	1.16E+08	7081.97	7108.136	7048.77	7081.97	7081.97	1.41E+09
99.50%	4.44292	4.47092	4.41346	4.4533	4.4533	1.25E+08	7094.91	7117.321	7055.945	7094.91	7094.91	1.48E+09
Maximum	4.46	4.5	4.418	4.464	4.464	1.96E+08	7104	7122.7	7058.3	7104	7104	1.66E+09

Table A62: Descriptive statistics for ENEL stock price and FTSE index for 2014

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	3.928863	3.973184	3.87978	3.927114	3.927114	36383545	6682.505	6711.978	6648.512	6682.101	6682.101	7.02E+08
Standard Deviation	0.294232	0.291805	0.291899	0.290053	0.290053	15136601	147.056	137.0632	156.2757	147.4558	147.4558	2.28E+08
Median	3.966	4.038	3.926	3.97	3.97	33107963	6716.6	6747.3	6679.3	6712.7	6712.7	6.93E+08
Skewness	-0.68622	-0.74924	-0.63297	-0.67544	-0.67544	1.303898	-0.99597	-0.92257	-1.08506	-0.97672	-0.97672	0.221435
Kurtosis	-0.12946	-0.01475	-0.25676	-0.1184	-0.1184	2.321432	0.654848	0.276328	0.976292	0.612	0.612	3.600714
Extreme values												
Minimum	3.144	3.184	3.116	3.134	3.134	12356589	6182.7	6283	6072.7	6182.7	6182.7	0
0.50%	3.17562	3.19816	3.14318	3.18016	3.18016	13181013	6200.139	6314.971	6154.96	6200.139	6200.139	0
1%	3.18324	3.21696	3.17232	3.20436	3.20436	14955337	6241.57	6326.51	6185.562	6241.57	6241.57	0
5%	3.3328	3.3742	3.2954	3.331	3.331	17983081	6391.5	6426.97	6333.79	6391.5	6391.5	4.1E+08
95%	4.3234	4.3512	4.2708	4.3164	4.3164	64526112	6855.31	6873.81	6825.65	6855.31	6855.31	1.04E+09
99%	4.39784	4.41568	4.35228	4.38676	4.38676	91297798	6874.244	6889.554	6855.104	6874.244	6874.244	1.46E+09
99.50%	4.4	4.4492	4.37514	4.42358	4.42358	93050573	6877.19	6897.601	6857.349	6877.19	6877.19	1.54E+09
Maximum	4.486	4.486	4.412	4.46	4.46	99692886	6878.5	6904.9	6866.3	6878.5	6878.5	1.7E+09

Table A63: Descriptive statistics for ENEL stock price and FTSE index for 2013

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	2.868281	2.89818	2.834703	2.867805	2.867805	33248025	6469.677	6503.902	6438.862	6473.248	6473.248	6.77E+08
Standard Deviation	0.278214	0.276989	0.276139	0.277855	0.277855	12811819	179.3338	175.6476	178.4112	177.1171	177.1171	1.68E+08
Median	2.88	2.92	2.85	2.885	2.885	30086082	6486.7	6511.65	6438.95	6486.7	6486.7	6.64E+08
Skewness	-0.03224	-0.03527	-0.02263	-0.03233	-0.03233	1.995739	-0.46741	-0.42618	-0.39845	-0.38457	-0.38457	1.23064
Kurtosis	-1.14546	-1.13157	-1.13098	-1.13261	-1.13261	8.397149	-0.17274	-0.24654	-0.38116	-0.38443	-0.38443	5.845152
Extreme values												
Minimum	2.306	2.326	2.282	2.304	2.304	272514	5897.8	6044.6	5897.8	6027.4	6027.4	1.02E+08
0.50%	2.3244	2.3593	2.3011	2.32765	2.32765	15856002	6027.868	6061.448	6018.615	6034.105	6034.105	1.91E+08
1%	2.3404	2.3779	2.3051	2.3408	2.3408	16089222	6039.11	6089.08	6026.535	6050.765	6050.765	2.94E+08
5%	2.429	2.4685	2.404	2.428	2.428	18020452	6117.025	6136.05	6093.975	6120.525	6120.525	4.65E+08
95%	3.2825	3.311	3.227	3.29	3.29	54937062	6729.125	6763.55	6702.55	6732.225	6732.225	9.78E+08
99%	3.3529	3.3821	3.3262	3.3516	3.3516	74587435	6776.05	6811.1	6739.47	6776.05	6776.05	1.23E+09
99.50%	3.3569	3.3949	3.34745	3.3676	3.3676	88771351	6796.695	6834.69	6758.338	6796.695	6796.695	1.44E+09
Maximum	3.37	3.398	3.354	3.384	3.384	1.16E+08	6840.3	6875.6	6781.5	6840.3	6840.3	1.54E+09

Table A64: Descriptive statistics for ENEL stock price and FTSE index for 2012

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	2.737409	2.770895	2.700187	2.737868	2.737868	48066471	5737.324	5770.563	5704.666	5739.658	5739.658	8.03E+08
Standard Deviation	0.302853	0.299838	0.305832	0.302986	0.302986	26517113	165.8055	154.996	170.1687	163.3549	163.3549	2.53E+08
Median	2.816	2.84	2.788	2.816	2.816	41803217	5776.6	5804.1	5745.2	5776.7	5776.7	7.92E+08
Skewness	-0.10936	-0.07268	-0.1374	-0.11905	-0.11905	3.407432	-1.02314	-1.01986	-0.96244	-0.99026	-0.99026	0.987545
Kurtosis	-1.21147	-1.22616	-1.21348	-1.22157	-1.22157	18.57853	0.532636	0.457741	0.351946	0.403104	0.403104	5.798929
Extreme values												
Minimum	2.028	2.086	2.02	2.034	2.034	16214153	5260.2	5324.4	5229.8	5260.2	5260.2	0
0.50%	2.09024	2.15264	2.0296	2.08016	2.08016	17562247	5260.2	5342.208	5254.656	5266.736	5266.736	41966736
1%	2.16672	2.19344	2.05856	2.15888	2.15888	18162331	5263.672	5353.4	5258.616	5284.232	5284.232	1.58E+08
5%	2.3064	2.3456	2.2792	2.3164	2.3164	24280669	5389.7	5412.36	5335.48	5389.7	5389.7	4.66E+08
95%	3.1712	3.2068	3.138	3.17	3.17	86517624	5936.3	5956.58	5915.3	5936.3	5936.3	1.2E+09
99%	3.28488	3.32328	3.23776	3.27976	3.27976	1.51E+08	5959.532	5976.792	5941.448	5959.532	5959.532	1.46E+09
99.50%	3.29752	3.33288	3.2616	3.28488	3.28488	1.78E+08	5961.46	5985.936	5944.56	5961.46	5961.46	1.74E+09
Maximum	3.32	3.334	3.274	3.308	3.308	2.56E+08	5965.6	5997	5950.1	5965.6	5965.6	2.31E+09

Table A65: Descriptive statistics for ENEL stock price and FTSE index for 2011

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	3.886482	3.930537	3.836792	3.885387	3.885387	52992398	5685.007	5731.385	5633.568	5684.231	5684.231	8.81E+08
Standard Deviation	0.59609	0.588396	0.606235	0.597512	0.597512	22740917	316.1929	300.8359	334.4446	315.1895	315.1895	2.39E+08
Median	4.044	4.085	3.998	4.052	4.052	46579015	5790	5842	5763.4	5786.1	5786.1	8.53E+08
Skewness	-0.12755	-0.12572	-0.12212	-0.13092	-0.13092	1.21707	-0.52732	-0.49745	-0.56023	-0.51332	-0.51332	1.367124
Kurtosis	-1.39848	-1.38085	-1.43299	-1.40915	-1.40915	1.479659	-1.06861	-1.14575	-0.98324	-1.07428	-1.07428	5.221512
Extreme values												
Minimum	2.842	2.87	2.78	2.842	2.842	11270336	4944.4	5075.5	4791	4944.4	4944.4	1.88E+08
0.50%	2.87568	2.93088	2.81	2.85728	2.85728	15315042	5016.608	5106.1	4885.26	5016.608	5016.608	1.99E+08
1%	2.88896	2.96848	2.8324	2.88944	2.88944	20776734	5041.248	5115.46	4928.884	5041.248	5041.248	2.73E+08
5%	2.986	3.036	2.942	3.0064	3.0064	27090038	5128.32	5196.48	5055.68	5128.32	5128.32	6.23E+08
95%	4.7208	4.7584	4.6872	4.722	4.722	96184036	6055.92	6085.16	6015.88	6055.92	6055.92	1.34E+09
99%	4.81632	4.8404	4.78288	4.8084	4.8084	1.2E+08	6084.012	6102.412	6050.832	6084.012	6084.012	1.65E+09
99.50%	4.83344	4.85464	4.78688	4.81544	4.81544	1.37E+08	6086.812	6103.7	6051	6086.812	6086.812	1.93E+09
Maximum	4.84	4.858	4.802	4.832	4.832	1.42E+08	6091.3	6105.8	6066.7	6091.3	6091.3	2.05E+09

Table A66: Descriptive statistics for ENEL stock price and FTSE index for 2010

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	3.894037	3.926175	3.854679	3.890908	3.890908	51319380	5466.461	5507.14	5426.309	5468.047	5468.047	1.01E+09
Standard Deviation	0.180601	0.17563	0.188934	0.182986	0.182986	37113590	267.7434	260.5085	275.7493	269.2822	269.2822	3.7E+08
Median	3.9	3.9275	3.86	3.89	3.89	40205017	5498.7	5531.9	5454.3	5498.7	5498.7	9.6E+08
Skewness	-0.14585	-0.13689	-0.13595	-0.14116	-0.14116	2.940458	-0.10793	-0.1059	-0.09425	-0.10188	-0.10188	1.144346
Kurtosis	-0.66862	-0.66743	-0.74267	-0.71947	-0.71947	11.06745	-0.86153	-0.89989	-0.89881	-0.8718	-0.8718	3.158472
Extreme values												
Minimum	3.445	3.4675	3.415	3.4325	3.4325	12036199	4805.8	4863.4	4790	4805.8	4805.8	0
0.50%	3.4556	3.4848	3.4246	3.4463	3.4463	14083580	4827.588	4890.98	4810.084	4827.588	4827.588	1.19E+08
1%	3.4728	3.524	3.4356	3.4779	3.4779	17699372	4880.716	4942.1	4822.444	4880.716	4880.716	2.87E+08
5%	3.6025	3.65	3.56	3.6	3.6	23099272	5067.86	5107.1	5012	5067.86	5067.86	5.54E+08
95%	4.1725	4.1905	4.146	4.1755	4.1755	1.28E+08	5872.48	5898.28	5847.16	5875.24	5875.24	1.73E+09
99%	4.2021	4.2322	4.1711	4.2033	4.2033	2E+08	6001.9	6014.948	5977	5996.4	5996.4	2.15E+09
99.50%	4.2265	4.244	4.1779	4.213188	4.213188	2.14E+08	6008.9	6021.5	5977.864	5996.4	5996.4	2.44E+09
Maximum	4.23	4.2825	4.18	4.23	4.23	2.94E+08	6008.9	6021.5	5982.2	6008.9	6008.9	2.76E+09

Table A67: Descriptive statistics for ENEL stock price and FTSE index for 2009

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	3.78853	3.831645	3.737268	3.785882	3.785882	53236182	4568.228	4615.974	4524.743	4572.527	4572.527	1.15E+09
Standard Deviation	0.378977	0.370075	0.387313	0.377982	0.377982	42222796	512.639	508.0614	521.698	515.5388	515.5388	3.08E+08
Median	3.78781	3.85334	3.748115	3.779255	3.779255	39940305	4447.5	4500.05	4409.8	4455.2	4455.2	1.11E+09
Skewness	-0.44171	-0.45779	-0.45828	-0.46557	-0.46557	3.358233	0.063961	0.077815	0.054937	0.057839	0.057839	0.447008
Kurtosis	-0.73118	-0.77068	-0.68514	-0.7019	-0.7019	14.9939	-1.18898	-1.21568	-1.19098	-1.19844	-1.19844	1.797537
Extreme values												
Minimum	2.82364	2.99151	2.7763	2.84516	2.84516	43	3512.1	3564.8	3460.7	3512.1	3512.1	1.74E+08
0.50%	2.951429	2.99506	2.833868	2.899561	2.899561	19161048	3530.12	3605.518	3493.53	3530.12	3530.12	2.63E+08
1%	3.4728	3.524	3.4356	3.4779	3.4779	17699372	4880.716	4942.1	4822.444	4880.716	4880.716	2.28E+08
5%	3.101273	3.169065	3.045318	3.108805	3.108805	23738628	3816.775	3864	3762.9	3816.775	3816.775	7.67E+08
95%	4.315625	4.343125	4.27625	4.296875	4.296875	1.45E+08	5322.8	5372.125	5286.425	5324.85	5324.85	1.62E+09
99%	4.34225	4.363125	4.31475	4.3375	4.3375	2.05E+08	5399.925	5436.805	5390.49	5407.125	5407.125	2.08E+09
99.50%	4.35225	4.373625	4.322938	4.342938	4.342938	2.41E+08	5402.4	5444.54	5399.155	5430.808	5430.808	2.09E+09
Maximum	4.37	4.375	4.325	4.35	4.35	3.62E+08	5437.6	5445.2	5402.4	5437.6	5437.6	2.13E+09

Table A68: Descriptive statistics for ENEL stock price and FTSE index for 2008

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	5.437094	5.503325	5.364121	5.426483	5.426483	55097035	5378.496	5440.305	5301.471	5369.854	5369.854	1.39E+09
Standard Deviation	0.843843	0.834133	0.853125	0.842477	0.842477	35162444	717.3858	700.7891	735.1744	716.1253	716.1253	3.77E+08
Median	5.41916	5.44068	5.3589	5.40194	5.40194	45219716	5541.8	5625.9	5477.7	5534.5	5534.5	1.35E+09
Skewness	-0.31801	-0.3096	-0.31336	-0.32335	-0.32335	2.821769	-0.70973	-0.70364	-0.70424	-0.70084	-0.70084	-8.6E-06
Kurtosis	-0.61545	-0.55946	-0.69356	-0.64542	-0.64542	12.07438	-0.76598	-0.78926	-0.77747	-0.79503	-0.79503	0.311911
Extreme values												
Minimum	3.6264	3.69742	3.52955	3.52955	3.52955	0	3781	3911.6	3665.2	3781	3781	1.58E+08
0.50%	3.670564	3.705084	3.618653	3.666344	3.666344	0	3855.064	3963.22	3720.492	3855.064	3855.064	2.95E+08
1%	3.689332	3.719027	3.628814	3.675471	3.675471	7613191	3869.016	4021.548	3760.364	3869.016	3869.016	4.36E+08
5%	3.807184	3.869168	3.754238	3.81364	3.81364	21959293	4086.16	4198.7	3993.94	4086.16	4086.16	8.03E+08
95%	6.833562	6.893818	6.521928	6.559802	6.559802	1.16E+08	6221.02	6268.64	6183.76	6216.92	6216.92	2.13E+09
99%	7.024158	7.10353	6.98163	7.043782	7.043782	2.13E+08	6394.188	6438.408	6334.3	6365.3	6365.3	2.15E+09
99.50%	7.044474	7.116959	6.994028	7.052389	7.052389	2.23E+08	6445.644	6505.44	6378.108	6405.444	6405.444	2.15E+09
Maximum	7.08063	7.12367	7.01176	7.06341	7.06341	2.89E+08	6479.4	6534.7	6402.6	6479.4	6479.4	2.15E+09

Table A69: Descriptive statistics for ENEL stock price and FTSE index for 2007

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	6.908388	6.955316	6.862117	6.91044	6.91044	54045215	6403.257	6445.285	6359.852	6403.651	6403.651	1.69E+09
Standard Deviation	0.255958	0.249583	0.258899	0.256218	0.256218	32893476	177.6095	168.4779	183.1451	177.8461	177.8461	3.68E+08
Median	6.92998	6.98378	6.889085	6.94074	6.94074	44367707	6412.8	6448.65	6365.6	6414.85	6414.85	1.72E+09
Skewness	-0.65302	-0.6421	-0.68394	-0.67653	-0.67653	2.421155	-0.13328	-0.02017	-0.19601	-0.15073	-0.15073	-0.95719
Kurtosis	-0.04217	-0.17226	0.005757	-0.08091	-0.08091	7.799879	-0.78225	-1.06304	-0.7232	-0.76975	-0.76975	1.729304
Extreme values												
Minimum	6.10355	6.2585	6.09924	6.17672	6.17672	0	5858.9	6109.3	5821.7	5858.9	5858.9	1.45E+08
0.50%	6.2585	6.33598	6.12959	6.242898	6.242898	3274515	6011.04	6116.943	5894.843	6011.04	6011.04	2.56E+08
1%	6.2585	6.33598	6.221912	6.2585	6.2585	16214598	6049.52	6126.765	5995.705	6049.52	6049.52	4.54E+08
5%	6.40485	6.464033	6.3532	6.390863	6.390863	23569742	6128.15	6166.8	6058.15	6119.65	6119.65	1.07E+09
95%	7.253878	7.276473	7.206528	7.240965	7.240965	1.1E+08	6674	6721.45	6635.625	6674	6674	2.15E+09
99%	7.327915	7.367729	7.291115	7.323393	7.323393	1.89E+08	6722.905	6742.775	6684.105	6722.905	6722.905	2.15E+09
99.50%	7.336522	7.388172	7.298968	7.354925	7.354925	1.99E+08	6728.995	6751.59	6694.958	6728.995	6728.995	2.15E+09
Maximum	7.36041	7.39915	7.30445	7.36902	7.36902	2.36E+08	6732.4	6754.1	6697.7	6732.4	6732.4	2.15E+09

Table A70: Descriptive statistics for ENEL stock price and FTSE index for 2006

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	6.090244	6.126265	6.055168	6.094717	6.094717	48860660	5916.102	5947.689	5887.198	5918.201	5918.201	1.64E+09
Standard Deviation	0.283177	0.283059	0.283966	0.28486	0.28486	32015076	180.2229	174.5816	184.9456	180.4788	180.4788	3.5E+08
Median	6.00024	6.02176	5.9615	6.00024	6.00024	38686126	5895.5	5921.3	5867.4	5896.6	5896.6	1.66E+09
Skewness	1.111291	1.126186	1.089183	1.118462	1.118462	1.775564	0.057594	0.116046	0.023993	0.056935	0.056935	-0.55116
Kurtosis	0.306506	0.285868	0.257024	0.303985	0.303985	3.378065	-0.8829	-0.99832	-0.88021	-0.89617	-0.89617	0.125894
Extreme values												
Minimum	5.62146	5.66881	5.58272	5.63437	5.63437	0	5506.8	5544.4	5467.4	5506.8	5506.8	4.76E+08
0.50%	5.646815	5.674274	5.596326	5.645305	5.645305	0	5523.137	5625.193	5484.024	5523.137	5523.137	5.26E+08
1%	5.66881	5.691363	5.623782	5.660889	5.660889	5974520	5549.008	5647.924	5508.798	5549.008	5549.008	5.86E+08
5%	5.77211	5.80224	5.72476	5.766517	5.766517	19920819	5652.21	5681.24	5606.78	5654.33	5654.33	1.07E+09
95%	6.707443	6.73198	6.668703	6.72466	6.72466	1.23E+08	6205.67	6239.89	6190.6	6210.26	6210.26	2.14E+09
99%	6.768393	6.798523	6.742568	6.769682	6.769682	1.59E+08	6246.212	6257.674	6223.518	6246.212	6246.212	2.15E+09
99.50%	6.773859	6.803989	6.74489	6.793054	6.793054	1.62E+08	6252.875	6266.292	6231.139	6252.875	6252.875	2.15E+09
Maximum	6.79224	6.80515	6.7535	6.80085	6.80085	1.93E+08	6260	6271.4	6240.1	6260	6260	2.15E+09

Table A71: Descriptive statistics for ENEL stock price and FTSE index for 2005

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	6.126838	6.163309	6.08651	6.124471	6.124471	45978035	5155.889	5177.916	5138.843	5159.602	5159.602	1.56E+09
Standard Deviation	0.22729	0.226634	0.227245	0.229892	0.229892	27827872	240.2587	241.2742	240.7775	241.001	241.001	3.24E+08
Median	6.17241	6.20039	6.122915	6.16381	6.16381	39063933	5128.25	5163.35	5102.85	5150.2	5150.2	1.57E+09
Skewness	-0.21838	-0.19726	-0.24653	-0.22967	-0.22967	1.895704	0.179356	0.175092	0.184887	0.187267	0.187267	-0.62565
Kurtosis	-0.69609	-0.76233	-0.68047	-0.73026	-0.73026	6.201115	-1.29516	-1.32246	-1.28208	-1.28266	-1.28266	1.145017
Extreme values												
Minimum	5.60424	5.68172	5.57842	5.59563	5.59563	0	4783.6	4809.8	4765.4	4783.6	4783.6	3.08E+08
0.50%	5.643757	5.708819	5.595918	5.635641	5.635641	0	4789.636	4813.93	4771.162	4789.636	4789.636	3.82E+08
1%	5.66605	5.719467	5.624777	5.671691	5.671691	0	4796.159	4816.537	4774.762	4796.159	4796.159	6.13E+08
5%	5.74198	5.780505	5.69894	5.733155	5.733155	15945395	4818.68	4846.985	4803.6	4821.94	4821.94	1.07E+09
95%	6.465325	6.49954	6.435195	6.461446	6.461446	95841355	5528.915	5548.42	5505.96	5531.125	5531.125	2.08E+09
99%	6.586623	6.62437	6.539273	6.583093	6.583093	1.45E+08	5596.056	5622.8	5591.9	5622.8	5622.8	2.15E+09
99.50%	6.615482	6.627402	6.55903	6.60991	6.60991	1.79E+08	5615.189	5634.926	5595.355	5622.8	5622.8	2.15E+09
Maximum	6.62437	6.64159	6.57702	6.62867	6.62867	1.94E+08	5638.3	5647.2	5622.8	5638.3	5638.3	2.15E+09

Table A72: Descriptive statistics for ENEL stock price and FTSE index for 2004

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	5.601351	5.640616	5.566621	5.608843	5.608843	40816025	4521.134	4542.738	4502.374	4522.911	4522.911	1.63E+09
Standard Deviation	0.347158	0.348565	0.346823	0.349391	0.349391	26389865	131.3162	130.464	133.7459	132.9081	132.9081	3.61E+08
Median	5.68172	5.69894	5.63868	5.67311	5.67311	36412114	4493.7	4515.5	4477.6	4498.85	4498.85	1.65E+09
Skewness	-0.54842	-0.52891	-0.51039	-0.50504	-0.50504	1.748652	0.559689	0.571136	0.570397	0.558144	0.558144	-0.78436
Kurtosis	0.072719	0.04463	0.01869	0.00915	0.00915	4.627894	-0.5911	-0.63452	-0.60255	-0.59205	-0.59205	1.038455
Extreme values												
Minimum	4.64007	4.64007	4.64007	4.64007	4.64007	0	4287	4324.9	4283	4287	4287	1.55E+08
0.50%	4.667059	4.732571	4.655823	4.71346	4.71346	0	4302.964	4333.775	4284.359	4302.964	4302.964	4.44E+08
1%	4.735194	4.796924	4.712728	4.764382	4.764382	0	4308.191	4338.67	4288.586	4308.191	4308.191	5.77E+08
5%	4.933631	4.984851	4.899622	4.934492	4.934492	10864445	4339.21	4360.315	4318.55	4339.21	4339.21	9.45E+08
95%	6.14659	6.196949	6.09494	6.17198	6.17198	95355036	4760.43	4789.21	4739.265	4769.92	4769.92	2.14E+09
99%	6.218818	6.24128	6.204956	6.22407	6.22407	1.4E+08	4803.958	4820.775	4788.024	4819.8	4819.8	2.15E+09
99.50%	6.22407	6.247264	6.221444	6.22407	6.22407	1.54E+08	4815.378	4823.343	4797.41	4819.8	4819.8	2.15E+09
Maximum	6.23268	6.2585	6.22407	6.24128	6.24128	1.67E+08	4820.1	4826.2	4813.5	4820.1	4820.1	2.15E+09

Table A73: Descriptive statistics for ENEL stock price and FTSE index for 2003

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	4.690371	4.729094	4.649439	4.68892	4.68892	27955455	4049.054	4082.043	4020.348	4051.712	4051.712	1.62E+09
Standard Deviation	0.190883	0.187986	0.1929	0.188547	0.188547	19015663	262.6357	253.354	273.2189	263.519	263.519	3.63E+08
Median	4.65729	4.69172	4.63146	4.65729	4.65729	24684679	4087.9	4129.3	4074.4	4091.3	4091.3	1.67E+09
Skewness	0.659579	0.791577	0.629002	0.738984	0.738984	2.796367	-0.54732	-0.52812	-0.56112	-0.55392	-0.55392	-1.00973
Kurtosis	0.453544	0.562877	0.432517	0.487872	0.487872	13.7702	-0.60644	-0.65848	-0.59128	-0.5897	-0.5897	1.806535
Extreme values												
Minimum	4.2699	4.2699	4.24407	4.2699	4.2699	0	3287	3466.4	3277.5	3287	3287	2.41E+08
0.50%	4.282812	4.369756	4.263873	4.325855	4.325855	0	3441.01	3474.68	3318.35	3441.01	3441.01	2.94E+08
1%	4.333604	4.38181	4.2699	4.35599	4.35599	0	3469.56	3491.86	3396.78	3469.56	3469.56	2.94E+08
5%	4.40764	4.4679	4.34738	4.40764	4.40764	8436027	3579.1	3626.4	3535.1	3579.1	3579.1	1.02E+09
95%	5.12216	5.1652	5.08772	5.11355	5.11355	56152179	4382.4	4409.4	4366.7	4388.7	4388.7	2.14E+09
99%	5.1652	5.220294	5.132488	5.17381	5.17381	1.07E+08	4442.42	4458.8	4432.9	4449.82	4449.82	2.15E+09
99.50%	5.189301	5.231487	5.154007	5.185864	5.185864	1.27E+08	4453.66	4472.17	4446.83	4466.53	4466.53	2.15E+09
Maximum	5.21685	5.25129	5.15659	5.19103	5.19103	1.6E+08	4470.4	4491.8	4470.4	4476.9	4476.9	2.15E+09

Table A74: Descriptive statistics for ENEL stock price and FTSE index for 2002

	ENEL						FTSE					
	Open	High	Low	Close	Enel_Adj Close	Volume	Open	High	Low	Close	IFTSE_Adj Close	Volume
Average	4.952787	5.012257	4.890778	4.950743	4.950743	22074743	4601.358	4645.27	4550.06	4595.824	4595.824	92325307
Standard Deviation	0.604872	0.597548	0.615554	0.606465	0.606465	11564401	556.6712	543.6623	569.4134	555.9822	555.9822	3.63E+08
Median	4.92416	4.97581	4.84668	4.92416	4.92416	20221555	4546.8	4631	4506.3	4542.9	4542.9	0
Skewness	-0.05718	-0.06635	-0.04316	-0.05868	-0.05868	1.504777	-0.05547	-0.05193	-0.03495	-0.04016	-0.04016	4.004461
Kurtosis	-1.71424	-1.71826	-1.71865	-1.72398	-1.72398	5.079505	-1.71832	-1.71827	-1.71629	-1.71615	-1.71615	14.75659
Extreme values												
Minimum	3.88251	4.01164	3.78781	3.89973	3.89973	0	3671.1	3761.1	3609.9	3671.1	3671.1	0
0.50%	4.01164	4.046938	3.834301	3.976346	3.976346	0	3703.88	3773.54	3624.71	3703.88	3703.88	0
1%	4.04263	4.12011	3.939324	4.02541	4.02541	0	3727.02	3779.56	3648.4	3727.02	3727.02	0
5%	4.16659	4.25268	4.10633	4.15799	4.15799	8043783	3835.2	3907.2	3777.3	3835.2	3835.2	0
95%	5.71616	5.75059	5.6645	5.70755	5.70755	43961227	5261.4	5292.3	5237.6	5261.4	5261.4	1.24E+09
99%	5.817738	5.855618	5.745424	5.81085	5.81085	63592557	5306.38	5329.8	5278.1	5306.38	5306.38	1.8E+09
99.50%	5.834097	5.883164	5.774691	5.822904	5.822904	69774500	5317.99	5347.42	5293.54	5317.99	5317.99	1.88E+09
Maximum	5.83668	5.91415	5.79363	5.82807	5.82807	85061707	5323.8	5362.3	5313.9	5323.8	5323.8	1.92E+09