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ABSTRACT

For many decades now, electricity has become an indispensable source of energy for the functioning of economic activity. Therefore, it is only natural to wonder what the consequences of the high prices of electricity due to the tax burden will be. The aim of this investigation is precisely to evaluate the impact of the tax burden on electricity at two major levels: Foreign Direct Investment (FDI) and Income Inequality (measured by the GINI coefficient). Information from the 28 member states of the European Union (EU) is used for this purpose, and data was collected from 2007 to 2017. At the methodological level, we used a model of simultaneous interdependent equations and the Generalized Method of Moments (GMM). The results are in line with other studies in the literature on this subject, highlighting the fact that the higher the tax burden on electricity, the lower the FDI uptake and the higher the level of income inequality. In the relationship between FDI and income inequality, there is a ñvirtuous circleò because lower income inequality attracts FDI while FDI uptake, in turn, decreases the GINI coefficient. From an environmental point of view, it is found that taxation on pollution leads to a reduction in inequality and when its interaction with electricity taxes is analysed it has a beneficial effect by reducing the unfavourable impact caused by electricity taxes.

Keywords: Electricity taxes**;** FDI; GINI coefficient; Environmental Taxation; GMM.

JEL Codes: F21, H23, I32, O23, Q43, Q48.

1. I ! TRODUCTIO !

Fiscal policy is one of the most important competitiveness instruments of countries within the European Union (EU) and the Eurozone, as it is the only major policy over which individual governments retained control after adopting the single currency. In turn, energy, and in particular electrical energy, is a powerful basis across all economic activity and all infrastructure. In other words, nowadays, families, industries, commerce and services use, in an indispensable and almost irreplaceable way, electricity to perform their functions as economic agents. In addition, and as explained below, a large component of the final price of electricity is made up of fees and taxes.

The fact that the topic of this investigation is under heated discussion today is the main reason for choosing it. For example, the reduction of the VAT rate on electricity is one of the measures discussed in national budgets, seemingly aiming to find a combined solution between reduction of the tariff deficit[1] and a reduction in the VAT rate charged on the contracted power, in addition to a tax on renewable energy.

In addition, this is a topic that has always raised questions, discussions and some doubts and concerns, not only because of its impact on public accounts, but also because of its impact on the economic activity as a whole. As might be expected, the higher the tax burden on electricity, the higher the tax revenue, as the substitution effect with other energy sources will be difficult to verify, especially at the corporate level. However, the unfavourable effects that they encounter are not to be underestimated by the impact they have on society, especially on economic and social justice grounds. In this context, two aspects should be highlighted: energy expenses supported by companies and inequality in household income. The combined analysis of these two questions will be the guiding thread of this study. Companies react to the increasing cost of energy caused by electricity taxes on electricity by changing their supply and prices and their investment plans. This is a relevant determinant, among others, of the international playersô decision at the investment level to carry out within a country. Families, depending on their revenue levels, can suffer additional difficulties, this being the case especially for low revenue families, thus increasing inequality in society, in consequence of the increased prices of electricity due to the taxes on electricity. In this research we take account of these relationships between electricity taxes over foreign direct investment and inequality.

[1] The tariff deficit is nothing more than the result of a political decision not to allow electricity prices to reflect their costs in one year, limiting price increases to an arbitrary administrative ceiling and forcing future consumers to pay with interest what is consumed this year.

A percentage (59%) of European companies indicate energy costs as one of the main obstacles to investment, according to a study[2] carried out by the European Investment Bank (EIB) in 2018. It should also be noted that, according to the same study, energy costs hinder investment more than the tax burden supported by companies. In this research, it is possible to draw conclusions about two variables reflecting the effect of electricity taxes, which increase the cost of electric energy and corporate income tax revenue.

The price of electricity can be an important factor of competitiveness, mainly for enterprises that depend heavily on electricity in their production processes. High electricity prices can drive major losses on competitivity when comparing to more developed countries, with higher wages but also with higher investment in infrastructure and lower electricity prices. The reduction in energy costs would be advantageous for the companies, namely in countries with low productivity levels, and can be a factor of attraction for international investment.

In other words, the fact that the tax burden on electricity is high may increase the financial burden on companies, and the consequences of such a situation can be observed from various perspectives. In addition to increasing the tax burden borne by companies operating in the country and being able to condition, for example, their expansion and development, this may also divert FDI to other destinations where companies are better off, understood in this context as having overall lower electricity and energy costs. Thus, with the high tax burden on electricity, and given the relative importance given to this issue by investors, countries may be shifting important investments away from the economy, either by not capturing or relocating already established companies in the country to other regions. From any perspective, the competitiveness of the economy will in some way be at stake.

The analysis of the question of inequality in household income is important and central to the study because it extends the scope of analysis to industrial consumers as well as domestic consumers[3]. This will make it more likely to draw more inclusive and complete conclusions

[#] ñEuropean Investment Bank Investment Report 2018/2019: Retooling Europeôs Economyò. ""

[$] When domestic consumers are mentioned, they are not necessarily families. This may, for example, be a commercial establishment whose contracted power and its electricity consumption do not fit into the industrial consumption bands. This can be a limitation in the analysis by placing households and some businesses at the same level and with data interpretation not fully decomposed and separated.

about the impacts of the tax burden on electricity in various dimensions of the economy. Thus, as far as domestic consumers are concerned, it should be borne in mind that, since electricity is considered a basic necessity, the portion of the household budget earmarked for the payment of this good will be higher in the lower household budgets. Thus, distributional concerns are warranted, since if the tax component of the price of electricity is high, it will be the lower-income households who will feel this impact most strongly.

Another issue that is closely linked to the theme under study, by uniting the concepts of energy cost and inequality, is the issue of energy poverty. Taking an European study[4] that assessed the ability of households to keep their homes at comfortable temperatures and pay energy bills, it was found that there are about 41 million households in the 28 EU countries that cannot be heated in winter and 91 million that cannot be refreshed in the summer. Given these figures, three Eastern European countries (Slovenia, Hungary and Bulgaria) attain high levels of energy poverty, which seems to be the result of the low income earned by the majority of the population, poor energy efficiency, buildings and equipment used are inefficient. At the opposite extreme, Sweden, Finland, Denmark and Austria are the countries with the least energy poverty values.

Thus, given the high energy costs for households, they eventually deprive themselves or substantially reduce their energy consumption. This places families in the most vulnerable socio-economic conditions at risk, since when it is not possible to maintain a comfortable temperature in their homes, health concerns such as breathing problems may arise or worsen. The study even goes so far as to say that the lack of thermal comfort "is related to 40% of the excess deaths that occur during the winter", more recurrent in countries with less housing conditions. However, the problem seems to be more widespread as it also occurs in summer because, due to climate change, "as higher temperatures are expected to be more frequent, the scale of the EU population affected by energy poverty in summer is expected to increase dramatically."

Overall, there are 17 countries with significant levels of energy poverty and in the EU the energy bill increased by 33% between 2000 and 2014, says the ZERO association citing figures from the European Commission, with households from some EU countries spending a full salary just to meet energy costs.

[4] This study, which used data from Eurostat, was carried out by the Network of Environmental Organizations: Coalition for the Right to Energy, where the Portuguese organization ZERO (Sustainable Terrestrial System Association) is inserted.

To better understand the relevance of this issue, it should be noted that energy poverty remains a major barrier to economic development, particularly in sub-Saharan Africa and much of Asia (Bazilian et al., 2014). However, as it turned out, this is not a problem confined only to the most disadvantaged regions of the globe.

Regarding electricity price decomposition, and in order to standardize this issue at EU level, it should be noted that Eurostat periodically publishes this information according to two components: Energy and Networks; and Fees and Taxes. Considering the 28 countries of EU, the electricity prices for domestic consumers vary from the basic level (minimum is approximately 10 cents/kWh for Bulgaria) to the triple (Denmark) and, for industrial consumers, they vary from the basic level (minimum of 8 cents/kWh for Sweden) to the double (Germany). The information published by Eurostat highlights the importance of fees and taxes in determining final prices. For domestic consumers, Denmark and Germany have the greatest tax burden (fees and taxes) in the EU-28 (graphs in Annex 1).

In terms of purchasing power parity, the highest prices are paid in Germany, Spain and Portugal, while on the opposite end of the spectrum, Finland, Luxembourg and the Netherlands were the countries in which the electricity bill weighed the least on families.

It should also be noted that the indicated percentages (reproduced from the ERSE information summary for the 1st semester 2018) are higher than those verified in the 2nd semester of 2017, which seems to indicate an increase in the tax burden on electricity.

In the study by Pereira, A.M. and Pereira, R.M. (2018), a permanent increase in the legal rate of VAT on electricity from 6% to 23% has positive budgetary and environmental effects but unfavourable economic and distributive effects. It will be the negative consequences at these last two levels that are intended to be studied in this research by analysing the impact of the tax burden on electricity on FDI and on household income inequality.

According to the authors Oueslati, W. et al. (2017) there is a positive, albeit modest and verifiable under specific criteria, relationship between the shares of energy tax revenues in GDP and the GINI coefficient (measure adopted for income inequality). That is, the focus of this article is on issues of equity and social justice, and their relationship to the tax burden on energy. Thus, in view of this study, we intend to narrow the scope of the analysis by focusing on electricity rather than energy as a whole, given its undeniable relevance to economic activity.

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In summary, this paper aims to analyse the impact of the tax burden on electricity on both FDI and household income inequality for the EU-28 countries using panel data (2007-2017). Two central research hypotheses are proposed, which are further explained below. In addition, the impact of FDI on inequality is also analysed, and vice versa, as well as the influence of an environmental variable on income inequality.

There are key factors that differentiate this study from existing ones: specific data is used for electricity rather than energy as a whole; a simultaneous relationship is proposed between FDI and the GINI inequality measure, including the analysis of environmental issues, in order to increase the scope of the research findings.

As for the methodology used, the analysis is not only country cross-section (for the 28 countries of EU-28), but also time-series, repeating for each country 11 years of observations (panel data analysis), with the objective to make the research more robust and complete, attending to the diversified nature of the data. Sources of information are Eurostat, OECD, European Commission, UNESCO and World Bank databases. In order to test the two research hypotheses, we use the estimation of each of the two econometric equations by the Generalized Moments Method (GMM) by replying to the endogeneity problem and correcting the issue of heteroscedasticity due to the economic and dimension differences of the cross-section units (the 28 countries).

Regarding the main results achieved, these confirmed that there is an unfavourable impact of the electricity tax burden on FDI and inequality, that is, the higher the tax levied on electricity, the lower the FDI that is captured and the higher the GINI coefficient.

In relation to the structure of the work, it is divided into 4 main sections: literature review and definition of research hypotheses, description of the methodology applied in research, enumeration of the results obtained and, finally, presentation of the conclusions reached with the investigation.

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2. LITERATURE REVIEW A ! D DEFI ! ITIO ! OF RESEARCH HYPOTHESES

Issues of electricity price and its breakdown, analysis of the impacts of the tax burden on electricity at macroeconomic and FDI level, as well as impacts at distributive level will be addressed. Subsequently, and in order to make this simultaneous analysis coherent, the relationship between FDI and Income Inequality will be investigated. Finally, some relevant conclusions on environmental taxation and ñgreen electricityò are presented.

2.1. Electricity as a source of energy

First of all, it is worth mentioning why this research focuses on electricity and not on another energy source or even energy as a whole. Other sources of energy, such as coal, are often used in the production of electricity itself, although it is increasingly coming from renewable energy sources such as wind, water or solar energy.

In fact, the importance of electricity for society is not something recent and among the forms of energy consumed by humanity, it has become one of the most important, because, from it, changes have occurred in various dimensions of society.

Discovered in the early nineteenth century, its large-scale consumption was possible only in the last decades of that same century, and its expansion is related to the development of the so-called industrial capitalism. Thus, electricity becomes essential in the process of modernization of society by boosting industrialization and reflecting on the culture itself. There is no question regarding its benefits, amenities and its frequent presence in the daily lives of people, ranging all the way from lighting to the use of various electronic devices such as computers, heating, transport, industrial machines, among many others. Thus, it can even be said that it is a good[5] across all economic activity and agents. Consequently, electricity is even considered a basic human right because of its strong impact on individualsô quality of life.

However, the issue is no longer simple and linear as one considers all the factors that intervene in the power generation process until it is available for consumption. It should be mentioned that the production and distribution operations of electricity accumulate in a highly

[&] Electricity is classified as a corporeal good according to Article 3 (2) of the VAT Code.

complex process, involving expenses that must integrate the calculation of tariffs, even if carried out outside the concession area and by agents other than the direct service provider whereas the overall cost will be supported by final consumers (Schumann and Kroetz, 2008).

In addition, energy, including electricity, is the main driver of a country's economic and social growth, as it is vital for maintaining and developing a modern economy and society (Acharjee, 2013). Thus, non-access to energy is an obstacle to economic development, as there is a strong correlation between GDP and access to energy, the latter being a consequence of economic growth and a fair redistribution of wealth by the population (Khennas, 2012). Some authors even argue that the relationship between energy consumption and the human development index is greater than the relationship between energy consumption and GDP.

When analysing Nigeria's electricity supply system, it was found that its malfunctioning has serious economic consequences for the country, in particular in terms of economic development and the attractiveness of FDI that boosts the economy, not forgetting the undeniable threat to the welfare and safety of the population (Dada, 2014).

Energy is one of the main factors for economic growth and development (Shahbaza, M. et al. 2017). Earlier, authors such as Jamasb (2006) had stated that a successful electricity reform could improve efficiency, lead to lower prices and achieve better quality of service. The next section intends to give some insights on the price of electricity.

2.2. The price of electricity and its decomposition

Turning to the analysis of electricity prices, it should be noted that they vary from country to country, as they depend largely on state-specific taxes, their geopolitical condition, the cost of environmental protection and variations in energy demand and supply (Soares, 2016).

In the analysis of the decomposition of electricity prices, the level and structure of electricity prices should be considered as a potential energy policy tool to improve energy efficiency (Verbic, M. et al. (2017)). The relationship between electricity price and energy intensity[6] is relevant for European economies, not only because it is an important indicator of sustainable development but also because it contains relevant information on electricity price

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decomposition. In the present study, this breakdown is presented for households in the EU (with Norway added) [Fig. 1].

These prices, which include taxes and duties, were stable until 2003, when they began to increase with the introduction of greenhouse gas emission allowances and other environmental charges. Thus, while rates and taxes represented on average 15% of the kWh price in 1991, this figure amounted to 32% at the end of 2011 (Cruciani, 2011).

It should be noted that the relative share of taxes in 2015 averaged 28.5%, with the lowest levels found in Malta (5%) and Lithuania (13%), while the highest in Portugal (50%), Germany (52%), and Denmark (69%) [Fig. 1]. Applying the purchasing power parity standard, the price of electricity is highest in Poland, Cyprus and Portugal, and lowest in the United Kingdom, Slovenia and Spain.

Fig.1: Electricity prices for residential consumers in the EU-28 and ! orway in 2015, in cents per kWh

Source: Reproduced from Verbic, M. et al. (2017), p. 61.

! ote: Data represent the second half of 2015 for average annual residential consumption between 2500 and 5000 kWh.

Following this analysis of electricity prices and their breakdown, it is appropriate to focus further on the findings of a study by Filipovic, S., et al. (2015), whose objective is to analyse energy intensity in the EU-28 between 1990 and 2012 and to study the determinants with a relevant impact on it. In it, the authors state that energy prices, energy taxes and GDP per capita

have a negative impact on energy intensity, while growth in gross domestic consumption and final energy consumption per capita positively affect this variable.

Given the price structure of electricity, which proved to be the most important factor under study, it was found that consumers pay the lowest tax contribution in the United Kingdom, where a relatively low VAT rate is applied to the basic price, without other taxes. By contrast, Denmark charges the highest taxes, where more than half of the final price corresponds to environmental taxes. It should also be noted that Denmark has a comprehensive environmental tax system and is the country with the highest implicit energy tax rate in the EU-28 (i.e. energy tax revenue for final energy consumption).

This study found a high weight of fees and taxes on the final energy price, proving once again that taxation has been one of the main drivers of rising energy prices for households in recent years in countries such as Denmark, which at the same time had a low level of energy intensity.

Total energy tax receipts are highest in Slovenia, Bulgaria and Estonia. However, this is not due to high tax rates, but rather to high levels of final energy consumption.

In the second half of last year 2018, the highest prices for every 100 kWh of electricity were observed in Denmark (31.2 euros), Germany (30 euros), Belgium (29.4 euros), Ireland (25.4 euros), Spain (24.8 euros) and Portugal (22.9). The countries with the lowest price are Bulgaria (10.1 euros), Lithuania (11 euros) and Hungary (11.2 euros). On average in the EU, electricity prices are around 21.1 euros. However, Portugal leads the ranking of the price of electricity when measured in terms of purchasing power parity. As for the tax burden, it is found that the rates and taxes represent 64% of the electricity bill in Denmark, Portugal 55% and Germany 54%. By contrast, in Malta this share represents only 6% of the final price of electricity.

2.3. Impacts of the tax burden on electricity

This section will focus on the main findings regarding the impacts that the tax burden on electricity has on two major variables in the economy: FDI and Income Inequality. The issue of the increase in the VAT rate on electricity, namely at the peak of the economic and financial crisis, is analysed below."""""

2.3.1. Macroeconomic and FDI impacts

At the macroeconomic level, issues addressing productivity, competitiveness and investment will be addressed, as well as FDI.

Starting with the analysis of the macroeconomic consequences of the energy tax burden on productivity, we highlight the effect of changes in energy tax (and price) on Total Factor Productivity (TFP) and net trade at industrial level. In this context, it was found that the negative marginal effect of higher energy taxes on TFP and net trade is significantly reduced for industries with stronger human capital and even turns into a positive overall effect in certain cases. This suggests that human capital is an important determinant of the ability to mitigate the negative impacts of energy taxes (Gonseth et al. 2015).

Another study, based on data from Indian companies, analyses the effect of electricity prices on the type of industry in which companies choose to operate and their implications for productivity growth (Abeberese, 2017). Although the results of this study contribute mainly to the literature on productivity growth in developing countries, it is worth highlighting its relevant conclusions. This author proved that, in his sample, and in response to an exogenous increase in the price of electricity, companies switch to less electricity-intensive production processes within narrowly defined industries, reduce their machine intensity and have lower production growth rates and lower productivity. Taken together, these results suggest that high electricity prices make companies operate in low-intensity industries, leaving aside the opportunities for increased productivity available in more electricity-intensive and possibly more technologically advanced industries. In this way, restrictions placed on rising electricity prices may limit a country's growth. In addition, while most of the literature on infrastructure constraints in developing countries has focused on the availability of infrastructure itself, this article emphasizes the importance of considering its accessibility as well. That is, even with the provision of infrastructure, in this case electricity, its high price (i.e. the restriction of infrastructure) can instigate combat strategies that have negative consequences, such as the fact that it can affect the productivity of the company. This is because companies can use less efficient production processes in an attempt to become less dependent on this infrastructure.

Turning to the issue of competitiveness, and using data from Indonesia, it has been shown that energy prices have a small but statistically significant long-term adverse effect on competitiveness (Rentschler and Kornejew, 2017). In addition, these authors demonstrate that companies have the ability to respond to higher energy prices by adjusting the energy mix used,

i.e. replacing certain more expensive energy goods with cheaper ones, increasing energy efficiency and passing costs on to end users. However, these response measures are not sufficient to fully mitigate the adverse effect of high energy prices on companies.

Also, in this context, it is proved that energy taxes in Tianjin (China) may slightly improve GDP, but have an adverse impact on the energy sector due to the rise in energy prices. Thus, the scale of production will be reduced and capital and labour resources will be transferred to low emission and energy consuming sectors (Wang B. et al. 2018).

Now highlighting the investment impact of the tax burden on electricity, it appears that rising energy prices have a negative effect on the investment of a large panel of industrial companies in India between 1993 and 2013 (Sadath and Acharya, 2015). This effect is transmitted to the company's investment through demand and supply factors, also depending on factors such as the energy intensity of production. The results also showed that the sales growth-investment ratio becomes weaker in the face of rising energy prices, which may be justified by the more cautious investment approaches adopted by companies. Thus, it seems necessary for policy makers to develop a comprehensive energy policy that guarantees the continued supply of affordable energy to industrial companies.

Next, the topic of the impact of the tax burden on electricity on FDI will be deepened, as it is, along with the issue of income inequality, a key aspect of this research.

Focusing now on the FDI theme, and according to UNCTAD (2014)[7], FDI is defined as an investment by a company resident in a particular country (called a parent) with long-term control and interest in a company resident in a country other than its own (called a subsidiary). This investment is reflected in an initial transaction involvement between the two companies but also encompasses all subsequent transactions between the two. Thus, FDI is considered when the investor resident in another economy holds at least 10% of the common shares or voting power. FDI inflows and outflows concern the capital that is directly or indirectly provided by a foreign investor to the subsidiary in a third country and the capital that a company from one country receives from the investing company, respectively. According to the same source, FDI involves three components: equity participation in a company in a country other than that of the investing company, reinvestment of profits in those companies and intra-company financing of the same group.

(UNCTAD-United Nations Conference on Trade and Development.

Moreover, it has been found over the past decade that interaction between countries has been strengthened by FDI flows (Leitão and Faustino, 2010) and that FDI has been seen as an escape from stagnation, in the case of developed economies, and poverty, in the case of developing economies (Brooks et al., 2010).

Having described the concept of FDI and its current importance, and moving on to its more concrete analysis, it is observed that many authors reflected on the impact of the tax burden on its attraction. However, the conclusions obtained are not unanimous.

Authors such as Blonigen (2005) dispute the more intuitive hypothesis that an increased tax burden will necessarily have a negative impact on FDI attraction. The author states that the subject is quite complex and therefore the effects of fiscal policy on FDI vary substantially depending on the different types of rates or different tax treatment that may occur in the issuing and receiving country of FDI.

Taking a more moderate position, authors such as Simmons (2000) and Hristu-Varsakelis et al. (2011) consider that the tax burden is not the most relevant component in companies' decision making regarding the location of FDI, although they identify a statistically significant relationship between the two variables.

On the other hand, authors such as De Mooij and Ederveen (2003), Desai et al. (2004) and Göndör and Nistor (2012) consider fiscal policy to be the factor, or one of the most relevant factors, in the decision-making process of companies regarding the location of FDI. In this sense, and taking into account the considerations of these last authors, we intend to analyse in this study the impact that the tax burden on electricity has on FDI location decisions.

In this context, there is also an important study that finds that US FDI is sensitive not only to direct income taxation, but also to indirect taxes, thus opening doors to a more inclusive definition of tax competition (Desai and Hines, 2001). In other words, there is scope for energy taxes, and in particular electricity taxes, to influence FDI location decisions, while not forgetting that others may have more weight such as income tax, dividends, among others. Several investigations also prove that both direct and indirect taxes have a very pronounced impact on the location of investments by multinational companies (Desay, Foley and Hines (2003, 2004)).

It is these same multinationals that play an important role, even more noticeable in developing countries, by introducing new technologies that in the long run benefit all workers, even those with lower skills who are involved in learning and adapting to new technologies.

That is, FDI flows are considered beneficial as they can theoretically contribute to the improvement of production processes.

Considering other explicative determinants, FDI is statistically negatively related to the corporate income tax rate and the cost of labour and, positively related to GDP per capita and the degree of openness of the economy (Pereira, Manuel J.R.C. (2010)).

In this context, we can look at the study by Costa-campi, M. T. et al. (2018) which, by analysing the effect of energy market integration (EMI) on FDI, concluded that its application signals institutional credibility and alleviates energy costs in an external market by encouraging FDI. This is because an EMI reduces energy uncertainty and price volatility as well as signalling stronger and more reliable institutions. Accordingly, FDI can increase both inside and outside the EMI area through two channels, either by converging energy prices or reducing price dispersion.

In the above study, the integration of the Iberian Electricity Market (MIBEL) in 2007 was used to empirically quantify the effect of the EMI on FDI, and the results showed that the integration of the electricity market in Portugal and Spain increased both the amount of FDI participants and the number of foreign projects. The study also concluded that the increase in FDI was mainly due to the reduction in price dispersion. However, the signal of institutional credibility sent by MIBEL had a greater influence than expected by the real price reduction. In addition, there was also a positive increase in FDI from neighbouring countries (such as France), although of smaller magnitude.

However, despite these positive results, the implementation of an integrated market for electricity and natural gas still seems to be far away, something that has been subject of negotiation and discussion in Europe since the early 1980s. Despite this lag or apparent failure of implementation, energy policy has become one of the EU's key policies, given the common energy goals and concerns of all its Member States[8] . Of particular note are the scarcity of some raw materials, high energy prices, ecological problems and strong economic dependence on oil and natural gas of producing countries.

It is also relevant to add that FDI generally has a positive relationship with economic growth as it enables knowledge of the economy to be increased through the acquisition and

[8] It was in this sense that, when ratifying the Lisbon Treaty in 2007, it was decided to strengthen the powers of the European Commission on European Energy Policy.

diffusion of capacities and the introduction of new management practices at the organizational level (Li and Liu, 2005). Thus, it can be argued that FDI is considered an important determinant of a country's economic growth (Tsai, 1995; Seyoum et al. 2015).

2.3.2. The tax burden on electricity and their effect on income distribution

According to OECD (2011), income inequality reflects the way resources are distributed across society, with the GINI index being the most commonly used indicator in its measurement, which can be calculated for gross income (before taxes and subsidies), net income (after tax and transfers) and through the analysis of spending by consumption. The basis of analysis may still be by individuals or households. This indicator then compares the accumulated proportions of income received, assuming 0 when there is perfect income equality and 1 when there is complete inequality, thus synthesizing the asymmetry of income inequality into a single value. Thus, as the index increases, the inequality in income distribution in a given country increases. For more details see the information in Annex 2.

However, there are other indicators for measuring income inequality beyond the GINI coefficient. The Theil Index, the decile dispersion ratio and the direct measure ratios, such as dividing the total income share by the income share of the poorest, are also listed.

Moving now beyond the definition of the concept, it can be said that the most common explanatory factor for income inequality between countries is economic growth. According to the Kuznets curve (1955) and the inverted U hypothesis, inequality grows at a first stage, and after reaching a certain point decreases, revealing an inverse relationship between economic growth, measured by GDP per capita, and inequality.

However, this relationship between economic growth and inequality has not been strongly supported by the empirical results that test the inverted U hypothesis. While authors such as Dreher and Gaston (2006), Tayebi and Ohadi (2009) have not verified Kuznets's hypothesis, others such as Faustino and Vali (2011) and Majeed and Macdonald (2010) present evidence of their existence. This is due to the different methodologies applied.

Now refocusing on one of the key issues of this study which are distributional effects, it is noteworthy that the heterogeneity of households, especially with regard to income and expenditure patterns, may suggest that equity concerns really justify reducing tax rates for goods and services that make up a larger share of low-income household budgets (Sorensen,

2007). Thus, many countries apply reduced rates to basic needs such as food, heating and electricity, taking into account distributive objectives (Borselli et al. 2012).

By studying the macroeconomic relationship between energy taxes and income inequalities, it can be seen that the application of energy taxes is often hampered by distributional concerns. However, their importance as tools for increasing economic efficiency, achieving environmental objectives and increasing public revenues, will not be overlooked. That is, energy taxes can effectively induce households and businesses to take into account the environmental externalities of energy transformation and use (Oueslati, W. et al. 2017).

In this regard, it should also be noted that the relationship in question is studied if there are no mechanisms for transferring the tax burden from labour and corporate profits to environmentally harmful activities, as well as where these tax reforms exist (the so-called ETR's[9]).

It was then found in the study by Oueslati W. et al. (2017) that, for a panel of 34 OECD countries between 1995 and 2011, in the absence of such mechanisms of ñrecyclingò tax revenue, there is a positive, albeit modest, relationship between the share of energy tax revenues in GDP and the GINI coefficient. This coefficient was the variable adopted by the authors to measure income inequality and will also be one of the variables used in the methodology of the present work. It should also be noted that, based on the previous description of the concept, the GINI coefficient to be used was calculated for the equivalent (net) disposable income, based on households. In contrast, where these mechanisms have been implemented, there is a relatively stronger inverse impact between the share of energy tax revenues in GDP and income inequality. This implies that these mechanisms induced a transfer of income from higher to lower income groups, which led to a decrease in inequality.

Also, in this regard, and when formulating a policy, Vandyck and Regemorter (2014) note that, when additional tax revenue from energy is used to increase social transfers to households, reform is beneficial for low-income groups, notwithstanding the decrease in production levels in all regions of Belgium (country studied by these authors in this area). However, when energy tax revenue is used to reduce direct labour taxes, tax change is slightly regressive, with national GDP being only slightly affected, but regional production levels diverging. Since it was not concluded by the progressive effects of the measure, it appears that this conclusion somewhat contradicts the findings of Oueslati, W., et al. (2017).

[*] Environmental Tax Reforms.

In addition, energy taxes can influence income inequality through various channels that affect household income sources (Fullerton and Heutel, 2007; Mieszkowski, 1969). This is because energy taxes change the relative prices of final consumer goods and factors of production. This change in relative prices will, in turn, induce changes in the demand for goods and services and in the production patterns of firms, bringing the labour market to a new equilibrium, where wage levels and their distribution will probably differ from that observed before the introduction / increase of these taxes. The direction of this change is, however, difficult to predict as it depends on various factors such as the elasticity of demand and supply for different goods and the marginal rate of substitution between different factors of production (Oueslati, W. et al. 2017).

Energy taxes may also result in increased unemployment in the affected industries, possibly accompanied by an industry-specific loss of human capital. At the same time, investments and job creation in less environmentally harmful economic activities are also triggered. Thus, and through these channels, energy taxes affect the distribution of labour and capital income and consequently inequalities in income sources (Oueslati, W. et al. 2017).

It should also be noted in the aforementioned study that one of the countries where inequality in disposable income increased most during the period analysed was Denmark (19.8%), which corroborates what was found by Verbic, M. et al. (2017), already mentioned in this literature review- both studies point to the fact that this is one of the countries where the relative share of taxes in the price of electricity is the highest.

Another aspect that the literature suggests is that the distributional effects of energy tax rates may vary significantly depending on the product to be taxed (Ekins et al., 2011; Flues and Thomas, 2015; Speck, 1999; Wier et al., 2005). In particular, this literature suggests that taxes on transport fuels are mainly proportional or progressive, while taxes on electricity or heating may be regressive.

2.3.3. The increase in the VAT rate on electricity

It is pertinent to present some conclusions from a study by Pereira, AM and Pereira, RM (2018) whose objective was to evaluate the possible impacts of a measure taken by the Portuguese Government in 2011. This measure consisted of increasing VAT on electricity from 6% to 23% as a way of generating additional revenues required by the austerity policy in the context of external financial assistance.

"""""A particularity of this study is that the time period of analysis comprises the years 2005-2014, and the model is designed to replicate a stylized steady state of the economy as defined by the trends and information contained in the dataset. Long-term results (up to 2050) are thus focused.

The main conclusions obtained by the authors of the referred investigation can be integrated into four main levels:

- At budgetary level there is a net increase in long-term tax revenues and a decrease in public debt;
- At the economic level there is a rise in the Consumer Price Index (CPI), which has a negative effect on overall economic unemployment: a long-term fall in GDP and employment as a result of decreases in private consumption and investment. Improvements in the long-term trade deficit are also noted.
- At the distributive level, purchasing power is lost by all households, as a result of higher prices and lower income after tax. But this loss of welfare for families is heterogeneous, that is, it depends on the consumption patterns for each income level and so the effects are most felt by the lower income families. This is because electricity costs are decreasing with income, so there is a regressive price effect that more than compensates for the effect of income progressivity. The observation of such conclusions in terms of distributive effects leads to a need for further study of this issue, thus being one of the motivations for carrying out the present investigation.
- In terms of energy and environment, there is a reduction in energy demand by households and the productive sector, with this drop being more pronounced for electricity. An insignificant reduction in long-term carbon dioxide emissions is also expected, which is not better because households replace electricity with other more polluting energy sources. Moreover, part of this favourable effect derives from the reduction in the level of production due to the weaker economic activity induced by the increase in the VAT rate on electricity. That said, it does not seem to be a viable environmental policy solution.

In sum, the study concludes that a permanent increase in the electricity tax burden, in this case via an increase in the legal rate of VAT on electricity from 6% to 23%, has positive budgetary and environmental effects, but unfavourable economic and distributive effects.

An intriguing issue in this context is the fact that there are three countries in the EU with low electricity tax rates and at the same time subject to Excessive Deficit Procedures and therefore under strong pressure to increase tax revenues. They are France, Greece and the United Kingdom. This is a question that certainly has political, economic and social aspects, but it leaves virtually no one indifferent, whether industrial or domestic consumer, given the weight that taxes have on electricity in Portugal. It thus seems to be an additional incentive for the study of this subject, although its understanding is complex given the various spheres of society, namely politics, present in such situations.

Based on the issue of the most recent economic crisis, indirectly addressed in the above study, its relationship with FDI and income inequality should also be highlighted.

Taking into account the analysis suggested by the relationship between FDI and the most recent economic and financial crisis in the EU, it can be said that there has been a favourable evolution of economic growth worldwide in recent decades, as a result of a significant contribution from FDI. However, the aforementioned crisis affected both the world economy, noticeably from 2008, as well as the sustainability and FDI carried out by multinational companies (Filippov and Kalotay, 2009). Developed countries were more affected by the crisis than developing countries, as they experienced a sharper fall in FDI inflows. In Portugal, FDI decreased significantly in the post-global economic crisis period (Soares, 2012).

It can also be said that most of the investments received in Portugal come from EU countries such as Luxembourg, and that there are some economic variables that explain part of FDI, in particular the size of the market, openness to trade, labour costs and economic stability (Leitão and Faustino, 2010). It should be noted that in recent years the country has attracted some major investments associated with tourism potential, a sector considered one of the strongest in attracting FDI. The automotive sector also continues to benefit from investment opportunities, although in this case there is not an actual increase in FDI inflows, as manufacturers are already installed in the country. Some sectors which are strongly capable of attracting FDI include tourism and leisure, information and communication technologies, energy, services, geological resources and aeronautics (Ernst & Young, 2011).

In the study by Soares (2012), the fact that there is a suspicion of structural instability in the structure of FDI relations and their determinants in the pre- and post-crisis periods led to the analysis being divided into two distinct periods: from 1985 to 2006 (before the crisis) and from 2007 to 2011 (after the crisis began). It was then concluded that the structure of FDI relations

changed significantly with the onset of the latest global financial and economic crisis, especially in developed countries. Determinants such as market size, openness to foreign trade and human capital were the most relevant in explaining FDI relations in the pre-crisis period. Currently, economic and political stability appear to be the determinant that best explains the FDI inflows received by countries. However, it should be noted that when these conclusions were reached, only five years had passed since the start of the economic and financial crisis, which makes these conclusions not benefit from such significant statistical robustness as in the pre-crisis period for the post-crisis period.

As far as income inequality is concerned, and according to the OECD (2014), the booming economic crisis in 2009 and the ensuing recession period halted the downward trend in income inequality until date. Thus, there has been a decline in the GINI coefficient since 2004, which was halted by the onset of the economic crisis, and the coefficient remained relatively stable from 2010, with some decreases in recent years. However, in 2011, Portugal was one of the most unequal countries in Europe in terms of income when measured by any inequality indicator (OECD, 2014). It is also noted that Portugal felt the effects of the crisis later than the other countries in Europe, i.e. household disposable income increased by 2010 and unemployment increased exponentially from 2011, while in Europe these changes occurred earlier.

That said, it is imperative to consider the welfare of families and the social dimension of the crisis. This requires an adjustment process to preserve social cohesion and support future reforms.

As a complement to the above, there are some alternative solutions to the increase in VAT on electricity that may be able to achieve the same objective in terms of public accounts, e.g. the magnitude of alternative fiscal policies corresponds, on an annual basis, to the loss of tax revenues from the reversal of VAT on electricity from 23% to 6%, trying to achieve a less adverse economic and distributive effect (Pereira, AM and Pereira, RM, 2018):

- General VAT Rate increases by around 0.4 percentage points, which means an overall increase in statutory taxes from 23% to 23.4%. Overall, the effects observed at the various levels are more favourable with this measure;
- Corresponding increase in the Petroleum and Energy Products Tax, on average, approximately 13% of the price of each product. Overall, this alternative is clearly favourable from an economic, distributive and environmental point of view. From a

budgetary point of view, it leads to a longer-term decrease in the government debt-to-GDP ratio slightly lower than the current measure;

- Corresponding increase in the Carbon Tax Rate as an environmental measure, which although desirable from this point of view would lead to an economic worsening without alleviating the adverse distributional effects of the current higher VAT rate on electricity.

With respect to the carbon tax on the price of fuels, this measure is justified by the need to monitor the evolution of CO2 licence prices in the European carbon market, which underwent a strong appreciation in 2018. The purpose of this additional tax created by the reform of green taxation is to encourage the decarbonisation of the economy. In this context, given the growing importance of the theme and adjusting the focus of fuels to electricity, this study is a section that deals with the issue of tax incentives to promote the so-called ñgreen electricityò.

It should also be noted that it was a rate of this kind, but with a much more pronounced increase, which was at the base of the protests organised by the movement of the so-called ñyellow vestsò in France, leading the French Government to make some setbacks, even in the year 2018.

This demonstrates the need for some caution with regard to such decisions, given the various economic and social impacts they cause. It therefore seems necessary to strike a balance between what are the requirements of public accounts or even environmental goals and what are the needs and social 'will', where concerns, even if indirect, are found with adverse distributional effects and fiscal equity issues that certain measures cause in the population. In other words, it is not because a society is quite peaceful and somewhat more compliant with the tax demands imposed on it that the harmful effects that certain measures have are not felt, not only in the economic sphere but also at the social level.

Also, in this context, it should be noted that the high costs of electricity lead to little energy being used to heat and cool the houses, says the association ZERO[10], which calls on the Portuguese Government to invest in "simplified support to safeguard people in the most vulnerable socioeconomic conditions." The issue here is the problem of the so-called ñenergy povertyò already mentioned in the introduction of this study.

[+] ZERO: Sustainable Earth System Association.

However, what might seem like a solution to combat the high energy costs is contradicted by the OECD[11] . The reduction of energy taxes, given their significant impact on the final price of energy, could be seen as a way of reducing the impact of this problem on the economy. However, the OECD recommends that the country raise taxes on diesel and the energy taxation of coal and natural gas in order to achieve greater fiscal sustainability and greener growth. This recommendation is based on the fact that the institution considers that ñthere are too many exemptions and reduced VAT ratesò and that strengthening public finances also involves widening the tax base by reducing exemptions and reduced rates on consumption taxes and greater use of environmental taxes. The study also adds that ñthere is scope for increasing environmental taxation, given that national tariffs for some energy sources do not reflect the environmental costs associated with their useò. This issue of environmental taxation will be the focus in one of the next sections of this chapter.

2.4. Relationship between FDI and income inequality

Based on the literature review conclusions about the relationship between FDI and income inequality, the proposed model focuses on these two aspects, which are interconnected. Several studies have associated the internationalisation of a country in general and FDI in particular with income distribution (Jensen and Rosas, 2007; Basu and Guariglia, 2007). However, it seems appropriate to start by stating that, broadly speaking, economic globalisation is carried out in two main ways: the foreign trade path and the FDI path through multinationals. Considering then the FDI pathway, there are studies that conclude that the effects on income sharing differ depending on whether countries are developed or emerging, i.e. they are in the process of moving to developed countries.

Thus, the effects of FDI on income sharing would be positive (i.e. lowering inequality) in developed countries[12], while the reverse would happen in emerging countries. According to Çelik and Basdas (2010), FDI inflows improve equality in income distribution in developed and developing countries and aggravate inequality in emerging countries. As for FDI outflows, they would tend to negatively affect income sharing.

[11] ñOECD Economic Report on Portugalò, published February 18, 2019.

[12] The classification here seems to differentiate developing countries from emerging countries. However, while there is no universally accepted definition, it seems acceptable to regard emerging countries as developing countries that have prosperous economic growth frameworks and socio-economic characteristics that differentiate them from other peripheral economies. The term emerging countries was first used by the World Bank in the 1980s.

Complementary conclusions to these more central ones were also obtained. Increased FDI uptake has been shown to reduce inequality, while diminishing income inequality attracts FDI - a virtuous circle.

It should be noted that the fact that the data used on electricity tax revenues only consider excise duty leads us to believe that if VAT is still added to electricity, the results obtained here were even more pronounced and relevant.

The fact that the variables relating to corporate income tax (CIR) and the degree of openness of the economy (GA) were not significant in this research, leaves room for further research to refine this aspect. The interaction between electricity taxes and pollution taxes can also be deepened to account for the interdependence of the two taxes.

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A ! ! EX

Annex 1

In order to contextualize and standardize the issue of electricity price decomposition at EU level, it should be noted that Eurostat periodically publishes this information according to the following components:

- **Energy and networks:** The energy component reflects the prices formed in the market and related to the purchase and sale of energy delivered to consumers. The networks necessary for the transmission of energy from the power generation centers to the consumers are subject to regulation and the Network Usage tariffs are approved by national regulators.
- **Fees and Taxes:** The fees and taxes component incorporates taxes such as VAT and Excise, as well as other policy-making costs such as costs of general economic interest (CIEG). For example, CIEGs include the extra costs of special regime production under guaranteed prices, the costs of maintaining contractual equilibrium (CMEC), the costs of offsets for isolated island systems, municipal rents and other costs. Network Usage charges reflected in Network Access charges paid by all consumers.

It should be noted that the CMEC is a remuneration paid to energy companies, acting as a kind of insurance to offset the revenues that the company would have from the sale of energy under normal market conditions, being its cost imputed to the taxpayers through the electricity bill. The CMEC arose with the need to replace the Energy Purchase Agreements (PPAs) that were banned by the European Energy Liberalization Directive in 2003, which required an "efficient, free and competitive market regime". These PPAs were created in Portugal with the aim of attracting private capital for energy production, in order to help enhance the value of EDP in the first privatization phase that started in 1997, as simultaneous investment in energy production did not seem advisable. and in distribution given the difficult situation of energy In fact, both the PPAs and the CMEC contributed positively not only to the public coffers with their appreciation during the EDP privatization process, but also to the electricity, as the effective nominal profitability of these contracts was higher than the opportunity cost of the capital considered by government order. These contracts are still expected to be in force until 2027, although their existence and operating rules divide opinions.

In Portugal, the Energy Services Regulatory Authority (ERSE), based on the information published by Eurostat, presents the disaggregated and contextualized information for the

country. Its interpretation is relevant for the simplicity of its analysis, which allows a better understanding not only of the decomposition of electricity prices in Portugal and in the other EU countries, as well as the averages of the EU-28 and the Eurozone. 19, as it also contributes to justify the theme under study.

Fig. 1.1: Decomposition of electricity prices for domestic consumers in DC Consumer Band

Source: ERSE Briefing, 1st semester 2018.

! ote: Dc-Consumption Band between 2500 kWh and 5000 kWh which is the most representative in Portugal.

Fig. 1.2: Decomposition of electricity prices for industrial consumers in the Consumer Band Ib

Source: ERSE Briefing, 1st semester 2018.

! ote: Ib-Consumption band between 20 MWh and 500 MWh which is the most representative in Portugal.

The following are the portions that make up an electricity bill in Portugal in addition to energy consumption, whether the consumer is on the regulated market where the tariff to be paid is approved by ERSE, the so-called regulated tariff, or on the free market[23] where the retailer sets the prices and conditions to apply to the customer.

- Energy Consumption (Assessed by measured consumption or estimated consumption, whether or not there is, respectively, an actual reading during the period to be invoiced);
- Contracted Power (Price varies by offer or trader and is defined at contract);
- Additional Services (These allow you to obtain more favourable energy prices, which may include the maintenance of appliances, construction works, insurance, among others);
- Refunds (Some merchants have loyalty programs that allow you to get refunds of a percentage of the invoice amount, which can be deducted directly from the amount payable or made available on discount cards).
- Fees and taxes (listed in chapter 2.3.3.)

[23] !F)!(*!%$1-::$+!) . -)!) . $!:(G$%-:(H-)(/#!/,!) . $!$#$%&'!O-%I$)!)//I!3:-1$!&%-+2-::'!G$)J$$#!;EE@!-#+!A==C7!

Annex 2

Graphically [Fig. 4], the GINI coefficient can be represented by dividing the area between the Lorenz curve[24] and the equality line across the area below it. As the area of income concentration decreases, the GINI index approaches zero and when the Lorenz curve coincides with the line of equal distribution the GINI index is zero, which means perfect income equality. It is thus a coefficient that measures the discrepancy between perfect income equality and the real situation observed in an economy.

Fig. 2.1: Lorenz curve of income distribution

Source: Reproduced from KAIZELER, A. C. (2012), p. 20

[#%] to each group of the population, which allows a reading of the type: "x% of the poorest population have y% of the total income". The further from the diagonal this lin

Annex 3

Fig. 3.1- Tax incentives for green electricity production in direct taxes

Source: Reproduced from Cansino, J. M. et al. (2010), p. 6004.

Fig. 3.2 - Tax incentives for green electricity production in indirect taxes, pigouvian taxes and others

Source: Reproduced from Cansino, J. M. et al. (2010), p. 6006.

Annex 4

Table: Theoretical summary table of the main articles reviewed.

Article	Analysis Perspective	Sample	Estimation Method
Pereira, A.M. & Pereira, R.M. (2018)	Analysis of a measure taken by the Portuguese Government in 2011, which consisted of increasing VAT on electricity from 6% to 23%. Detailed study of the budgetary, economic, distributive and environmental effects of this measure. It also focuses on some possible alternatives to this measure.	The time period comprises the years 2005-2014 and stock values 2015. However, the model was designed to replicate a stylized steady state of the economy, so long-term results (up to 2050) are focused.	Dynamic general equilibrium model for the Portuguese Economy.
Oueslati, A. et al. (2017)	Study of the macroeconomic relationship between energy taxes and income inequalities, i.e. focus on distributive effects. Of note is the dependent variable GINI and the explanatory variable Energy_Tax	Panel data for 34 OECD countries for the period 1995 to 2011.	Fractional Panel Data Logit Model (PDFL) with correlated random effects. A robustness check was also performed.
Verbic, M. et al. (2017)	The main objective of this paper is to analyse the impact of electricity price on energy intensity. However, a relevant study is revealed as it contains information on electricity price breakdown for households in the EU.	Panel data for EU-28 adding Norway for the period 1990-2015.	Panel data model applying a fixed effects estimator.
Loureiro, A.S.S. (2016)	This paper contributes to the empirical literature on the relationship between FDI, poverty and income inequality by focusing on the analysis in Portugal, characterized by relatively high levels of inequality and poverty.	Portugal was analysed from 1973 to 2014.	Time series estimation (co-integration) was used, namely Johansen's methodology and Granger's causality tests.
Filipovi, S. et al. (2015)	The focus of this paper is to analyse energy intensity in EU-28-member states. However, it is relevant as it contains relevant information on household electricity price breakdown in the EU.	Panel data for the EU-28 during the period from 1990 to 2012.	Panel data model applying a fixed effects estimator. The HAC variance estimator was applied to calculate the standard errors of regression coefficients.
Kaizeler, A. C. (2012)	This article summarizes the literature and empirical studies on the effects of globalization on inequality in income distribution.	Summary of literature findings for developed and developing countries.	It is a synthesis of literature for the realization of a future empirical study and therefore no estimation of econometric models is yet used.

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Article	Analysis Perspective	Sample	Estimation Method
Soares, Cláudia C. C. (2012)	The aim of this study is to empirically analyse the impact of the global financial and economic crisis on the attraction of countries' FDI flows, namely in terms of its main determinants.	FDI flows received in 195 countries are considered, including observations from two time periods: pre-crisis (1985-2006) and post-crisis (2007-2011). The analysis is carried out considering the world as a whole and each continent individually.	Estimation of an econometric panel data analysis model. To estimate the model, we used the fixed effects estimator to allow the estimation of the effect of fixed and invariable characteristics over time on FDI flows, such as geography, language and history of countries.
Cansino, J. M. et al. 2010	It provides a comprehensive overview of the main tax incentives used in the EU to promote green electricity, ie tax incentives to encourage the use of renewable energy in electricity generation. Thus, it contributes to the specialized literature on renewable energies, while being relevant and complementary to this study.	EU-27 study during the period 1996 to 2010.	This is a more descriptive article, so we do not use any estimation of econometric models.
Pereira, Manuel J.R.C. (2010)	The goal is to study the impact of the tax rate which focuses on corporate income on the attractiveness of FDI. This study proves to be pertinent in adapting its econometric model to study the impact of the tax burden on electricity in the attractiveness of the IDE. Of note is the dependent variable FDI.	Panel data for the EU-15 from 1997 to 2007.	Estimation of model parameters with fit least square method with fixed effects. Ten effects were analysed annual time periods and the heteroscedasticity analysis was performed through the estimators Consistent White.

Annex 5

With regard to data on tax revenues from electricity taxes, some aspects should be highlighted:

- These include revenues from excise duties, i.e. VAT on electricity is excluded.
- Denmark: Change of method from 2011, resulting in a better reflection of real revenue. Not comparable to previous years due to included refunds;
- Malta: In 2014, the amount used includes 3,154 million euros related to fees charged in 2012 and 2013;
- Austria: Data for electricity and coal are not presented separately, i.e. both are included in the figures for natural gas. For this reason, it was considered in this investigation that the amount of tax revenue from electricity taxes in Austria is not available;
- Portugal: Special Electricity Tax data available since January 2012.

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