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An analysis on the relationship between Tax Evasion and Environmental Policies

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INTRODUCTION

In recent years, technological and industrial development has had a double face of the world. While considerable progress has been achieved in the socioeconomic sectors, it was causing the intensification of natural and renewable resources used for energy production. These activities gave off a large quantity of substances harmful for the environment, greatly compromising the environmental balance. In developed countries, technology has transformed life and working styles. U.S. Global Change Research Program shows that, human activities, in particular greenhouse gas emissions trapping heat from burning fossil fuels, deforestation and changes in land use, are primarily responsible for climate change in the new industrial age, particularly in the last six decades.

As pointed out by some studies that will be analysed in this thesis, there are cases where the market will not provide the socially optimal quantity of a good, thus creating market inefficiency. Pollution is seen as the end product of an inefficient market, which as a negative effect, creates not only a loss of social welfare but also priceless environmental damage. Theoretical studies suggest that in the presence of pollution, national bodies have to correct the final result through the implementation of particular environmental policies, that see the involvement of the tax system as a fundamental resolution tool. Fiscal environmental reforms are an important instrument to resolve market inefficiency related to pollution. They are an economic and fiscal instrument which could facilitate the development of measures to correct market failure and to achieve environmental goals.

When implementing an environmental tax reform, we need to take into account the administrative costs necessary for the control and collection of taxes. The optimal tax structure must be able to balance the trade-off between administrative costs and costs closely related to environmental regulation. As pointed out in this thesis, tax evasion is one of the factors that creates more administrative cost within the tax system. Indeed, among the negative aspects of the Italian tax system, we can highlight the high administration costs and the high rate of tax evasion. If we think to use the amount of not declared income in every year or the financial resources used by national bodies to combat

the tax evasion phenomenon, to strengthen policies in support of the environmental goals, these financial resources would trigger fiscal, social and environmental benefits. Theoretical and empirical studies lead us to think that, the use of environmental policy based on tax reforms could be a prerequisite in facilitating environmental protection, as they would reduce tax evasion and other inefficiencies within the tax system, while maximising the financial resources for sustainable development.

The aim of this thesis is to study in depth the phenomena of tax evasion and the environmental problem in Italy from an economic and fiscal point of view. In addition, policies and scientific studies will be analysed to highlight the advantages and disadvantages of the connection between tax evasion and environmental taxation goals. Going into more detail, the first chapter will give a definition of tax evasion, to then clarify the path taken in the historical context, focusing on the contrast policies used, and analysing positive and negative aspects; the second chapter deals with fiscal policies for national development with green objectives – in which the subject is analysed from a theoretical point of view – it illustrates the historical path that led to the emergence of the problem, and national policies used to combat it; the third chapter will highlight the links between tax evasion and environmental policies, by analysing scientific studies that demonstrate how tax policies, related to both phenomena, can bring great benefits to both sides.

Chapter 1
TAX EVASION: AN ITALIAN BAD HABIT

1.1 **Definition**

Tax evasion is one of the main problems of modern economy, since it determines the health of public accounts, the economic and financial credibility of the stability of the country.

What do we mean by tax evasion? Paola Maiorano, in an article published in the Economics and Finance Treccani Dictionary in 2012, defines tax evasion as «behaviour in violation of the law in the field of taxes, fees, contributions» (Maiorano, 2012b, p. 1). This definition includes all those illegal procedures aimed eliminating or reducing tax and social security contributions. She says also that «it occurs when the taxpayer withdraws in all 'total' or in part 'and partial' from the tax obligation, by hiding taxable amounts and/or taxes» (Maiorano, 2012b, p. 1). It is a violation of the tax laws deriving from engaging in active or omissive behaviours, to the detriment of the State. The tax evasion phenomenon is distinguished from tax avoidance phenomenon, that is the ability to submit lawfully to contributions, taxes or fees through the use of legal procedures. Usually, tax avoidance aims to reduce its tax burden by means that are not punishable by criminal or civil law (Maiorano, 2012a). In tax evasion the taxpayer clearly violates the tax regulations. However, in tax avoidance, despite making an administrative offence, it does not determine a violation in fiscal terms.

1.2 **Socio-cultural roots**

In Italy, the term 'evasion' is already found in the translation of the principles of J.S. Mill edited by F. Ferrara, but it is with Pantaleoni that it entries in the scientific language (Pantaleoni, 1882).

Payment of fees is one of the main duties mentioned in the Italian Constitution. The Article 53 states that «All are obliged to contribute to public expenditure on the basis of their ability to pay ...», imposing on the citizen the duty to pay taxes to public institutions.

The tax duty is part of the citizens' mandatory duties of solidarity, which are the basis of his inclusion within an organized community. According to the article of the constitution that imposes every individual to pay taxes, by following the liberal ideology of the nineteenth century, taxes are tributes aimed to support public expenditure which are the costs incurred by the State and other public figures to carry out their tasks for the benefit of the Nation (Leccese, 2007).

1.2.1 *The origins of the Italian tax system: first forms of 'tax evasion'*

Until 1923, the structure of the Italian tax system foresaw a strong consumption's taxation. It was held mainly at the municipal level through inner functions, a specific tax levy on individual assets, mainly represented by food products (even the essential one, such as flours), but also from combustible materials and for construction. In addition to its own duties (levied, in most cases, by the municipalities in exchange for an annual fee paid to the State), the State paid some manufacturing taxes. Between the end of the 19th century and the beginning of the 20th century, the first values relating to a form of tax evasion emerged, obtained thanks to the descriptive statistics on estate tax contained in the Gini analysis (Gini, 1962). Particularly useful have been the lists of tax payers' names, published for the first time in 1872. These lists included important data on corporate and professional income tax, and personal income tax with particular attention to RM (Ricchezza Mobile)[1]. Thanks to the studies carried out, an attempt was made to reconstruct a general picture of the tax system. Two important conclusions about tax evasion were attained:

1. The first relevant element was the high number of income of companies and professions which were not subject to tax, and therefore completely escaped tax. The figures showed an increase in the number of collection's acts (tax rolls) of companies and professionals from about 380,000 in 1876 to 565,000 in 1902. The existence of widespread evasion was deduced by comparing the number of roles and the number of people potentially taxable, the latter derived from the analysis of censuses or yearbooks. In 1909 it was found that, in some big cities, «the number of taxpayers affected by the tax in the categories of trades and professions reached only the third

[1] Direct tax that was based on the individual income tax return that each taxpayer was required to complete.

of owners» (Nicola, 1909, p. 412). What at the time was deduced as the missing mechanism of the system, was the lack of the taxpayer's cooperation, required to submit his own declaration (Manestra, 2010);

2. The second relevant element was the small amount of income taxed, broken down by branch. Based on the ministerial reports of the period in which companies and professionals were listed, in the period from 1876 to 1893, the majority of persons had an average annual income of more than 1,000 lire, amount that in 1886 was recognized as the actual salary of a porter who occupied the lowest jobs in the workforce (MEF, 1886). These results strongly questioned the veracity of the taxpayers's statements. (Manestra, 2010);

The data described briefly summarize the first years of the Unification of Italy in tax matters. On them, however, there were several doubts: «tous ces calculs » (Perdrieux, 1910, p. 33), it was already written at the beginning of the century, « ne tiennent pas compte d'une masse de circonstances de fait, et Statisticalens les considèrent comme dépourvus de toute rigueur» (Perdrieux, 1910, p. 33). These criticisms were born from the fact that in those years Italy was in a serious crisis of poverty. These circumstances have been used to justify the lean participation in percentage's terms of regular taxpayers, as well as the mediocrity of the amounts obtained, particularly in the lower middle income brackets.

1.2.2 *Towards the modernization of national accounting: Vanoni's contribution*

A clearer and more complete picture has arrived thanks to Ezio Vanoni, an Italian economist which was a member of the committee charged with preparing tax reforms. He presented a reform, the Vanoni Law, which still represents one of the key elements of the Italian tax system. In the 1950s, he gave for the first time two distinct and separate definitions of tax evasion and tax avoidance; until that period the two different taxes were considered as an only one phenomenon: the tax conformity adopted with tax avoidance procedures and the total or partial non-conformity of the taxpayer as an example of evasive tax action.

Vanoni stated that «48,3% of the missing taxes were in fact divided into a modest 7,7% called evasion and 40,6% to be ascribed to the phenomenon of erosion» (Manestra, 2010, p. 14). In this historical context Vanoni was the author of a major change in the perception of the tax problem. It declared that paying taxes was not primarily a problem of laws or

employees, rates or sanctions, patriotism or civic sense; in its conception the non-compliance was, first of all, a moral problem of conscience, as related to the duty of solidarity (De Mita, 2000). Below is a statement of his past history, which makes clear his perception of the tax problem: «In our country, there is often the feeling that tax evasion has become a way of life, a way of acting to which the public opinion does not react, and to which the individual almost considers a legitimate form of defence, against an imposition that he considers to be detrimental to his or her individual sphere of action… tax evasion takes on the characteristics of a real and substantial anarchy, of a denial of the basic requirements of social coexistence, and it is for this reason that we need to arrive at a system in which there are no justifications or moral, nor techniques of evasion, and leading to the most open condemnation moral before than juridical, for the evader» (Vanoni, 1948, pp. 19-20).

During the 1960s (the modernization of national accounts had already begun in the 1940s), ISTAT[2] declared that there was a need for a renewal of the methodology for collecting and reviewing tax data of the Italian tax system (ISTAT, 1951). New methods of economic survey were added to it, including ISTAT corporate surveys and those for Bank of Italy on the balance sheets of Italian households. Subsequently, there was a simplification of the tax scenario in 1980. They concentrated the main income from taxes, deriving from RM[3] (in addition to the income of the movable wealth struck separate income from business capital and self-employment and employee), land and buildings, additional taxes and IGE[4], in two concentrated taxes, Value Added Tax (VAT) and Personal Income Tax (PIT) (Manestra, 2010).

1.2.3 *VAT, IRAP[5] and IRPEF[6]: an empirical analysis between 19th and 20th century*

VAT and IRPEF had been the subject of numerous studies, partly because of the considerable influence that this type of tax evasion has compared to others.

In 2007 by Margliani and Pisani, reconstructed the phenomenon of VAT evasion for 25 years (1980-2004). The logical hypothesis on which Margliani and Pisani have based their studies, consists in having exhaustive estimates (exhaustive means that they include

[2] National Institute of Statistics.
[3] Ricchezza Mobile.
[4] General tax on buildings.
[5] Regional tax on productive activities.
[6] Tax on personal income.

the economy not observed and not observable) of the Gross Domestic Product (GDP) national accounts, provided by the National Statistical Office (ISTAT). The analysis then continues with the estimates of the Total Tax Base, that is the value of the transactions recorded by the tax if the phenomenon of evasion does not exist, and the estimate of the Tax Base Declared. The comparison of the two parameters gives rise to the undeclared tax base, which is closely linked to the trade covered by the VAT legislation. Once the bases and the respective average rates are known, it is easy to obtain the declared VAT revenue and hidden VAT revenue. In this way, we obtain a tax compliance measure in a given economic system (Marigliani and Pisani, 2007). Their study reveals mixed Undeclared Tax Base values of around 35% for the first ten years, a peak in 1990 (37,1%), followed by a descending phase up to 1999 (26,9%) and therefore a new phase of growth up to 2004 (33%) (Marigliani and Pisani, 2007).

In 1996, Bernardi and Bernasconi carried out further analyses on VAT for the period 1980 to 1994, using the same calculation procedure as previously carried out by Marigliani and Pisani. This time, data are calculated by reference to individual sectors. Listing some percentage values from the early 1990s (particularly in 1991), Undeclared Tax Base's evasion rates were over 50% for public bodies, trade and transport, and 40% for construction and other services, while the industry sector in the narrow sense[7] (the industry with exclusion of the constructions) has stopped to 14.6% (Bernardi and Bernasconi, 1996).

After a brief analysis that allowed to quantify VAT evasion at the end of the 20th century, we investigate some processed data on IRAP, taking as a reference the study carried out in 2006 by Pisani and Polito for the period 1998-2002. It provides an economic analysis of tax data aimed at identifying the IRAP undeclared base component. It is carried out by linking the data obtained from the IRAP declarations and the statistical data obtained from the national accounts (ISTAT). The former reflect the economic situation declared by the taxpayer, while the ISTAT data offer a representation of the macro-economic picture including the hidden component of the tax. Thus, by subtracting tax data from the national accounts, an estimate of the undeclared component is obtained. This is possible after the two sets of data have been homogenised, in order to avoid the calculation of distorted estimates of the evasive phenomenon[8] (Pisani e Polito 2006). The study refers to a

[7] The industry with exclusion of the constructions.

[8] For further information see Pisani e Polito, (2006), "Metodologica di integrazione tra i dati IRAP e quelli di Contabilità Nazionale", in *Documenti di Lavoro dell'Ufficio Studi*.

positive trend in the IRAP evasive phenomenon, which fell to ITL[9] 218 billion in 1998 to ITL 202 billion in 2002. The largest amount of money evaded is concentrated in the south and islands, where, despite a level of income significantly lower than the northern breakdowns, it is estimated to be 39.78% in 2002. In the second place there is the north-west (23.44%), followed by the northeast and the centre, both of which are between 18% and 19% (Pisani e Polito 2006).

Regarding to IRPEF, some studies have been conducted to clarify possible evasion, but the complexity of the system has limited the analysis of the phenomenon (Manestra, 2010). An initial study was accomplished 2000 by Simonetta Botarelli, in which, by referring to the period 1977-1994, she studied the structural evolution of the tax. First of all, it points out that taking into account the interventions of the tax legislator on the structure of tax, only employee income is selected as income with the highest degree of IRPEF coverage. In order to obtain a descriptive picture of the procedures used, it should be noted that on the basis of the results obtained, there is a comparison between tax data, taking into account the progressivity of the tax, and data provided by the national accounts (ISTAT). The study shows that, with regards to the period 1977-1994, the degree of tax-payers' adherence to the IRPEF rate remains constant above 65%, reaching peaks of 70% (Botarelli, 2000).

Also, according to the IRPEF, the study realized in 2008 by Marino e Zizza, allowed to estimate the tax evasion for the year 2004 reconstructing the tax framework by type of taxpayer. It compares the Bank of Italy's Household Budget Survey (IBFI) data, with those provided by the Ministry of Economy and Finance (SOGEI). The possible positive differences between net income per capita recorded in IBFI and income declared in SOGEI were considered evading income. Based on the measurement, the two data sets have been made comparable, for the least approximate result possible (Marino e Zizza, 2008). It should be borne in mind that the difference between net income per capita resulting from the two data sources, interpreted here as tax evasion, may also be due to factors not attributable to this phenomenon (they may be due for example from other microeconomic factors). This study shows that, tax evasion was null and void for employed and retired workers, 56,3% for entrepreneurs and self-employed workers (the income per capita recorded in the IBFI is more than double that resulting from the SOGEI

[9] Italian lira.

data), 44,6% for those who accumulate both types of income and 83.7% for rentiers[10] (Marino e Zizza, 2008).

1.2.4 *The tax evasion phenomenon in the last decade*

Leaving aside the numerous taxes in our system, in this paragraph, we will concentrate only on calculating VAT, IRPEF and IRAP tax evasion, so as to provide a general picture of tax evasion over the last decades. The tax evasion is focused on the taxes and social security contributions deducted from the public budget. It is calculated from the difference between taxes and contributions that have been paid, and the taxes and contributions that taxpayers would have to pay in a system of perfect tax compliance. (MEF[11], 2019b). For the period 1980-2009, ISTAT did an analysis to estimate VAT evasion using the tax gap linked to the non-compliance behaviour of taxpayers (ISTAT, 2011). In the procedure data recorded in the national accounts system and tax system were used, taking into account a range of values between two types of evasive behaviour, with consent (evasion arising from an agreement between operators) and without the consent (does not require an agreement between the parties to the transaction). The amount of tax declared is reconstructed from information on VAT flows paid by taxpayers and information on the average tax rate obtained from the taxpayer returns. The gap is derived by subtracting from the potential base the base of the amount declared, so that will generate an undeclared tax base (with maximum and minimum values). The propensity to non-compliance is given by the ratio between the base gap and the Gross Domestic Product (ISTAT, 2011). The study shows that, after a fairly stable period in the 1980s, with a tax gap of 19,6% in 1980 and a tax gap of 19% in 1988, evasion increased considerably in 1989 and 1990, with an undeclared base of 22,4% in 1989, followed by a slowdown in 1994 (17,6%), for then resuming steeply until its peak in 1996 (22,2%). Since then, there has been a downward trend, although there have been marked fluctuations (18,9% in 2001 and 19,7% in 2006). As for the final part of the series, there are significant improvements in 2007 (16,6%) and 2009 (15,3%) (ISTAT, 2011).
According to the period 2012-2017, the document of the Ministry of Economy and Finance shows the main aspects of tax evasion, focusing in particular on VAT taxes, IRPEF and IRAP (MEF, 2019a). The method used to estimate evasion is based on tax and

[10] Those who live on income deriving from large land holdings.
[11] Ministry of Economy and Finance, indicated in the text with the term 'MEF'.

contribution revenue subtracted from the public budget. The calculations are made by means of a gap's measurement (Gap) between taxes and contributions actually paid and taxes and contributions that taxpayers would have had to pay under a scheme of perfect tax compliance. In this study, we will take as reference the percentages obtained in terms of propensity to the gap. The propensity to gap indicates the non-compliance propensity by taxpayers, given by the ratio between the amount of the tax gap and the theoretical revenue (a reduction of this ratio is equivalent to an improvement in tax compliance). First of all, what emerges from the study is a high propensity to avoid self-employment and enterprise IRPEF. In the period 2012-2014 has been estimated a remarkable increase of the propensity to the gap IRPEF has been estimated, with a rate that goes from 67.4% in 2012, to 68% in 2013, before going up in 2014 with a 68.8%. According to the period 2015-2016 instead, it is recorded a linear trend of the propensity to the gap IRPEF, with a rate of 68.1% in 2015 and 68% in 2016, and then resumed sharply in 2017 with a peak of 69.6% (MEF, 2019a). For VAT evasion rather than IRPEF, the study shows a linear trend in values for the whole from 2012 to 2017. The study shows a little growing trend in the three-year period 2012-2014, with a value ranging from 27.6% in 2012 to 27.8% in 2014, with a significant decrease to a value of 26.6% in 2015, and it stabilized at 27.4% in 2017 (MEF, 2019a). According to the IRAP gap propensity, the period 2012-2017 sees a decreasing trend of the measured values. Despite the trend is characterized by strong negative fluctuation in the three-year period 2012-2014 (reaching values of 23.1% in 2013 and 22.9% in 2014), in the next three-year period 2015-2017 the study shows the consolidation of the value below the average percentage of the period, with a value of 20.9% in 2017 (MEF, 2019a).

1.3 **The theoretical principles for tax compliance improvement**

The Italian taxation is not only among the most exorbitant in the world, but it is also among the most complex (Tfm Group, 2017). It ranks third in the ranking drawn up by the survey 'Financial complexity index 2017', written by Tfm group, a multinational company active in the field of tax and insurance consulting. The study was made by conducting a survey based on 70 questions, in which national accounting and tax experts classified the complexity of their local jurisdiction according to the following weighted parameters: the accounting and tax rules and regulation taxes; how to incorporate relevant

regulations into your business; the risks associated with non-compliance (Tfm Group, 2017).

In structural choices of an inefficient tax system, is possible to identify the solutions in two theoretical extremes: on the one hand the total responsibility of a tax authority and, on the other, the disregarding by the taxpayer for public goods. In this context, there are five types of thesis on which to base a strategy that could bring improvements to a tax system (Manestra, 2010):

- A Quantitative thesis, where tax evasion depends on the level of the tax burden. According to this theory, the explanation of tax evasion lies in the excessive pressure that encourages non-compliance; as a solution, it would be useful to adopt a policy of tax reduction, where taxes are reduced to encourage voluntary compliance by the taxpayer. However, in the Italian historical experience, there has been a strong recourse to an incremental tax rate, in which the tax was increased to compensate for the non-compliance.
- A Structural thesis, where the presence of a problem in the construction of the tax system is maintained, attributable to technical errors or to the inconsistency of taxes compared to the social and economic fabric of the country. It would imply a structural overhaul of the tax system by modifying, replacing or supplementing the existing system.
- An Administrative thesis, where tax problems are caused by mismanagement of the tax system. This thesis in its turn can be divided into two theoretical subsets: the procedural subset, if it presupposes shortcomings or defects in the provisions governing the tax process (declaration, payment, evaluation, litigation, collection); the organisational sub-set, if it concerns the provision and distribution of the human and instrumental resources of the financial administration.
- A Behavioural thesis, in which the inefficiencies of the system are attributable to a taxpayer's attitude towards tax authorities, characterized by a lack of a sense of civic duty or political protest. The solutions proposed include a series of authoritarian measures, from punitive measures (sanctions and strengthening of investigative powers) to the collaborative measures, which aims to involve the taxpayer at a persuasive level, educating him from the fiscal point of view. The latter has been one of the strategies adopted by the Italian State in recent years.

- A Legislative thesis, for which the formal complexity of the system is held to be responsible for the tax non-conformity. In this case, a procedure is suggested whereby the problem should be tackled from the optimization of the regulatory structure.

1.4 **Analysis of the evasive phenomenon in Italy: Shadow economy**

In recent years, significant progress has been made in combating tax evasion, and a large part of the revenue has emerged from it. Nevertheless, regarding to taxes and contributions, non-compliance has been estimated at more than EUR 100 billion (MEF, 2014). A phenomenon closely related to tax evasion is the shadow economy. It represents one of the more acute phenomena at international level, especially in Italy. It comes from the production activity of goods and services that, although legal, escapes from the government statistical observation, thus re-entering in tax and contribution fraud phenomenon. Moreover, the shadow economy encompasses all economic transactions that are not directly observable by the State and by official statistics. Methods of shadow economy estimation are divided into direct and indirect methods. Direct methods, which refer to microeconomics data, are based mainly on surveys carried out on households, businesses and data from tax surveillance activities. Indirect methods deduct the size of the deficit from the comparison of macroeconomic indicators (for example, the income generated and its use for consumption, investment and savings; input of electricity and output from industry; demand for actual currency and in the absence of taxation; actual unemployment and participation rate deemed likely on the basis of sex and age). (Zizza, 2001). The knowledge of the shadow economy phenomenon is a necessary condition to provide exhaustive estimates of gross domestic product, and for measuring its impact on the growth of the economic system.

In Italy, the shadow economy is very widespread, especially in some production sectors. Between 2000 and 2008 the amount of the shadow economy ranged from EUR 255 billion to EUR 275 billion per year, around 16-18% of national GDP (ISTAT, 2010). Thanks to the study presented by Schneider et al. (2015), it was possible to understand the phenomenon in the decade, referring to the period 2013-2014. According to that period, Italy recorded an unobserved economy value from a 26.8% of GDP in 2003 to 20.8% in 2014. Instead, analysing the study of Filippo Elba (2016), it was possible to make a comparison among the percentages of the Italian shadow economy with two of the main

European countries, France and Germany. By referring to 2014, France estimates a shadow economy of 10.8% of GDP, follows Germany with 13.3% of GDP (Elba, 2016). The Italian performance has improved over the years (20.8% in 2014), but still far from the percentage of the other two European countries. A study done by Murphy (2012), provided an essential contribution to the analysis of the phenomenon. The data analysed, provided by the Statistical Office of the European Union, are based on the size of the shadow economy calculations and referred to all the European countries. Relating to the dimension, the size of shadow economy also came from the World Bank, that has defined it by including all market-based legal production of goods and services that are deliberately concealed from public authorities (Murphy, 2012). According to the study, the shadow economy in Italy is estimated at more than 400 billion in 2009. It caused a loss of revenue of 180,2 billion euros, which includes both the non-payment of taxes and social security contributions. In both cases, the study shows how the two estimates represent the highest values recorded at European level in 2009 (Murphy, 2012). Another study carried out by the Centre for Studies and Research of Southern Italy (Intesa San Paolo), has estimated for the year 2018, the value of the Italian shadow economy at 22.9% of GDP in 2018.

Tax Evasion is one of the main factors influencing a country's economy. If we look at the Italian figures, the sum they represent is one of the major obstacle to national development policy, because of subtracting revenue, they in turn distort normal market mechanisms, making enterprises less competitive (Confindustria Study Centre, 2019).

1.5 **Negative aspects in the Italian tax system**

Italy, because of its tax regime, is one of the least competitive countries in the OECD, and this represents an obstacle to the economic development of the country (Confindustria, 2018). The report, written by Confindustria in 2018, compiles a list of negative aspects that characterize the structure of the Italian tax system. In particular, it highlights the high tax burden, the high tax and contribution burden on labour, the high rate of tax evasion and the complexity of tax rules and obligations (Confindustria, 2018). These aspects, according to the Confindustria Study, create an important gap compared to the main European partners, which results in a less competitiveness and attractiveness of the Country (Confindustria, 2018). Regarding to these ones, the report stresses that the Italian tax and contribution burden in 2017 was 42.4% of GDP, slightly lower than in

some European countries such as France (46.5%) and Belgium (44.8%), but much higher than other major countries such as Germany (33.6%) and Spain (33.9%) (Confindustria Study Centre estimates elaborated on European Commission data). Focusing on the high tax and contribution burden on the labour market, it turns out to be the highest within the Eurozone. Revenue from taxes and contributions as a percentage of labour income was 42.6% in 2016, higher than the Eurozone average (38.4%) (Confindustria Study Centre, 2018). Regarding to high taxation and tax evasion, the tax burden on the taxpayer calculated by comparing tax revenue to the net GDP of shadow economy was 53,4% in 2016, in first place among the European countries and very far from the average of the Eurozone (46,8%). According to estimates by the European Commission (2016), the Italian tax evasion referring only to the VAT gap, obtained from the difference between the revenue collected and what is supposed to be collected, amounted to 36 billion euros, 25.9% of theoretical VAT revenue. It is slightly lower than in previous years, but still higher than in other European countries. The Italian tax system is also characterised by its high level of complexity. The tax rates of the different taxes are accompanied by an articulated system of 'tax expenses'; this term indicates the different forms of exemption, exclusion, reduction in tax, or schemes based on existing legal provisions (in 2018 tax expenditures are involved in the majority of taxes, and the loss deriving from non-collection tax revenue exceeds the 54 billion euros)[12] (CSC, 2018). Moreover, some of these tax mechanisms over the years have changed the original system of individual taxes and have made it more difficult to comply properly with tax rules. The complexity also relates to the time required for a company to fulfil its tax obligations. According to the World Bank's paying tax survey, in 2016 in Italy the time required for a company to comply its tax obligations was 238 hours per year, higher than required in other major euro countries such as Germany (218 hours), Spain (152 hours), France (139 hours), Belgium (136 hours), Austria (131 hours) and the Netherlands (119 hours) (World Bank Group, 2017).

[12] Among the tax expenditures, some benefits were not included for questions of homogeneity with the definition elaborated by the OECD. Among these, the reduced rates of VAT, the deductions for expenses for the production of income, the deductions of mandatory social contributions, substitute taxes on capital income (Ministry of Economy and Finance (2017), Annual Report on tax expenditures).

1.6 **Strategy and results: Activities against tax evasion**

In recent years, with L.D. 193/2016, L.D. 50/2017, L.D. 148/2017 and L.D. 119/2018, and with the budget laws developed in 2017 and 2018, the Italian State has introduced many measures with the aim to contrast tax evasion so as to improve compliance among taxpayers, in particular for VAT. The strategy used to promote tax compliance was to develop a cooperative relationship between taxpayers and tax agencies. For this purpose, attempts have been made to modify the system, by simplifying the accounting and reporting obligations of taxpayers and introducing tools and procedures to facilitate communication with administrations. An example, may be the presentation of the supplementary tax return attached to the original tax return presentation, in which the taxpayer finds errors in compiling the data or that has not provided all the elements necessary for identifying the income or any tax deductions. From a bureaucratic point of view, however, this new strategy has allowed the operating structures to address defaulting inflows, allowing for a number of several important resources available, to focus on less collaborative and less transparent contributors (MEF, 2019b).

1.6.1 *Preventative and contrast measures*

The main activities put in place by the government are finalised to consolidate the governance of the tax administration through a stronger coordination of agencies and improvement of the strategic management. The aim was to improve prevention activity, simplify and digitise compliance activities, reduce the tax gap and improve the collection of the tax system (MEF, 2018). For this purpose, the national revenue authority has carried out activities to prevent and combat tax evasion and avoidance, with strategies oriented to voluntary compliance of the taxpayer. In case of prevention activities, the instrument chosen to positively affect the moral tax is represented by the communications sent to citizens, professionals and companies, for the promotion of compliance (MEF, 2018). There are two types of communication that have been developed: those that are sent close to the deadline for submitting declarations and those which contain reports of probable errors and omissions made when completing the declaration (MEF, 2018). The strategic approach directed at the taxpayer is producing positive results, both in terms of change in behaviour and in terms of recovery of taxes that have not been paid or have been paid but wrongly. In 2017, the use of the compliance strategies has allowed to collect

from the declarations of the taxpayers a total amount of 1,3 billion euros, recording an increase of 160% over the result achieved in 2016 (MEF, 2018).

Referring to the functions of the Ministry of Labour and Social Policies, the reorganization has previewed, with executive decree 14 September 2015, n. 149, the institution of the National Inspectorate of the job (INL), with the integration into a single agency of the inspection services of the Ministry of Labour, the INPS and INAIL. The aim of this exercise was to rationalise and simplify the supervisory work in the field of labour and social legislation (MEF, 2018). In relation to the INL inspection activity, for 2017, results obtained in the field of prevention and combating of contributory evasion have seen the recovery of social security contributions and insurance premiums, for an amount of 1,1 billion of euros (MEF, 2018). The National Institute of Social Security (INPS) supports the action against tax evasion implemented by the INL, aimed at verifying the regularity to identify breaches of major economic importance. It is made through the administrative verification or documentary supervision of individuals and company contributions. Regarding to the strengthening of tax evasion and avoidance control activities, the National Institute of Insurance against Accidents at Work (INAIL) introduced a Business Intelligence-based system[13], involving systematic and in-depth analysis for the selection of companies potentially at risk of evasion, risk of avoidance or use of irregular labour. Then, it will then have the task of contrasting legality to work (MEF, 2018).

1.6.2 *VAT gap and recovering measures*

In Italy, VAT gap can be broken down into the following components (MEF, 2018):

- evasion of omitted billing, or the so-called evasion with consent;
- evasion of omitted declaration, or the so-called evasion without consent;
- evasion of omitted deposit.

Tax evasion from omitted billing is difficult to contrast with specified law. It is based mainly on the will of the economic operators who, by mutual agreement, do not make the tax receipt, thus avoiding the correct registration of taxes. Procedures to combat this

[13] It has provided an agreement between Inail and Unioncamere to put their technological know-how as a common factor, allowing them to strengthen strategies to contrast insurance and tax evasion against workers.

illegal practice result in a difficult investigation, particularly because it is dependent on the responsibility of economic operators. For this reason, the financial administration strategy has decided to introduce some fiscal incentives, as an instrument for the emergence of a counter-reaction of interests between the parties, in such a way as to make it convenient to issue tax receipts and thus to enable them to be traced electronically. (MEF, 2019a).

In order to combat evasion resulting from omitted deposit or the omitted declaration, lately the government has taken specific measures which have helped to reduce this evasive phenomenon. Some measures have introduced a different method of payment of VAT compared to the ordinary method. It gives the burden of tax payment to taxpayers considered more "reliable" in the performance of tax obligations. These measures include both introduction and extension of the reverse charge[14], and subsequently the extension of the application's scope for the split payment mechanism[15]. Moreover, the Budget Law 2018 introduced the widespread obligation of electronic invoicing to end consumers (introduced in 2014, and until 2016 only for public administration, to be extended in 2017 to private economic operators such as businesses and professionals). (MEF, 2018).

1.6.2.1 Electronic invoicing

In this paragraph, we focus on the procedure related to compulsory electronic invoicing, a strategy that has enabled a large part of the VAT tax gap to be recovered in recent years. Through an interchange system, it enables the financial administration to acquire real-time information on the issuance and receipt of invoices between users. At the same time, it allows to carry out checks on the consistency between VAT return and VAT deposit (MEF, 2019a). As a result of the 2014 Budget Law, it appears to be a particularly effective instrument. Thanks to this procedure, the government guides the system towards digitisation and a simplified administrative framework (before the introduction of this mandatory procedure, the tax administration took about 18 months to establish the existence of a defaulting trader and combat VAT fraud) (MEF, 2019a). The immediate availability of electronic invoices allows a reduction in verification times, and this entails

[14] Reverse charge is the VAT application method which makes it possible to carry out the reverse charge of this tax directly on the recipient of the supply of the good or service, rather than on the supplier.

[15] Introduced with the Stability Law (2015), it is a VAT liquidation mechanism to be applied when private companies have commercial relations with public administrations.

more effective control procedures in combating tax evasion. Some data on VAT revenue related to internal trading in the first four months of 2018 show that, considering the results obtained in the reference months of its first application (2015), VAT revenue has risen by 5,4%. The importance of these data takes on even more value considering the static phase of the economy recorded in this period (Montanino, 2019).

An estimate of the effect generated by the electronic invoicing introduction on tax revenues is made with the study done in 2019 by the Department of Finance and the Agency of Revenue (MEF, 2019a). They have set up a system for monitoring VAT revenue flows and prepared a methodology for comparison, with a few indicators representative of trends in revenue. In this estimation was isolated the tax revenue factors from exogenous elements of the normal business cycle evolution. Since the link between revenue and any economic indicator is not deterministic, two indicators were used to define a range that would express the minimum and maximum assumptions on the evolution of the fiscal development (MEF, 2019a). To identify the change in revenue related to the business cycle, a constant elasticity between VAT revenue and the macroeconomic indicator is supposed, the latter represented by the amount of internal resources compatible with gross VAT produced by domestic trade and gross receipts of industrial consumer goods (MEF, 2019a). By subtracting the amount of revenue calculated on the basis of the macro indicator reference to the net VAT accrual, there will be a residual unexplained revenue which includes the effect of electronic invoicing. From this point, based on estimates made by the Department of Finance and Revenue (MEF, first half 2019), was obtained an unexplained residual VAT revenue was obtained, attributable to the effects of electronic invoicing, which ranges from EUR 0.9 billion to EUR 1.4 billion (MEF, 2019a). From a theoretical point of view, this value represents the tax recovery obtained from the amount of tax evasion.

1.6.2.2 Synthetic Stability Indexes (ISA)

One of the mechanisms adopted by the Italian authorities against tax evasion is the adoption of the Synthetic Indices of Tax Reliability (ISA). Strongly supported by the Organization for Economic Cooperation and Development (OECD), they are indexes developed with a methodology based on data analysis and information related to multiple tax periods. They represent the synthesis of elementary indicators designed to verify the normality and coherence of business or professional management, including different tax bases. The Italian Revenue Service (ISA) has developed these indices in order to

encourage the spontaneous emergence of tax bases, to stimulate the taxpayer's tax liability for business activities, arts or professions and the strengthening of collaboration between them and the Italian Revenue Agency Service (Revenue Agency Service, 2019). The ISA procedure allows economic operators to independently assess their position and verify the level of reliability on a scale from 1 to 10. Depending on the value reached, for example, they can be excluded from some checks, or be exempted from affixing the conformity visa for the clearing of loans and other taxes. The application of the reliability indices is one of the initiatives that National Revenue Agency has adopted in order to foster more cooperation between tax authorities and taxpayers, promoting the spontaneous fulfilment of tax obligations (tax compliance) (Revenue Agency Service, 2019).

The introduction of reliability indices also aims to counter undesirable behaviour, distortion of competition and market rules. The goal of this procedure is to move from a repressive logic to a rewarding logic. This is in line with the wider strategy to improve relations between tax authorities and taxpayers, aimed at strengthening ex ante prevention compared to ex post repression, and developing greater equity in the relationship between the taxpayer and financial administration (MEF, 2019b).

1.6.2.3 Sales receipt lottery

«Effective from 1 January 2017, taxpayers, natural person resident in the territory of the State who make purchases of goods or services, outside the exercise of commercial activities, art or profession, by traders who have opted for electronic transmission of fees, can participate in the drawing of lots of prizes awarded under a national lottery. To participate in the extraction, it is necessary that taxpayers, at the time of purchase, communicate with the merchant his tax identification number and that the latter transmits the data to the Revenue Agency Service» (LEGGE 11 December 2016, n. 232, comma 540). As a result of the budget law 2017, in the new 2020 budget law, is a planned a practical test on the so-called 'lottery receipts', a real lottery managed by the State in which consumers who purchase goods or services from a merchant that adapts the telematics payments transmission can participate. With the introduction of the electronic receipt, the sales data will be transmitted directly to the tax authority, which will be able to carry out more timely checks. In addition, by DECRETO-LEGGE 26 October 2019, n. 124, Art 19, paragraph 1 letter a, the Public Government has made some amendments to the Article 1 of the law 11 December 2016, n. 232, paragraph 540, adding the following

amendment: «Awards do not contribute to the recipient's revenue for the whole amount paid during the tax period and are not subject to any tax collection».

The first instructions are provided by the legislative provision of 31 October 2019[16]. Contrary to what was thought, it will not be enough to provide the fiscal code, but the lottery code, which every consumer will have to generate on the so-called "lottery portal" on the website of the Revenue Agency. The code, as well as the sales data, will be transmitted by the traders to the Revenue Agency. Merchants will play a key role in the operation and, in the first place, will have to update the electronic recorders by 31 December 2019 to allow the acquisition of the lottery code. The receipts lottery will be the first anti-evasion measure that will directly involve the consumer who must provide the merchant his lottery code, in order to participate in the drawing of the monthly and annual prizes provided. According to the Government, the possibility of participating in the State lottery will encourage consumers to request the issue of the tax receipt to the retailer (D'Andrea, 2019).

1.7 **Achievement results**[17]

Recent results on tax evasion show a total tax gap of around EUR 109,7 billion over the three-year period 2014-2016, of which EUR 98.3 billion in tax revenue and EUR 11,4 billion in contribution revenue. From 2014 to 2017, there has been a significant reduction of the tax revenue gap (EUR 4,6 billion), from around EUR 95,4 billion in 2014 to around EUR 90,8 billion in 2017. Limiting the analysis to 2016-2017, there has been a reduction of the tax revenue gap (excluding employment and TASI) by EUR 1,1 billion, mainly due to the reduction gap of personal income tax and corporate income tax (EUR 1,9 billion, equal to a decrease of 5,5%). On the other hand, for the same period, there was an increase in the VAT gap of EUR 1,1 billion (up 3.1%)[18] (MEF, 2019b).

[16] Electronic storage and telematics transmission of the data of the valid consideration for the lottery of the referred to in article 1, paragraphs from 540 to 544, of the law 11 December 2016, n. 232.

[17] Tax gap estimates depend on the evaluation of the shadow economy, which, like all statistical data, may be subject to revisions and errors, and by the hypotheses adopted to make national Accounting data comparable with those of the tax register.

[18] Given the characteristics of the methodologies used, marginal variations from one year to the next should be interpreted with caution, as they could be due to statistical approximations.

Paying attention to the data disclosed by NaDEF 2019 (Update Note on the Economic and Financial Document), we focus on current revenue from activities against tax evasion. In 2018, the annual result of the Internal Revenue Service, relating to the overall collection target from evasion, is 19,2 billion euros (-4,5% compared to 20,1 billion euro in 2017). For the year 2019 instead, referring to the NaDEF 2019 (Confindustria, 2019), Confindustria has drawn up a series of observations in which identifies new estimates on a further recovery from evasion. It shows a recovery of EUR 15,34 billion in 2019 (including EUR 12,57 billion resulting from tax assessment and control activities and EUR 2.76 billion from interests and sanctions). These data turn out more of approximately 0,41 billion euros regarding to the revenues in 2018 (pairs to 14,93 billion euros). As the document notes, the new esteem is slightly advanced (+2,14 billion euros) regarding to the preventive revenues in the document DEF of April 2019 (13,20 billion). The difference is likely to result from an increase in VAT revenue (+EUR 1,72 billion) and a more dynamic IRPEF (+EUR 0,43 billion). This increase is strongly evidenced also in the estimated data for 2019 and those estimated for 2020 and 2021 (respectively +2,68 and +3,04 billion euro) (Confindustria, 2019).

According to the taxpayer orientation strategy, it is producing positive results both in terms of increased managerial levers to promote behavioural change and, in terms of recovery from taxes not obtained or obtained to a lesser extent. In 2018, the increase in taxpayer's compliance strategies, resulted in higher revenues of 1,8 billion euros, with an increase of 38,5% compared to 2017 results.

As regards to the analysis carried out by the Confindustria Study Center (Confindustria Study Center, 2019) it is noted that, despite the stagnation observed in recent years due to a decrease in internal resources, tax revenue from VAT appears to be increasing. It shows how in the first five months of 2019, VAT revenues generated by the domestic trade recorded revenues of 44 billion euros, 2 billion more than in the same period in 2018 (+ 4,6%). According to these studies, the increase in VAT could show an anomaly. However, considering on the one hand the decrease in production of domestic resources, and on the other the increase in VAT revenue, the trend to reduce tax evasion can be sufficiently deduced, since the study reveals an increase in tax revenue compared to the slowdown in the tax base. The growing revenue recorded could be attributed to the private extension of electronic invoicing compliance (Confindustria Study Center, 2019).

As far as the Synthetic stability indexes (ISAs) are concerned, since this is a newly implemented and completed operation, no data are available to allow us to assess it. We can only offer an initial opinion from the MEF in its statement for the fiscal period 2017 (MEF, 2017), where structurally they state that, the introduction of ISAs has primarily led to a significant simplification of the tax framework, reducing the number of economic sectors and the homogeneity of groups by company types.

1.8 **Future projects**

From what we can gather from reading the chapter, several manoeuvres have been implemented in recent years to strengthen the tax system and combat tax evasion, developing strategies that involve the active participation of taxpayers.

Referring to the new 2020 budget law, a series of fiscal manoeuvres will be implemented, in order to maintain the positive trend in recent years. It provides procedures to combat tax evasion and tax fraud, as well as measures to recover tax revenue, where this is also possible through increased dissemination of traceable payment instruments. The national government has also expressed its willingness to continue action against tax evasion by simplifying the rules and compliance, as well as promoting compliance by taxpayers. It will also introduce, in order to conduct more transparent commercial transactions, specific measures to facilitate the use of electronic payment methods, while aiming at increasing taxpayers' digital capacity in using them. In this context, electronic invoicing procedures and telematics transmissions (starting from 1 January 2020) will be extended to all exhibitors (Confindustria, 2019).

Regarding to the electronic and cash payments, a new limit will be set for cash payments that will fall from three thousand to two thousand euros, and then fall to one thousand euros in 2021 (Imparato, 2019). In addition, the national government should start testing the so-called lottery of sales receipts, in which those who purchase goods or services from the undertaking carrying out the electronic transmission of commissions could participate. With the introduction of the electronic sales receipt, the sales data will be transmitted directly to the tax agency, thus allowing it to optimize the control time on the tax compliance of each exhibitor (D'Andrea, 2019).

Chapter 2
CLIMATE CHANGE:
A GLANCE ON PUBLIC POLICIES

2.1 **Introduction**

In 1987, the World Commission on Environment and Development (1987) tackled the problem of economic development, paying particular attention to environmental degradation. The definition of this new environment and economic objective gave rise to a heated political debate, in which we began to talk about the so-called 'double dividend effect'. The double dividend literature examines welfare gains from implementing a revenue-neutral tax reform in terms of fiscal balance (Nathalie Mathieu-Bolh, N., 2017). The Double Dividend Effect is the result of reforms based on restrictive fiscal instruments. It combines and increase in environmental tax look forward to correct the negative externality and reduce taxes on labour and capital. The environmental dividend is the wealth gained from improved environmental quality, while the non-environmental dividend is the capital gained from the more efficient tax system. If the conditions of both dividends are verified, we are in the presence of a double dividend. The development of environmental taxes not only create environmental benefits, but could affect the efficiency of the tax system (Nathalie Mathieu-Bolh, N., 2017).

The fiscal environmental reforms are one of the more important parts for regulating pollution. They are an economic and fiscal instrument that can used to facilitate the development of measures to achieve environmental goals (Bontems and Bourgeon, 2003). When an environmental tax reform is implemented, policy maker needs to take into account the administrative costs necessary for the control and collection of taxes. The optimal tax structure must be able to balance the trade-off between administrative costs and costs related to environmental regulation (such as environmental subsidies) (Smulders and Vollebergh, 2001). As verified in the previous chapter, tax evasion is one of the factors that creates more administrative cost in the tax system. If we think to use the amount of not declared income in every year or the financial resources used by national bodies to combat the tax evasion phenomenon, to strengthen policies in support

of the environmental goals, these financial resources would trigger fiscal, social and environmental benefits. This leads us to think that, the use of environmental policy based on tax reforms could be a prerequisite in facilitating environmental protection, as they would reduce inefficiencies within the tax system, while maximising the financial resources for environmental protection.

In this chapter, we will focus on the pollution problem, how it arose and how it was tackled, taking a closer look at economic and fiscal policies used mainly to influence the behaviour of individuals towards more environmentally sustainable habits.

2.2 **Current situation**

The Earth's climate is changing much faster than anyone could ever imagine, to the point that scientists are continually undertaking new catastrophic scenarios on the future. Recently, technology and industrial development has positively affected the socioeconomic sectors, while however causing a more intense use of natural and renewable resources for energy production. These activities gave off a large quantity of substances that were harmful to the environment, greatly compromising the environmental balance.

In developed countries, technology has transformed the life styles. Likewise, these transformations are taking place in the richer parts of developing countries. Studies of U.S.GCRP[19] about climate change show that, human activities, in particular greenhouse gas emissions trapping heat from burning fossil fuels, deforestation and changes in land use, are primarily responsible for climate change in the new industrial age, particularly in the last six decades. The concentration of carbon dioxide in the atmosphere, the main man-made substance that contributed most to global warming, increased by about 40% in the industrial era compared to the previous era (USGCRP, 2018). This change has led to an intensification of the natural greenhouse effect, leading to an increase in the temperature of global surfaces and other unprecedented changes in the earth's climate in modern civilization. Greenhouse gas emissions from human activities will continue to affect the earth's climate for decades and even centuries, and this is because we are adding carbon dioxide to the atmosphere at a much faster rate than is removed from natural

[19] U.S. Global Change Research Program.

processes, creating the persistent conditions in which gases remain in the atmosphere for long periods and thus lead to overheating of the earth's changes (USGCRP, 2018).

The modern industrial economies, such as North America and Asia, are responsible for a large part waste, polluting emissions and global environmental damage. In addition, poverty, rapid population and growth in developing country have triggered a bad effect on natural resources such as forests, land or water. If the current consumption trend continues in the coming years, in 2025 two thirds of the world's population will live in water-water stress. (Saturnino and Imperatrice, 2004). Today, natural resources, ensure the survival of about a third of the population, and the environmental decline would reduce future well-being. This phenomenon forces economic and fiscal policies to focus as much as possible on a strategy aimed to progress and well-being, while ensuring at current and future generation to environmental heritage accessibility (Saturnino and Imperatrice, 2004).

These and many other issues require all global countries to embark on a strategy based on general policies, able to bring the entire global population to the same level of information, in such a way as to address the real problems and enable their country to overcome this problem within own territory. First of all, effective policies would need well-defined policy objectives, able to better address climate change. Current negative actions need to be changed, taking into account policies on their own country that must support citizens through economic subsidies or other adoption methods. These public policies must enable the population to behave in such a way as to counteract the bad behaviour that threatens the environment. In addition to the priorities listed above, considering the environmental problem from an international perspective, it is important to recall certain fiscal instruments applied to current public policies able to modify reforms lacking in environmental requirements. In that sense, economic subsidies and environmental taxes to promote environmentally-friendly behaviour would play a key role. Institutions should encourage a more efficient use of resources, while reducing pollution and excessive consumption of renewable resources (USGCRP, 2018).

National Government has to take a strong position to maximize environmental quality, as they are responsible for raising awareness among their citizens and setting specific goals. The national agencies have to adopt policies that adequately balance social benefits and costs, with particular attention to the issue of fairness and the constraints of the real world (USGCRP, 2018). For this reason, a mix of public policies (economic and fiscal policies)

will be necessary to operate on different time level (medium-long term), different spatial level (local, regional, national and global) and different institutional stakeholders (companies, governments and civil society). Such policies could bring taxpayers closer to the tax system, to reduce evasion, while contributing to an important common cause, world peoples' survival. (Rayner and Malone 1998).

2.3 **Environmental economics theories**

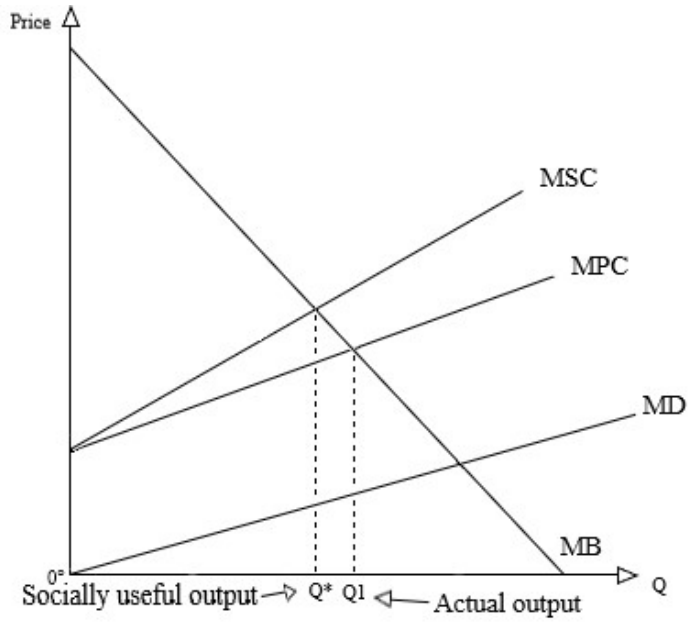
The environmental economy shows the big differences between the traditional administrative regulations and the economic incentive regulations. Operators know that, economic instruments cannot replace all administrative regulations. There are substantial problems in pollution control, and the number of pollutants is so high that a global charging system could become incredibly complex. State failures are as significant for pollution production as traditional market failures. From an energy source point of view, the National Government has failed to address environmental problems with policies that reduce energy demand and facilitate cleaner energy sources. On the contrary, considerable resources have been wasted on an expansionary policy and on solving less value problems (Andersen, 1994).

According to the commons and services production in a given market, if a market is organized, price is in equilibrium and market is perfectly competitive, so that there are many buyers and sellers of an identical product that maximize their utility, the market is able to allocate resources and full efficiency is achieved (Andersen, 1994). But, if a given market fails to allocate resources efficiently, we will face a market failure. When a market failure occurs, a price mechanism does not take into account all costs and benefits related to the supply or consumption of a specific good. When this happens, the market will not produce the supply of the good that is socially optimal, and will be over or under-produced (Hardin, 1968).

In most cases, economists see pollution as an inefficiency of market failure. To better understand pollution as an inefficiency of the market, let us take the example of a metallurgical industry, in which as a polluting effect released a chemical that we will call dioxin. Once released into the environment, dioxin causes congenital malformations and tumours. The first fundamental theorem of the welfare economy states that, markets allocate resources efficiently. In our example, the substance released by industry is the result of the markets functioning. Its presence in the environment causes a decrease in the

well-being of the population, but it is not compensated by compensation for the damage suffered, despite the producer's choice negatively affects the population's well-being. According to that point, when the activity of a producer or consumer directly affects the welfare of another subject, without compensating the injured party, the effect is defined 'externality' (Rosen and Gayer, 2018). Externality alters the conditions of economic efficiency. This means that pollution, as an externality, generates economic inefficiency. To better understand the concept of pollution as externality due to inefficient resource allocations, we will analyse from the graphical point of view the example of the polluting metallurgical industry and the surrounding population **(Figure 1)**. In that sense, the diagram in **Figure 1** shows on the horizontal axis the quantity of output Q produced by the factory, while on the vertical axis we will indicate the Price of the good. The Marginal Benefit curve (MB) shows the factory marginal benefit. For a given level of production, it is associated with a Marginal Private Cost (MPC), which reflects the payment of production inputs. The factory causes Marginal Damage (MD) to the population, as a result of the pollution by the volume of output produced. The slope of the Marginal Damage curve is positive, because at increasing levels of pollution, the population sees environmental conditions worse. If the factory wants to maximize its profits, it must produce all marginal output units so that the MB is greater than the MPC. From the population point of view, the output should take place as long as the MB of society exceeds the Marginal Social Cost (MSC). The components that generate the MSC are the productive inputs of the factory plus the marginal damage inflicted on the population (Rosen and Gayer, 2018).

Figure 1

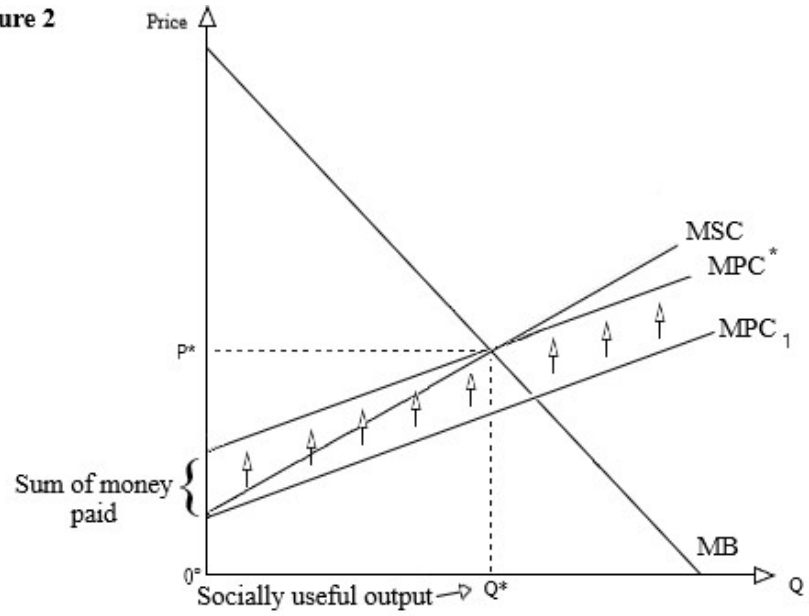


In a market with externalities, the supply curve (producer supply) reflects the **MPC** of the extra unit produced (the cost to the producer). In that sense, **MPC** fails to reflect the **MSC**, the extra costs (private and social) generated by an extra unit of the good. According to this theory, goods are overproduced and pollution increase (Stiglitz, 2015). Regarding to Hardin's study (1968), in the presence of externalities overproduction leads to inefficiency. The market does not include the costs of pollution and the allocation of resources does not take place according to the optimal Pareto criteria[20]. In that sense, the negative externality generated by pollution decrease population well-being (Hardin, 1968).

Pollution, defined as negative externality, can be corrected in two ways: the conditions under which individuals can autonomously correct allocation inefficiencies resulting from externalities; the conditions where individuals fail to achieve an efficient solution, and the State intervenes. In both cases, the result resulting from the correction of the externality will allow to equal the Marginal Social Cost with the Marginal Private Cost (**MSC = MPC**), so that the supply of the good is socially optimal (**Figure 2**) (Stavins, 2011).

[20] It occurs when the allocation of resources cannot improve the condition of one subject without worsening the condition of another.

Figure 2



In the following subparagraph, we will show the theory that individuals privately correct negative externalities generated by pollutant emissions (Coase theorem), and the theory that the State 'internalizes' the negative externality with an environmental tax reform (Pigoue theorem). Moreover, the common-pool resources theory will be analysed, defined by Nobel Prize in Economics, Elinor Ostrom, as a theory to contrast the exploitation of natural resources by community's auto-regulation.

2.3.1 *Coase theorem and property rights*

Ronald Harry Coase was one of the most important economists of the 20th century. Questioning the Pigou externality concept, he argues that, if property rights are well defined, pollutant actions and damages caused would be resolved by a voluntary agreement between the parties directly involved. In general, Coase considers tax exemption schemes and relationships in which polluters, by definition, will compensate those who suffer a utility damage (Coase, R. H. 1960). According to Coase, the issue of compensation can be specified as a question of liability between the parties, and therefore of property rights. The concept of property right implies not a right of physical property, but a set of legal rights that concern: a set of rights for the use of property in different ways; a right to prevent others from exercising certain rights; a right that restricts the assignment of a proprietary right (R. H. Coase, 1960). The main example of Coase is that of the breeder (A) and the farmer (B), where the cattle of the former (A) destroy the crops growing on the neighbouring lands owned by the latter (B). Following the Coase theorem, the livestock farmer would be obliged to pay compensation to the farmer who owns the

crops for the damage suffered by the farmer. Coase considers the relationship from another point of view, the problem being the result of a lack of sufficient property rights of the two subjects (Coase, R. H., 1988). In that sense, Coase follows a theory that only when property rights are well defined between the parties, they will be able to resolve the relationship through an economically efficient transaction. If, for example, livestock farmers have the right to raise livestock, then they are not responsible for the damage suffered by the farmer. The report will end simply on the basis of the interests of the individual actors, always and only if the property rights are well defined. In an opposite situation, where livestock farmers are responsible to the farmer, Coase is confident that the use of an alternative payment compared to what would result as an allowance produced by Pigouvian payment. Livestock farmers could pay farmers to stop growing, or to grow less crops. Since livestock farmers would pay farmers only for the profits lost from non-cultivation of crops and not for the value of the total crops, this would be a cheaper solution and would again lead to a more efficient use of resources (Andersen, 1994). According to this study, Coase shows that regardless of whether the ownership rights belonged to farmers or livestock farmers, a transaction between them would have led to an improvement in the efficiency in the allocation of resources, provided that transaction costs[21] were zero (Coase, R.H., 1988). This last expression represents the basic premise of the Coase theorem. Coase, however, declares that a situation with zero transaction costs is not realizable, and that it is the transaction costs to be decisive in the choice from the State of having to regulate, as the transaction costs would compensate for the possible gains (Coase, R.H., 1960). Public regulation faces significant transaction costs to regulate externalities. According to Coase, this would result in a greater economic loss. He thinks that, private regulation among people would not incur in transaction costs (in which case fees or other expenditure). People (producer or consumer) transfer a payment in the form of compensation from the polluting to the injured party. And by so doing, they would avoid economic loss triggered by public regulation and transaction costs.

The Coase theorem implies that the issue of externalities is primarily a matter of property rights. Once property rights have been defined, it should be possible for interested parties to commit to compensatory payments. If, for example, the ownership rights of a

[21] The costs that have to be incurred in order to realise an exchange, contract or economic transaction in general; they represent the costs of use of the market.

watercourse were well defined, it would not be possible to discharge pollutants without the consent of the owner. Consensus that could be obtained through compensation to the owner for the own damage suffered (Stiglitz and Rosengard, 2015). In general, Coase's theorem would lead to a large-scale privatisation of environmental regulation which. According to Coase, in the case of low transaction costs privatisation of environmental regulation would lead to more efficient solutions (Andersen, 1994). Coase assumed that, the system of tax concessions was managed in such a way as to literally correct the mismatches of the market, while transferring compensation from the polluters to the victims of pollution. The very purpose of taxation on externality, however, is not to compensate those who are damaged, but simply to impose restrictions on polluters, while preventing and controlling pollution (Andersen, 1994).

2.3.2 *Pigouvian Taxes*

Arthur Cecil Pigou was one the funder of the social economy. He bases its theory on the loss of social welfare resulting from the economic result and social policy in a particular State. Loss of social welfare is the result of a gap between the private marginal cost and the social marginal cost. According to Pigou, the goal of public regulation is to correct this gap in order to maximise social welfare while maintaining an efficient productive balance (Pigou, 1932). Public intervention should be undertaken only if it is economically advantageous for social welfare (Andersen, 1994). The theory of externalities plays a key role in Pigou's economic theory (Pigou, 1932). Pigou defines an externality: «the essence of the matter is that one person A, in the course of rendering some service, for which payment is made, to a second person B, incidentally, also renders services or disservices to other persons … of such a form that payment cannot be exacted from the benefited parties or compensation enforced on behalf of the injured parties» (Pigou, 1932. p. 183). According to Pigou, the three separate entities involved are necessary for an externality situation to occur: two parties (A and B) carrying out a transaction, and a third party (C) that suffers or benefits from this transaction but without being part of it. The Pigou concept about externality also includes the so-called 'inter-temporal externalities', the externalities imposed by one generation to the next (Pigou, 1932).

Pigou has criticized the traditional concept of utility, as it oriented towards current consumption compared to savings for future consumption (Pigou, 1947). Relate to that, Pigou claims: «There is also waste, in the sense of injury of the sum of total economic satisfaction, when one generation, though not destroying more stuff than it itself obtains,

uses up for trivial purposes a natural product which is abundant now but which is likely to become scarce and not readily available, even for very important purposes, to future generation» (Pigou, 1932, pp. 27-28). Pigou argues that pollution can be contained by imposing a tax on activities producing polluting emissions. In this sense, the main pollution taxes able to correct the negative externalities represented by polluting emission activities are the carbon tax and the energy tax. The carbon tax is a tax on energy resources that emit carbon dioxide into the atmosphere. An energy tax is a fiscal surcharge on fossil fuels such as oil, coal and natural gas. These taxes aim to reduce energy consumption, limit carbon dioxide and other fossil fuel combustion in the atmosphere (Karadeloglou, P., 1992).

According to the general economic theory of welfare, the tax would ensure equivalence between the net private product and the net social product. By imposing a sufficiently high pollution tax, private market operators would be subject to restrictions, thus decreasing their polluting activities to an optimal level. The solution devised by Pigou provides a tax (subsidy) per unit of the externality equal to its external marginal damage (benefit) (Baumol & Oates, 1988).

In 'The Economics of Welfare' (Pigou, 1932) Pigou did not explain the principles according to which the tax on externalities can be calculated, but he carried out a solution of environmental tax revenue use. He presumed that the taxes on the externality are equivalent to the damage suffered. They are directed to extraordinary restrictions on normal regularisation, and should be used for special purposes or funds as such (Pigou, 1932).

The criticism that Pigou makes of British road tax may be an example of the application of his thinking. Criticism of road tax is based on the fact that the revenues are spent on the construction of new roads and not on the normal maintenance of existing ones: «not only the motorist does not pay for the ordinary damage that causes to the roads, but gets in exchange for his payment an additional service useful to him rather than to the general public» (Andersen, 1994).

The Pigouvian Tax, adopted to counter the negative effects of externalities, is designed according to a 'Tax-bounty system'. Pigou points out that the revenue from tax must be used to improve the positive externalities generated in the performance of activities (Pigou, 1947).

Although the economic welfare theory requires regulation on the basis of market failures, such regulation is not expected to be easy to undertake. One of the main aspects described by Pigou, what makes a similar tax procedure complicated, is the government's inability to counteract the imperfections that Pigou himself describes. Moreover, the intertemporal nature of environmental problems certainly does not make it easy to apply such a system. Present generations tend to impose external effects on future generations in terms of pollution. In that sense, Pigou thinks that public policies are the most important action to protect the general interest of citizens, as they are able to achieve goals from which present and future generations would benefit (Andersen, 1994).

2.3.3 *Ostroms' studies*

Elinor Ostrom was a US scholar and an academic who, challenging the dominant duality between State and Market in the regulation of economic exchange systems, has demonstrated the existence of alternative regulatory structures to prevent over-exploitation of collective natural resources and their possible destruction. Ostrom shows that communities, understood as the whole of the appropriators and users of collective resources, are able under 'certain conditions' to self-manage natural resources in a satisfactory and lasting way. For 'certain conditions' Ostrom refers to knowledge, trust and communication between the components of a community, to the existence of rules or institutions already established in the territory, and the non-interference of an external authority such as the State. These studies show that, in different countries and cultures there are collective institutions, that is sets of shared rules, which have allowed local communities to self-manage complex environmental resource systems, in an efficient and sustainable way for very long periods (Ricoveri, 2013).

Before going into the details of the Ostroms' studies, it is necessary to clarify two fundamental points of research:

1. Conventional theory, the theory on which the Ostroms' studies are based;
2. Common-pool resources, the main subject of research.

The theory of conventional collective action states that, the problem of the use of common resources will not be solved unless an external authority determines the appropriate actions to be taken, monitor behaviour and impose the right sanctions. The term 'collective action' refers to a regulatory structure which decisions on the actions of the community taken in place by subjects, are taken independently from those taking part in them, despite the results jointly influence all those involved (Lichbach, 1996; Schelling,

1978; Vatn, 2005). Furthermore, it is assumed that no one will change their habits voluntarily, so as to reduce energy consumption and greenhouse gas emissions, and for this reason there is a need for an external authority that imposes very precise rules that can encourage people involved to change (Brennan, 2009).

According to Ostrom, pollution is a condition that severely damages the use and quality of natural resources. In turn, the damage caused to natural resources, as a common property resource, damages the entire community. The common pool resources defined by Ostrom, is the set of finite amount of natural resources available to the community, in which the use of a resource unit by one entity entails the renunciation of the use of the resource unit by another entity (Ostrom et al., 1994). For example, the common-pool resources can be linked to the water irrigation systems. Most common pool resources are so large that several players can simultaneously use the system. When units of resources (for example, water) are highly valued and many actors benefit from appropriating and consuming the resource, trading it for profit or using it as a factor in a production process, actions by an individual are likely to create negative externalities for other individuals (Ostrom, 2002).

Therefore, there is a need to adopt a self-regulation system of the common pool resources, in which the main actors, owners and users of the resource, are involved in the definition and adoption of the rules within own community, deciding on the level of inclusion and exclusion of participants, ownership strategies, participants' obligations, monitoring and sanctions and conflict resolution (Ostrom, 2002). As reported in the Ostrom's study (Ostrom, 2002) some common-pool resources, located territories outside the centres of government authorities, are governed entirely by appropriators. However, in most modern political economies has supported the conventional theory, and is difficult to find systems that are governed entirely by participants without rules established by local authorities, regional, national or international (Ostrom, 1991, 1997). With important open-access fisheries studies by Gordon (1954) and Scott (1955), most economists analysed simple common resource systems using broadly similar assumptions (Feeny et al., 1996). In such systems, the resource is assumed to generate a highly predictable finite supply of a type of resource unit (a species, for example) in each relevant time period. Appropriators are presumed to be homogeneous in terms of activities, competencies and cultural views. It is also assumed that there would be actors who maximise in short-term profit, and possesses complete information about the system. Since the open-source condition is in

force, the owners get ownership rights only on what they collect, which they then sell in an open competitive market (Ostrom, 2002). As Gordon and Scott's incisive analysis has demonstrated, «In this context each fisherman will only take into account its own marginal costs and revenues and ignores the fact that increases in its catches affect the returns of fishing effort for other fishermen, as well as the health of future fish stocks ... the result is overfishing, which can also lead to ecological overfishing» (Feeny et al., 1996, p. 189).

On the basis of these studies, Ostrom underlines how the conventional theory of the common pool resources can bring benefits to the community. She assumed that external authority's system, were needed to impose rules on the appropriators that produced excessive externalities on themselves and others, could be sustained in the case of a self-regulation by appropriators and users of common-pool resources. The community will form the institutional figure able to regulate the use of the resources available within the community in which they operate. In order to enable appropriators to pursue the change in the institutional structure that they have created, a coalition that brings out more expected benefits than the immediate and long-term costs of using common sources is needed (Ostrom, 2002). The study shows that, where appropriators and users cannot communicate and cannot gain confidence through their efforts or with the help of the political system within which they are integrated, conventional theory is likely to be supported (see Gordon 1954 and Scott 1955 studies). But, if appropriators can engage in private bargaining and have some autonomy in changing their rules, they may also have the ability to self-regulate. The organisation will depend on the characteristics of the common pool resource system and the appropriators who influence the benefits to be obtained and the costs to be faced. The result obtained must maximize the benefit generated. The fact that the activity of each appropriator is successful in the long term depends on the fact that, the basis of rules designed by the institution is consistent with the design principles with established and long-lasting rules (Ostrom, 2002).

2.4 **International co-operation: from Stockholm (1972) to Paris (2015)**

United Nations Conference on the Human Environment (UNCHE), held in Stockholm in 1972, signed the start of an institutional implementation for environmental problems. One hundred and thirty nations intervened at the conference, allowing to establish a point on the principles and recommendations related to human rights and responsibilities

related to the environment. In reality, those times were still premature and the strong industrial development still conditioned the international political scene. However, a strategy to protect the Earth's natural resources through planning processes was necessary (Saturnino and Imperatrice, 2004).

From that moment on, the protection and improvement of the environment have become of fundamental importance, as a prerequisite for the well-being of people and the progress of the world. It should be noted that, in the following two decades, this awareness has given rise to numerous studies and scientific research on the planet health, also by virtue of the establishment of various fundamental bodies, including United Nations for Education, Scientific and Cultural Organization (UNESCO) and the Intergovernmental Panel on Climate Change (IPCC) (Antich, 2003). In this context, the need for a new development model that reconciles economic growth with a fair distribution of resources has emerged. From the 1980s onwards, a world conservation strategy has been established, while identifying the sustainability of development as a set of values concerning human activity in all its fields, aimed at maintaining vital systems and essential ecological processes, biodiversity conservation and sustainable use of the ecosystem. This is the key concept that led to the Brundtland Report[22] in 1987, to the first effective definition of 'Sustainable Development': «the development capable of satisfying the needs of the current generation, without compromising the possibility that future generations will be able to satisfy them» (WCED report, 1987, p. 41) .

Introducing a definition of 'sustainable development process' also meant responding to the needs of each country to introduce environmental variables in decision-making and planning, ensuring efficient use of resources. Hence, it was necessary to identify a universal path that could involve all states in a global partnership, in order to preserve, protect and restore the health and integrity of the terrestrial ecosystem. Everything was discussed at the United Nations Conference on the Environment and Development of the Earth Summit (UNCED) in Rio de Janeiro in 1992 (Saturnino and Imperatrice, 2004).

The first world conference of Heads of State on the environment was the Earth Summit in Rio de Janeiro in June 1992. The main objective was to establish a new global partnership through cooperation between States. World aimed to respect the interests of all the inhabitants of the earth and to protect the integrity of the global system, the

[22] In 1987, Gro Harlem Brundtland, president of the World Commission on Environment and Development (WCED) established in 1983, presents the report "Our common future", formulating a guideline for sustainable development that is still valid today.

environment and development (United Nations, 1992). In this perspective, important agreements were reached on the future of the planet at the Earth Summit, including Agenda 21. It consists of an action plan for specific economic, social and environmental initiatives, aimed at defining a real global strategy of integration between environment and development (United Nation, 1992). Another important outcome of the Conference was the agreement with the United Nations Framework Convention on Climate Change (UNCCC), which in turn led to the drafting of the Kyoto Protocol, an international environmental treaty on global warming, entered into force on 16 February 2005. In particular, this protocol contains a number of priority actions to solve the global climate change problems. For developed and developing countries, the Kyoto Protocol requires global collaborative processes focused on socioeconomic development linked to the resolution of the climate change problem. One of the main goals set by the world community is to reduce overall emissions of carbon dioxide and other gases harmful to the environment. Kyoto Protocol obligates the countries to reduce pollution emissions to a level not less than 8.65% in the period 2008-2012 compared to emissions in 1995, considered as base year (UNFCCC, 2008)

During the period from 1992 to 2000, the environmental situation has significantly deteriorated. The speech of UN Secretary-General Kofi Annan, "Towards a Sustainable Future", during the Annual Conference on the Environment held in New York on 14 May 2002, reports that: «In the discussions on finance and the global economy, the environment is still treated as a guest barely tolerated. The lifestyle characterized by high consumption continues to weigh on the systems that support the natural life of the planet. Research and development remain limited due to insufficient funding and neglect of the problem of the poor». According to Annan, we can say that progress is even slower than the world imagined and the global environmental objectives of those years are further away than they should be satisfied (Daclon, M. C., 2008). Ten years after the commitments made in Rio in 1992 at the next Global Summit on Sustainable Development (WSSD) in Johannesburg in September 2002, was found that, the concentration of carbon dioxide in the atmosphere had increased from 316 parts per million in volume in 1960 to 370 ppmv in 2001, forests had decreased in the last decade with an average loss of 140,000 kmq/year; world poverty had increased, as the debts of poor countries had grown from 1843 billion dollars in 1992 to more than 2500 billion dollars in 2001 (Antich, 2003). Faced with this reality, the politicians and the government

of the participating countries formally reaffirm their commitment to achieve sustainable development. They expressed a desire to achieve the fundamental goals against poverty and pollution, by changing unsustainable patterns of consumption and production, protecting and managing natural resources. In addition, an action plan for sustainable development (Implementation Plan of the World Summit on Sustainable Development) was to be implemented. Among the most important decisions, we mention: the creation of a solidarity fund, relating to different areas of intervention (including poverty, renewable energies, water purification), of 0,7%, financed by rich countries' gross domestic product; the commitment to halve, by 2015, the number of people (currently 2,4 billion) who do not have access to drinking water; a substantial increase in the use of renewable energy sources (wind, solar, biomass); the protection of biodiversity through a significant reduction in the rate of extinction of the variety of living species by 2010. The Johannesburg Summit sought to plan the economic and social development of the new millennium, following sustainable processes for the environment and for future generations (Antich, 2003).

In 2012, twenty years after the first meeting, Rio de Janeiro Environment Summit (Rio +20) took place. From an environmental point of view, compared to the 1992 Rio conference, overall CO2 emissions increased by 36%, especially in developing economies, which show a 64% increase in greenhouse gas production. Moreover, from the first conference in Rio, the average temperature of the planet has increased by 0,4°C, the sea level has risen by 2,5 mm per year and 300 million hectares of forest have disappeared (Severo, 2012). Although the results were not the most exciting, in Rio+20 governments took the responsibility to start intergovernmental processes so as to strengthen the previously undertaken implementation process for sustainable development (UNFCCC, 2012).

Rio+20 represents an intermediate step towards a goal that sees the development of the economy with environmental sustainability needs, with the preservation of ecosystems and social equity. The main achievement in Rio is the recognition of the 'Green Economy' concept, as a driving force towards sustainable development and poverty eradication. This 'eco-sustainable' growth strategies could map out the future ways, in which global society can develop and thrive (UNFCC, 2012).

2.4.1 *Paris (2015)*

The Paris Pact is an historic agreement for the Parties to the United Nations Framework Convention on Climate Change (UNFCCC). It has aimed to combat climate change, while triggering actions to support a sustainable future according to Agenda 2030 programme. According to Paris Agreement, climate change represents an urgent and potentially irreversible threat to human societies and the planet. It therefore requires the maximum cooperation of all countries, with the aim of accelerating the reduction of greenhouse gas emissions. This is the fundamental premise set out in the text approved at the Climate Conference (UNFCCC), the result of a long journey back to Stockholm 72, which is fundamental for achieving the environmental objectives pursued so far (UNFCCC, 2015). The main goal is to keep the rise in global temperature this century below 2 degrees Celsius, limiting it to 1,5-degrees Celsius (the 1,5-degree Celsius limit is a significantly safer line of defence against the worst impacts of a changing climate). In addition, the agreement aims to strengthen capacity to address the impacts of climate change. In this sense, a positive change in terms of growth and employment is expected, through the use of new operating procedures (from a European perspective, the aim is to encourage investment and innovation in the renewable energy sector, with the ambition to become a world leader) (UNFCCC, 2015).

The agreement also provides for a strict framework of transparency and accountability, including the submission of inventories containing information needed to monitor progress. Inventories would be also an ambitious instrument, which lists a number of financing provisions for interventions and adaptation, losses and damage attributable to climate change (Senate of the Italian Republic, 2013).

As the Paris agreement has made known, unlike the Kyoto Protocol, no targets have been set for individual countries. Rather, it puts each country in a position where they have to contribute to the implementation of processes, with the goal of ensuring progressively ambitious collective progress. Paris agreement focuses on the different starting points and responsibilities of each country in accordance with the «principle of common responsibilities, differentiated by country according to their respective capacities» which applies «in the light of different national circumstances» (UNFCCC, 2015b, Art.2.2). This means that developed countries must continue to take action to mitigate climate change, while supporting actions taken by developing countries (Climate Focus, 2015).

2.5 **The first steps towards a Green Italy**

According to the evolution of environmental law, the Italian Constitution introduced environmental protection in the implementation of the precautionary principle. By introducing environmental protection with the traditional system that only concerned the right to health, it was definitively consolidated the social environment dimension. With the Title V of the Constitution reform took place the adoption of the Constitutional Law n. 3 of 2001, which it has inserted in the new Art. 117 Cost. the 'Environment' word. Among the subjects assigned exclusively by the legislature to the competence of the State, in the list referred to in paragraph 2 of the aforementioned article, are specified: «the protection of the environment, the ecosystem and cultural heritage» (Art. 117 Cost, paragraph 2); while the Regions are assigned: «enhancement of environmental and cultural assets» (Art. 117 Cost, paragraph 2) (Rovito, 2017).

The environmental issue has become more important since the late 1990s, thanks to international agreements reached at the United Nation World Summit on Climate Change. As can be seen from the Agenda 21, the plan for sustainable development in the implementation of (28 December 1993), the Ministry of the Environment expresses «the willingness to overcome the limits for the policy intervention in the environmental field, aimed to recover and prevent environment degradation. It was an attempt to reconcile the needs of a society in continuous growth and the requirements of environmental protection, according to 'sustainable development' principle» (Minambiente, 1993, p. 1). The plan envisaged actions mainly directed to the productive sectors, such as industry, agriculture, tourism and infrastructure (energy and transport). This is the first Italian document on the environment with an interministerial character, thus representing a fundamental reference for future government programs (Minambiente, 1993).

Regarding to the sustainable development goals listed in Agenda 21, a debate was created to extend the use of economic and fiscal tools as an effective means to support the environmental policies (OECD, 2003). The debates focus on the fact that market prices did not take account of environmental costs. Correcting them through fiscal reforms would lead to a better (more sustainable) resource allocation. Fiscal and economic tools could also be used to change the behaviour of individuals, thus creating a more environmentally sustainable society. However, it was difficult to see environmental burdens as a means of increasing revenue and educating citizens' behaviour. It was also

feared that these tools would be an unreliable way to achieve environmental goals related to the implementation of control and regulation policies (OECD, 2003).

Various theories and debates suggested that the use of fiscal and economic instruments, both for environmental and National productivity purposes, could coexist (OECD, 2003). The limit values that should be given to emissions and inclusion for environmental protection, would continue to follow the evolution of knowledge in the fields of environment and health, as well as in the field of technologies (with the widespread criterion of technological improvement, through their continuous use that increases effectiveness and efficiency). They would have evolved and adapted at the same pace as the markets, without restricting their productivity and hence their competitiveness (OECD, 2003).

The comparison with the technological and environmental standards achieved by innovative economies has been fundamental for the Italian system, as it has facilitated the adoption of environmental tax policies adapted to the new millennium (Minambiente, 1993). In the 1990s took the first economic and fiscal strategies aimed at achieving environmental objectives has been adopted. This is demonstrated by the fifth environmental action programme of the European Community[23], which provides for environmental taxes (carbon and energy tax) (European Community, 1993).

2.5.1 *The Italian Sustainable Development Action Strategy*

During the evolution of the sustainability concept, the theory of sustainable development and ecological economy was gradually developed (Arpac, 2004). The two theories support an idea of the economy no longer based on the parameters labour and capital, but on the parameters labour, natural capital and capital produced by man. The sustainable development and ecological economy theories are based on a more ecological vision of the economy, aimed at improving the quality of life (Arpac, 2004). In this regard, we highlight the importance of the principle of integration of European policies, discussed during the Treaty of Amsterdam, the principle of constitutional value for the whole of Europe. Art. 6 of the Amsterdam Treaty states that: «the needs of environmental protection must be integrated into the definition and implementation of Community

[23] Available on https://eur-lex.europa.eu/.

policies and activities (…), in particular with a view to promoting sustainable development»[24].

The position of the Italian Government on community environmental policies is contained in the Environmental Action Strategy for Sustainable Development in Italy 2002-2010, adopted on 2 August 2002, published by the Ministry of Environment and Protection of the Territory. The set of strategies defines the sustainable development action as a development which «guarantees the needs of the present without compromising the possibilities of future generations to do likewise» (Minambiente, 2002, p. 5). A growing economic system is sustainable only if, the amount of resources used for wealth creation remains, in quantity and quality, within appropriate limits of exploitation and not overload the absorption capacities provided by the ecosystem. If this does not happen the economy will continue to use and compromise the quality of natural resources that sooner or later will be exhausted or no longer usable (Minambiente, 2002). In this regard, the strategy adopted by the Interministerial Committee for Economic Planning (CIPE) identifies the main objectives and actions for the next decade for four priority areas: climate, nature and biodiversity; the quality of the environment and life in urban environments; sustainable use and management of natural resources and waste (Arpac, 2004). The Sustainable Development Strategy also aimed to ensure, in line with the Barcelona European Council (2002), the development of tools and procedures to address new environmental and economic goals (Minambiente, 2002).

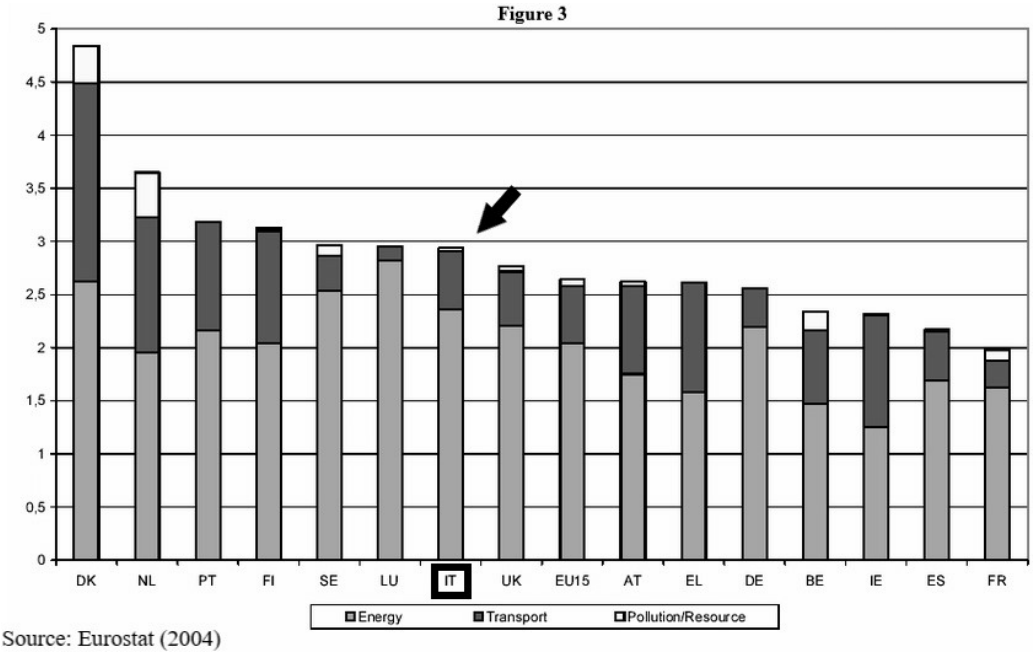
Environmental protection requirements have led over the years to the establishment of new emission standards, discharges waste and other forms of pollution, in order to create positive effects for the environment. It is also necessary for the development of new technologies and the modernization of industrial plants. In the early 2000s, the complex regulatory framework in force limited corrective action to protect the environment. Excessive regulation did not provide environmental benefits, but it was a burden on the efficiency of the administrative system, and so on the industrial system. Therefore, it needed a profound simplification (Minambiente, 2002). In order to consolidate all of this, it was considered appropriate to proceed methodically with clear and effective directives. A first example may be the Law 50/99 'Simplification Law 1998', focused on the regulatory impact on public administration, citizens and businesses. A second example can be represented by the preparation of environmental texts, through which the reference

[24] Available on https://europa.eu/european-union/law_en.

regulatory framework of Italian environmental legislation has been made less uncertain and better applicable (Minambiente, 2002).

Particular changes have also been made in the area of taxation. Among the most important were the ecological reform of the tax system, which was expected to shift slightly the tax burden from labour and VAT to the taxation of polluting emissions. The possibility of reducing the tax burden on labour or VAT by using environmental taxes is at the basis of what economists call the "double dividend", restrictive fiscal instruments, which combine an increase in environmental tax aimed at correcting the negative externality generated, and a decrease in taxes on labour or capital to generate positive economic effects (Minambiente, 2002; Nathalie Mathieu-Bolh, 2017).

To be clear on the Italian environmental tax situation in the early 2000s, we use the chart in **Figure 3**, which shows the weight of environmental taxes on national GDP (2.9%), as well as specifying the percentage of GDP by type of levy.



Source: Eurostat (2004)

2.5.2 *The Polluter-Pays Principle*

Mentioned in the first Environmental Action Program of the European Community (1973-1976) and in the Declaration of the Rio de Janeiro Conference on Environment and Development (1992), the polluter-pays principle has been in the Treaty of the European Communities since 1986 (Senate of the Italian Republic, 2017).

DIRECTIVE 2004/35/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 April 2004 on environmental liability for the prevention and remedying of environmental damage, states that the prevention and remediation of environmental damage[25] should be implemented by applying the polluter-pays principle, as laid down in the European Treaty, and consistent with the principle of sustainable development. The European Community Directive states that, according to the polluter-pays principle, the operator whose activity has caused environmental damage, or the imminent threat of such damage, will be considered financially liable. The system will persuade operators to take measures and develop practices to minimise the risks of environmental damage (European Community, 2004).

The polluter-pays principle is a much broader principle than that which can be envisaged for civil liability for pollution (necessarily linked to damage established by judicial proceedings). The polluter-pays principle includes not only the major environmental damage caused by exceptional events, but also the foreseeable small risks associated with the legitimate use of products and technologies widely disseminated in society. It can be implemented through the Pigouvian taxes (paid by polluters) or other economic and fiscal tools (permit markets, bonus/malus mechanisms). This principle aims to affirm a greater social justice as a complement to environmental policies based on obligations and prohibitions (Senate of the Italian Republic, 2017).

2.6 **The Great Recession as a starting point towards a Green Economy**

In 2009, after a global economic recession triggered by the worst post-war financial crisis, the United Nations Environment Program (UNEP) launched a global green economic initiative, inspired by the Rooseveltian initiative[26], updating it to take account of current concerns, starting with the environmental issue. The objective was to seize the opportunity of the crisis to restore credibility to the concepts of progress and development. This could be done by redesigning an economy that, according to UNEP, would be able to ensure better welfare and greater equity. It has to be achieved by

[25] For environmental damage is identified the damage to protected species and natural habitats, that is, any damage which has significant adverse effects on the achievement or maintenance of a favourable conservation status of such species and habitats (DIRECTIVE 2004/35/EC, Article 2, paragraph 1, point a).

[26] A vast and radical programme of economic and social reforms carried out between 1933 and 1937, known as the New Deal, which enabled the United States to overcome the great depression of the early 1930s.

reporting the ecological systems impacts within the sustainability parameters, starting with carbon emissions. Other bodies of international importance have also embarked on this new path, starting with the OECD, with the Green Growth Program (Barbabella, 2013).

Responding to the consequences caused by the economic crisis also in the social and environmental sector, the concept of Green Economy has become always more diffused. UNEP defines the Green Economy as the economic field of a State that results in an improvement of human well-being and social equity, significantly reducing environmental risks and ecological scarcity. In simpler words, the Green Economy can be defined as a low-carbon, resource-efficient and socially inclusive economy (UNEP, 2011). In the Green Economy, income and employment growth should be driven by public and private investments that reduce emissions pollution, improve energy and resource efficiency and prevent biodiversity loss and ecosystem services. These investments must be catalysed and supported by targeted public expenditure, political reforms and regulatory changes. The development path should maintain, improve and rebuild natural capital as a key economic resource and as a public benefit source (UNEP, 2011). The Green Economy is a complex process, which not only represents the transition from a traditional economy to a greener one, but presupposes a radical change in the structure, culture and practices that characterize a society (Muzzarelli, 2013).

Moving the subject from the purely theoretical to the political dimension, it is noted the fundamental importance that national governments and the private sector assume in the transition to a responsible environmental economic model. At the level of economic policy, this transition has involved in reforms and incentives to protect natural resources, while strengthening the infrastructure for the environment, introducing new market mechanisms[27] for the dissemination of eco-technologies, the creation of investment and the elimination of subsidies harmful to the environment. For the private sector, this transition has made possible to implement and increase investment in innovation, and 'catch' the most of the investment opportunities arising from a green economy. These measures have had not only a purely economic goals, but have also made it possible to integrate the social and environmental component in the context of sustainable development, also for the poverty eradication (Minambiente, 2013).

[27] New market-based mechanisms that improve cost effectiveness and promote mitigation actions, taking into account the different circumstances of developed and developing countries (Institute for Global Environmental Strategies).

The report for a global green economy (UNEP, 2011) suggested some actions to ensure the transition to a green economy that takes into account sustainable development and poverty eradication. To this end, it proposed to invest in the ecological conversion of the economy into ten key sectors: agriculture, construction, energy, fisheries, forestry, industry, tourism, transport, water management and waste. According to the UNEP Report, focusing on a 'Green Economy', was possible to reduce poverty by promoting economic development even in the most backward economies. The transition described by UNEP to a Green Economy is not to stifle growth and prosperity, but to reinvest in natural capital instead of exploiting it. It is a question of creating an economy that generates wealth and promotes the improvement of social welfare. The institutions have the responsibility to leave to the young people and to future generations a productive planet, in good health and able to guarantee a good quality of life (UNEP, 2011).

2.7 **Circular economy and Sustainable growth**

The concept of circular economy responds to the desire for sustainable growth in which production and consumption submit environment and natural resources to a considerable productive effort (European Commission, 2014). In the first decade of the 2000's, the economy worked with a model production-consumption-disposal, a linear model where each product was addressed inevitably to reach the end of life. The linear economy, which relied exclusively on the resource exploitation, was no longer a viable option. This is because the raw materials used for the production of goods and services, when they are fully exploited or are no longer needed, are disposed as waste. In addition, population growth and increasing wealth have strongly influenced resource demand, creating additional quantities of waste that are difficult to work off. This has led to adopt a new recycling model, thus abandoning the linear model (European Commission, 2014). The transition to a circular economy shifts the attention to reuse, adjust, renew and recycle existing materials and products. What was normally regarded as waste can be turned into a resource. The circular economy is best understood by observing the natural living systems (Biosystems), which work optimally for each of their elements, and at the end of life fit perfectly into the natural environment, giving life to other elements. By following the mechanism of the natural living system, in the circular economy, the final product is designed to be adapted, at the end of its life, to the life cycle of other products, and consequently form a flow that maintains the added value as long as possible. According

to this procedure, the residual waste would have been close to zero (European Commission, 2014).

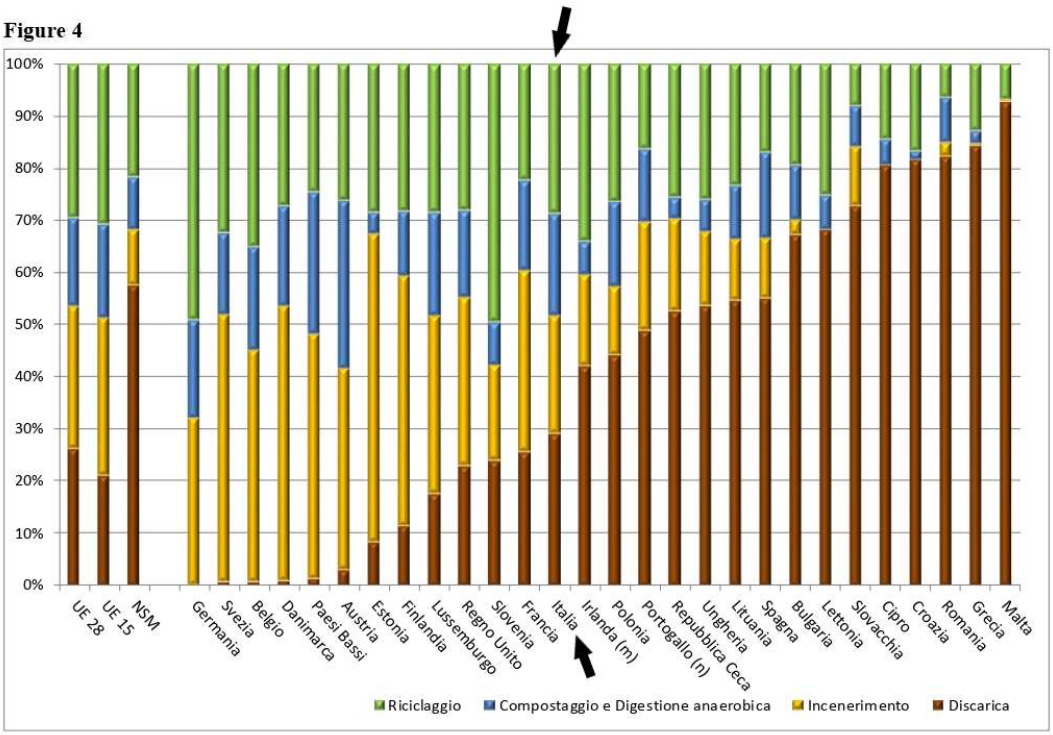
The circular economy requires the participation and commitment of different groups of actors, especially in the political and the entrepreneurial field. In the policy area the task is to provide businesses with structural conditions, predictability and confidence, to improve the role of consumers and to define how citizens can benefit from these procedures. The political system works to simplify the circular economy, combining regulation, market-based instruments, research and innovation, incentives, exchange of information and support in key economic sectors. In the business area, companies have the task of transforming the entire production cycle, completely redesigning the product supply chains, while aiming at efficiency in the use of resources following a circular production process. To increase the cooperation within the supply chain can reduce costs, wastes and environmental damages (European Commission, 2014).

"Il Piano d'Azione Nazionale su Produzione e Consumo Sostenibili" (PAN SCP), provided for by L. 221/2015 (art. 21), is one of the instruments adopted by the Italian government to implement policies and strategies in the area of circular economy, efficient use of resources and climate protection. According to Agenda 2030, PAN SCPt implements particularly the objective n.12, ensuring sustainable production and consumption models and, consequently, the National Strategy for Sustainable Development. The PAN SCP therefore provides specific action lines for each area of intervention, in order to promote circular economic models able to address, in an integrated way, the various aspects of sustainability (environmental, economic, social) (Minambiente, 2017b).

Italy is one of the most important economies in the European Union and in the world. The country is poor in natural resources and is heavily dependent on imports (in particular fossil energy and metals) (EU Observatory on Eco-Innovation 2016-2017). Maximising the circular Economy would make the national economy more sustainable, competitive and secure, while reducing its exposure to the negative effects of its high dependence on resources (Ghisellini and Ulgiati, 2020). Bianchi (2018) states that Italy is a pioneer in the implementation of the circular economy for recycling. The application of the circular economy's principles within the Italian economy contributes to about 1.5% of the national GDP, as well as creating employment, natural resources and CO2 savings (Bianchi, 2018).

Figure 4 shows the national performance of recovery, recycling and composting compared to final landfill, for municipal and special waste respectively. It summarizes the results achieved by the implementation of the policies undertaken in favour of the circular economy until the year 2017 (Ispra, 2017):

Figure 4



Source: Ispra calculations based on Eurostat data (2017)

2.8 **Economic and Fiscal instruments in support of the Italian Green Economy**

In recent years, environmental sustainability assumed a central role in the Italian political and economic agenda, and the tax system was one of the main tools to solve the national environmental problem.

Taxation, together with market mechanisms, is part of the economic incentive instruments essential for the proper implementation of policy guidelines for the energy, environmental and industrial sectors. On the one hand, it aims to reduce negative environmental externalities resulting from production, investment and consumption of resources with harmful effects on the environment. On the other hand, it aims to promote positive environmental externalities arising from production, investment and consumption of resources with positive effects on the environment (Confindustria, 2017).

In Italy, environmental reforms become more important over time. The path to green economy was not only the result of government decisions to revise the tax system (law of 11 March 2014, n. 23), but also a necessity of the banking, financial and insurance world

to lead the tax system towards economic and environmental goals. Financial environment, in support of effective financial instruments, needed a clear and stable incentive system to be put in place over time. The goal was to guide citizens in investment choices and actions, in order to reduce negative externalities. Specifically, it was necessary to provide a well-defined framework and to update the criteria with time intervals, so that stakeholders would correct own behaviour and would plan investments consistent with environmental goals. (Confindustria, 2017).

A fundamental step that has directed the national economy towards the environmental objective is the official enactment of the Draft Law (DDL) Green Economy, definitively approved by the Chamber of Deputies on 22 December 2015 in view of the agreement reached in Paris and the European commitment towards the circular economy, also known as 'Collegato ambientale alla Legge di stabilità'. The DDL Green Economy is the starting point for a different way of addressing environmental issues. We have moved from the logic of environmental protection standards as a barrier to the economic development, to environmental policies as a determining factor in stimulating an economic recovery with solid and long-lasting foundations. It focuses in particular on both the discipline on compulsory green purchases at the expense of the Public Administration (Green Public Procurement) and the eco-system incentives for the production and recycling of goods obtained by post-consumer waste (post-consumption materials and waste recovery) (Minambiente, 2016).

The legislator has identified product certification (eco-labels attesting the content of recycled materials in the product, Ecolabel, etc.) or system certification (EMAS, UNI EN ISO 14001 and ISO 50001)[28] as a tool for the payment of contributions, benefits and the granting loans to enterprises. Companies, holding such environmental certificates, also have the possibility of benefiting from a reduction in the necessary guarantees, for accessing to the provision of green goods and services contracts.

2.8.1 *National Energy Strategy (SEN)*

The National Energy Strategy, approved in 2017 by Ministerial Decree of the Ministry of Economic Development and the Ministry of the Environment and the Protection of the Territory and the Sea, represents the ten-year plan that the Italian government has

[28] International standards certificate, applicable to any type of public or private organisation, specifying the requirements of an environmental management system.

developed to anticipate and manage the changes referring to the national energy system (MISE, 2017). The document looks beyond the estimated goals for 2030, laying the foundations for the creation of an advanced and innovative energy system. The objective of the national energy strategy is to make the energy system more competitive, sustainable and secure. In particular, the task of sustainability should be to make a significant contribution to the decarbonisation process in line with the goals of the Paris Agreement. From an environmental point of view, the main objectives include: the reduction in annual energy consumption from 2021 to 2030; the closure of coal-fired plants by 2025; increased investment in research and development in clean energy technologies, including a renewable energy programme to reconnect energy objectives with landscape conservation. One question of major importance is the development of those renewable sources that have plenty of room for development, that is wind and photovoltaic. In that sense, the strategy is committed to promoting the renewal and strengthening of wind, hydroelectric and geothermal plants (MISE, 2017).

The strategy also provides incentives to the Italian industry on energy efficiency (e.g. residential construction of energy efficient structures). Regarding to incentives, the action lines are in different directions, including: incentives to be given to Italian industries for energy efficiency, reviewing and strengthening their deductions; in the transport sector, the strategy provides for incentives to enhance the local sustainable mobility, in order to reduce urban traffic, promote pedestrian and cycling mobility, while improving the energy efficiency and environmental performance; in the services sector, the strategy foresees the adoption of measures to promote the energy renewal of buildings, in particular public goods (MISE, 2017).

2.9 **Results achieved**

A study on Geo-economic scenarios carried out by the Confindustria Study Centre in 2019, classifies Italy as the leading European nation for environmental sustainability. These calculations, based on data collected and published by Eurostat, show that Italy is the country with the least consumption of raw material, less consumption of energy and more recycling and recovery of total waste (Confindustria Study Centre, 2019b).

The President of the European Commission, Ursula Von der Leyen, announced the European objective of full de-carbonisation[29] by 2050. In that sense, Italy can aim for an important political role, thanks to the excellent performance in terms of environmental sustainability. In relation to GDP, Italy's greenhouse gas emissions are the 21% lower than the EU average, raw material consumption 36% and energy consumption 57% less than the average of European countries (Confindustria Study Centre, 2019b).

2.9.1 *Renewable energies and energy efficiency*

Italy has already reached the targets set by the European Union on renewable energy by 2020. The nation had already produced 17,5% of energy from renewable energy sources out of the total energy consumed in 2015, and has further increased production by 18,3% in 2017. Satisfied the 17% objective of the Paris agreement by 2020, Italian government wants to invest other resources in energy efficiency to achieve an energy production percentage from renewable sources of 30% by 2030 (MISE, 2017).

As regards the production of electricity from renewable sources in Italy, comparing the figures for 2007-2013, has more than doubled. However, from 2014 onwards, growth slowed (mainly due to the sharp reduction in hydroelectric production and the economic slowdown in the renewable energy sector), until the lowest peak in 2017 (negative peak mainly due to the unfavourable climatic conditions of the year 2017). The preliminary estimates of the Mise (Ministry of Economic Development) with reference to the year 2018, show however a slight recovery of the sector (Ronchi, 2019).

2.9.2 *Circular Economy and Eco-Innovation*

As regards circular economy, the state of the Green economy report (2019) expresses positive signs for Italy. Making a comparison with the main European countries, referring to the productivity of resources, Italy in 2017 is in second place in the ranking of the five main European countries (with 3,5 euro/kg), behind the United Kingdom but ahead of France, Spain and Germany (Ronchi, 2019).

In 2017, 14 million tonnes (Mt) of municipal waste were recycled in Italy, accounting for 47,7% of the waste produced. Compared to the main European countries, Italy ranks second behind Germany and two percentage points higher than the EU average.

[29] The process of reducing the carbon-hydrogen ratio in energy sources, one of the causes of environmental pollution.

Regarding instead to the special wastes [30], in 2017 they were recycled in Italy approximately 99 million tons (+8% regarding 2016), pairs to 68% of the special wastes total produced (+1 percentage point regarding 2014). According to Eurostat, regarding to the circular utilisation rate of materials which measures the degree of use of recycled materials, in relation to the overall use of raw materials, in 2016 Italy is in third place in the EU ranking, preceded only by France and the United Kingdom, followed by Germany and Spain (Ronchi, 2019).

As regards the eco-innovation data in 2017, measured through the national public expenditure on research and development (the input of eco-innovation), has showed an increase in resources invested of 34% respect to data collected in 2000 (from 2000 to 2017). Nevertheless, Italy lags behind the most important European countries (well below the European average). This is demonstrated by the European classification with reference to eco-innovation, in which Italy ranks twenty-second, with an investment in research of 1,35% of GDP, compared to 2,06% of the European Union average. A positive result is also recorded using the number of patents registered at the national level (output of eco-innovation), by classifying Italy in fourth place in the European Union by number of registered patents, after Germany, France and the United Kingdom (Ronchi, 2019).

2.9.3 *The Eco-Industries market*

ISTAT has published preliminary estimates of the environmental assets account on the so-called 'eco-industries' sector. The document elaborates data on the supply of environmental goods and services, whose primary goals are the environmental protection and the management of natural resources. Data estimated cover value added, output, exports and labour input. The study focus only on market production, excluding non-market activities and those carried out on their own by companies, institutions or households (ISTAT, 2019).

In 2017, the report shows that, the added value generated from the field of the Eco-industries (estimated to the basic prices) is 36 billion of euros (+0,9% regarding the added value generated in 2016) and is the 2,3% of the total added value of the national economy. Preliminary estimates of the Eco-industries' Added Value indicate that, in 2017 more than 65% comes from the asset production for the management of natural resources (a

[30] Special waste is waste produced by industry and companies. They are different from municipal waste because they are not managed by the public administration on the basis of tax contributions, but are managed and disposed of by a system of private companies.

reduction in the take-up of resources from the environment and other actions for the conservation and maintenance of stocks). The other component of the added value (about 35%) is relative to the environment protection (that is activities of prevention, reduction or elimination of the pollution) (ISTAT, 2019). From the production point of view, environmental assets represent 2,4% of the national economy. In 2017, the production value of Eco-industries exceeds 77 billion of euros, recording an increase of 1,9% compared to the values collected in the previous year (2016). Always in 2017, regarding working units, the sector of Eco-industries employed 386 thousand full-time work units (+0,5% compared to 2016), predominantly (about 52.2%) used in the production of environmental protection products (ISTAT, 2019).

Regarding to the classification by type of product, in the period 2014-2017, the products that have recorded the greatest expansion came from organic agriculture and from the materials recovery services, used for the recycling and the recovery of the environmental rehabilitation (the latter is included in the grouping of soil protection activities) (ISTAT, 2019).

2.10 **Subsidies with negative environmental impact: a problem still to be solved**

As can be seen from the Catalogue of Environmental Subsidies produced by the Ministry of the Environment, not all measures granted in terms of incentives, exemptions and facilities respect the environment. In addition to the international context, also in the Italian context, there has been a lively debate on subsidies harmful and favourable to the environment (Minambiente, 2016).

Before embarking upon this topic, we give a definition of a subsidy, then define the environmentally harmful subsidy (SAD) and the environmentally favourable subsidy (SAF). The Ministry of the Environment must prepare every year, as established by Art. 68 of Law No. 221 of 2015, the Catalogue of environmentally harmful subsidies and environmentally friendly subsidies. The latter defines the subsidies as a State measure conferring an income or cost advantage (Minambiente, 2016). This definition is similar to that adopted by the OECD, where the subsidy is defined as a measure that keeps prices for consumers below market levels and for producers above market levels, or which makes it possible to reduce costs for producers and consumers, either directly or indirectly (OECD, 2006).

As far as environmentally harmful subsidies are concerned, there is no single definition in the literature. Based on OECD (2005) and Valsecchi et al. (2009), we define environmentally harmful subsidies a measure that increases production levels through the increased use of natural resources, resulting in an increase in the level of waste, pollution and exploitation of natural resources. Regarding to the environmentally damaging of a subsidy, it is difficult to identify and assess how favourable to the environment. According to the OECD report (2005), an environmental subsidy must reduce one or more physical units that have a consolidated negative impact on the environment. The OECD, talks about environmentally favourable subsidies, as subsidies whose introduction is closely linked to environmental reasons. For classifying purposes, therefore, an environmentally favourable subsidy must be a measure explicitly created for environmental purposes (OECD, 2005).

The Catalogue of Environmental Subsidies (2016) assessed the environmental compatibility of the various subsidies, identifying: 57 forms of subsidies harmful to the environment, amounting to a total public financial expenditure of EUR 16,2 billion; 46 environmental-friendly forms of subsidy, amounting to EUR 15,7 billion; 27 uncertain subsidies[31], with a total value of EUR 5,8 billion (Minambiente, 2016). Based on the information provided by the Catalogue, the Government may consider several options for intervention, ranging from the hypothesis of progressively removing harmful subsidies, aiming at recovering revenue for other uses (also within the sector concerned, to minimise any impact on international competitiveness), or even in the event of a reform of the subsidy, confirming its financial outlay but introducing environmental conditions for its disbursement (Senate of the Italian Republic, 2018).

2.11 **Future objectives**

Italy, due to its geographical location, is one of the European countries most exposed to the climate crisis. According to Green Economy study carried out by the States General of the Green Economy[32], if certain fiscal and economic policies with environmental requirements are not undertaken, we could have GDP losses already in the middle of the century, up to 10% of GDP in the second half of the century (Ronchi, 2019).

[31] Subsidies with both positive and negative environmental impacts.

[32] The States General of the Green Economy is an organization composed of 66 green economy enterprise organizations in Italy, sponsored by the Ministry of Economic Development and the European Commission.

In Italy, the greatest economic damage would be caused by floods, agriculture, tourism for heat waves, beache erosion, and a higher frequency of the extreme weather events. These and other phenomenon force national bodies to take policies aimed to the Green economy, aiming to targets set for 2030, while aligning them with the Paris Agreement on global average temperature (Ronchi, 2019).

2.11.1 *Objectives of the Budget Law 2020*

Approved by the Law of 27 December 2019, n. 160, N. 45/L, Budget Law 2020 contains some of the main goals pursued in terms of Green Economy, concerning several provisions to promote investments and measures to support environmental sustainability both in public and private fields. Taking some points as an example of such policies, we mention Articles 7 and 8 of the same law. Article 7 states the instruments of granting for contributions on the municipalities infrastructures, aiming to promote energy efficiency and territorial development; Article 8 states the establishment of an Investment Facility to finance or grant aid for operations with a low environmental impact (ISTAT, 2019b).
Some of the manoeuvres aim to implement a public investment plan through a fund with a total budget of EUR 4.24 billion for the years 2020-2023. Of this sum, EUR 150 million, in each year from 2020 to 2022, will be allocated to reduce greenhouse gas emissions. In addition, a revolving fund to support and invest in business research (FRI) will be available, set up at the Deposit and Loan Fund. Moreover, the 2020 budget law provides preferential measures to achieve economically sustainable projects in line with: the de-carbonisation of the economy; the circular economy; to support youth and female entrepreneurship; to reduce the use of plastic and replacing it with alternative materials; urban regeneration; sustainable tourism; adaptation and mitigation of local climate change risks; and in general, investment programmes or projects of an innovative nature with high environmental sustainability (Cottone, 2019).
As far as private green investments are concerned, they are supported by tax concessions and dedicated funds to promote eco-sustainable projects (see Art. 19 and 22 of LAW 27 December 2019, n. 160, N. 45/L). The new budget law also mentions the so-called 'Green New Deal', a Europe-wide agreement on the decarbonisation of the economy, the circular economy and urban regeneration, adaptation and climate mitigation, designed to achieve the climate neutrality by 2050 (ISTAT, 2019b).
The 2020 budget law sets new targets, in terms of financial resources invested, including green investment funds. From the investments in the national accounts, the ISTAT

analysis (ISTAT, 2019b) allows to identify some items related to the protection of the environment, giving indications on the expenses that our economy already carries out in this field. From the analysis, over the period 2008-2018, ISTAT study has found that private environmental investment expenditure accounted for just under 2% of total investment expenditure. To this end, the new Budget Law has aimed at boosting more state investment and development of the country, with particular attention to circular economy (ISTAT, 2019b).

2.11.2 *Fiscal policies: new job employments made by the Green Economy*

An interesting study on the national Green Economy development is contained in the Report on the State of the Green Economy 2018. In this study, ten investment choices in green economy measures would generate an increase in national employment. The effects of these measures have been estimated through the application of the inter-sectoral matrices[33], with data based on literature and interviews with operators and experts. In this study, the input-output table methodologies and the Social Accounting Matrix are used (Sustainable Development Foundation, 2018). The traditional Input-Output framework is a key tool in economic analysis, as it provides a useful description of cross-sectoral relationships. The primary objective of the input-output analysis is to analyse the productive side of the economy, focusing on intermediate input requirements and final outputs of industries (Mainar-Causapé et al., 2018). As for the Social Accounting Matrix (SAM), it extends the classic Input-Output picture. It can be defined as a database, which records data on all transactions between economic operators in a specific economy for a given period of time. Accounting matrices are the standard database for most economic models, as they provide data for economic modelling (as in multisector linear models, for example) and show a snapshot of the economy at a given time (Mainar-Causapé et al., 2018).

In the Sustainable Development Foundation's study (2018), the Input-Output framework and the Social Accounting Matrix quantifies the public expenditure programme impacts, in terms of: Direct effects on value added and employment produced directly on the possible sectors concerned; Indirect effects generated on the economic system, and related to the activation processes that each sector produces on other sectors of activity

[33] The intersectoral matrix allows to determine the amount of the i-th good needed to produce one unit of the k-th good.

through the purchase of intermediate goods, semi-finished goods and services necessary for the production process; Induced effects in terms of value added and employment generated by the use of the estimated additional income streams, achieved by those involved in such economic policies (Sustainable Development Foundation, 2018).

The employment rate generated by the estimate has been accounted in terms of annual work units, and they are therefore equivalent to so-called full-time jobs. The values in productive terms, generated from the activities of the green economy, referring to the five years post-2018, would be paired to approximately 370 billion euros; those of the added value would be of approximately 129 billion euros; the units of work, always accumulated in the five years, would be paired to approximately 2,2 million (that would arrive to approximately 3,3 million euros calculating also the indirect effects of the policies generated on the economy). This means to activate in average every year 74 billion euros of economic production, in great part national, almost 26 billion euros of added value and 440.000 units of work (664.000 considering the indirect effects) (Sustainable Development Foundation, 2018).

The increase of the employment rate is one of the important benefits that the Green Economy would generate. The UNEP (United Nations Environment Program) also states that the Green Economy is a means of generating jobs. In support of this theory, l'UNFCCC (United Nations Framework Convention on Climate Change) and l'ILO (International Labour Organisation) state that action to mitigate climate change would lead to the creation of new jobs (Sustainable Development Foundation, 2018).

Chapter 3
ENVIRONMENTAL FISCAL POLICY: DOUBLE BENEFIT ON TAX EVASION AND POLLUTION PROBLEMS

3.1 **Environmental pollution and Tax evasion: Fiscal policies to cure two 'diseases'**

The modern economy is characterized by continuous changes. Globalization and rapid economic development are the main drivers. On one hand, tax evasion represents a key issue, as it represents a lack of financial resources not only for tax authorities but also for taxpayers (Russo, F. 2010). On the other hand, we must consider the natural resources as the basis of any economic and social system. Our environment has been under great pressure since the beginning of the industrial era. Although the social and scientific development carried out in this century, we have not been able to eliminate effectively the erosion and decay of our environment (Charles D. Patterson III, 2000).

Lawmakers have many tools to encourage or discourage individual or corporate behaviour. One of the most effective and efficient tools is the fiscal policy, often designed to discourage or encourage action by citizens and to achieve social goals (Charles D. Patterson III, 2000). Through this instrument, we will try to understand the prerequisites for an environmental tax policy so as to improve the current situation of evasive and environmental phenomena.

The purpose of these environmental fiscal policies is to penalise polluting behaviour on the one hand, and encourage work, value added creation and business activities on the other one. High-pollution technologies and consumption patterns would be phased out of the market. A fundamental condition that an environmental tax policy should satisfy is the gradual development of the reforms. Slow change is needed to allow time for technological development and cultural changes. What will be considered is not so much the short-term elasticity in the response from society, but the long-term elasticity (Von Weizsäcker, E.U., 1994).

Following, study will focus mainly on the two 'diseases' to face, and then to analyse in the following paragraphs the possible solutions.

3.1.1 *Fiscal policies for Environment*

In many European countries, environmental taxes represent an important resource for limiting pollution. In recent decades, the use of this instrument has increased steadily, especially in countries such as Italy, France, Netherlands and United Kingdom. Among the main benefits that environmental taxes generate, we highlight: the ability to internalise external costs generated by polluters; the ability to generate additional tax revenue to be used to improve environmental quality; the ability to reduce distortions due to taxation on labour, capital and savings (Bontems, P., Bourgeon, J.M., 2005).

With particular reference to the Italian Government, in the early 2000s, it does not seem it has undertaken policies oriented towards sustainable environmental goals. A study carried out by the OECD for the year 2010, had shown in Italy a sharp increase in the tax burden on labour, followed by a gradual easing of the environmental tax burden. In 2010, government revenues from environmental taxes accounted for 2.6% of national GDP, and for only 6.1% of total tax revenues (compared to around 10% in 1995) (OECD, 2010). These data recommended for a review of the Italian tax system able to shift gradually part of the tax burden on labour and income to other taxes, also to stimulate growth. In that context, priority was given to a Green Fiscal Reform, able to shift the tax burden from income, capital and labour to activities that generate a negative pressure on the environment. The tax shift could happen through the introduction of: environmental taxes linked to externalities; tariffs on environmental services that reflect the costs of negative externalities generated; elimination of subsidies for services and products harmful to the environment (Croci, E. and Grasso, D., 2013).

In 2011, the OECD Economic Survey also stated that, Italy needed to restructure its tax system while reducing national public expenditure. The OECD has established a path to be followed, whereby the tax burden on labour had to be alleviated by other less distortive taxes. In this respect, the OECD recommended the use of indirect taxes on potentially environmentally damaging goods, as well as the gradual elimination of inefficient and environmentally damaging tax expenditure. Tax revenue from these procedures would have been able to restructure the budget or be used to reduce taxes on households and businesses. This would have made the tax system more growth-friendly (OECD, 2011).

Estimates on environmental tax reform presented by Andersen et. al (2011), indicated the conditions for a potential environmental tax reform to relaunch the Italian economy after the Great Recession (2008). According to the report, starting from a percentage of receipts

from environmental taxes of 6% (2010) of the total tax revenue, with the introduction of new environmental taxes, the revenues related to the environment could have reached about 10-11% of total tax revenue by 2015. The 2011 Decree-Law 'Salva Italia' is the example of the new national environmental strategy, in which the environmental component was explicitly included for the first time (Andersen et al., 2011).

When considering the introduction of any new environmental tax, it should be introduced at clearly and gradually defined stages, in line with increases in energy efficiency and resources. This would avoid negative distortions in the consumption of the taxed good, while not affecting the tax base. Under this procedure, the gradual implementation of the tax reform would allow the national economy to adapt to changes in relative prices (OECD, 2013)

3.1.2 *Fiscal policies for Tax Evasion*

In recent years, favourable global economic conditions, expansionary monetary policy undertaken by the EU and the structural reforms mentioned in previous chapters have been able to sustain Italy's progressive economic recovery. Improving tax compliance and contrasting tax evasion have been fundamental conditions to recover tax revenue, as they have provided key financial resources for national economic development. Despite recent progress, tax evasion, as shown in previous chapters, remains a very serious problem, and as such must be resolved (OECD, 2019).

The complexity of the Italian tax system contributes to low tax compliance by taxpayers. Recent estimates by the Ministry of Finance (2018) show the tax gap (the difference between the theoretical revenue that the government was supposed to collect in full compliance and the revenue actually collected) to more than EUR 100 billion per year (Ministry of Finance, 2018). The tax gap (as a percentage of theoretical receipts) appears higher on personal income taxes on self-employment and VAT (Carfora, Pansini e Pisani, 2016).

In recent years, governments have focused their efforts on improving tax compliance. An example, could be the Revenue Agency's procedure to improve taxpayers' voluntary compliance. Many OECD countries are increasingly relying on digital technologies to detect and prevent tax evasion, while creating synergies within national bodies to exchange information (OECD, 2019). These instruments have proven useful in reducing tax evasion and the black economy. The OECD Report, for Reducing Opportunities for Tax noncompliance in the Underground Economy, encouraged tax administrations to use

digital registers in order to identify undeclared revenue. The Italian Revenue Agency has promptly responded to these procedures, also increasing its use of digital technologies (current examples may be the use of electronic invoicing, or limits to the use of cash) (OECD, 2012).

Tax evasion is also the result of opportunistic behaviour among taxpayers, fed in some cases by the State itself. An example of government actions that indirectly affect non-compliance of taxpayers is the implementation of the tax amnesty[34]. Tax amnesty allowed to recover additional tax revenues, but also it fuelled a culture of non-compliance with tax laws (OECD, 2016).

Increasing economic growth, reducing social distances and providing future generations with the same environmental services as today, will be a major challenge and will require well-defined tax reforms. The latter will have to have a positive effect on the tax behaviour of taxpayers, so as not to induce them into evasive action.

3.2 **Environmental taxation: policy maker's goals**

In planning an environmental tax reform, National Government needs to define the right trade-offs between efficiency/equity and quality/revenue. The potential for net policy benefits also depends on the costs of administration and compliance, and the use of tax revenue. To improve environmental quality, achieve a fair distribution of benefits and costs, and reveal conceptual policy design compromises, the regulatory authority requires an analysis of all policy objectives (Sadler, R. T., 2001).

Many economists have proposed some policies on the use of environmental taxation. According to these studies, the inefficiency of the tax system has increased, causing losses in terms of unpaid taxes and welfare loss resulting from reduction in work effort, savings and investment (Ballard et al. 1985). Studies by Goulder (1995) have questioned the capacity of environmental taxes to improve the tax system in terms of efficiency. In favour of this theory, Hamond et al. (1997) report that, the introduction of an environmental tax could trigger the so-called 'Tax interaction effect', as an environmental tax could further increase the tax burden generated by taxes already in use, thus increasing the tax burden. In this sense, it would compensate for the potential environmental benefits that the imposition of an environmental tax generates.

[34] Tax amnesty aims to facilitate taxpayers who want to resolve tax-related gradients.

The Tax Interaction effect can be demonstrated through a comparison that sees, the implementation of an environmental tax in the presence of a world without pre-existing tax distortion (First-best world), and the implementation of the environmental tax in a world with pre-existing tax distortion (Second-best world) (Sadler, R. T., 2001). The theoretical bases used are those defined by the economist Pigoue (Pigoue, 1932).

Following the Pigouvian taxation theory, if we consider a first-best world without pre-existing tax distortion, the optimal marginal tax rates will be equal to the marginal environmental damage. The optimal tax rate will be imposed at such a rate that the marginal benefit of pollution reduction will be equals to the marginal abatement cost, so that is internalized the negative externality to the optimal level without discouraging the production of economic output Baumol and Oates (1988). However, given the presence of fiscal distortions, it is difficult or impossible to adopt such a strategy. Goulder et al. (1997), given the non-existence conditions for the first-best world, he based his study on a pre-existing tax distortion model, the Second-best world model. In conclusion, in term of environmental net benefits, it shows how the environmental tax efficiency has a higher cost than the model used by Baumol and Oates (1988), and that the optimal tax rate will inevitably be lower than the Pigouvian tax rate adopted in the first-best world model. The Oates study (1995) on environmental taxation as a means of increasing revenue in the second-best world with a pre-existing fiscal framework, reveals that, the presence of pre-existing taxes increase the cost of environmental policy, in particular when environmental tax revenue is used to finance the reduction of rates on other taxes (Oates, 1995). According to Oates's study, the analysis underlying the adoption of an environmental tax reform, in an optimal pre-existing fiscal framework, must provide the right conditions to maximise the trade-off between the various optimal fiscal criteria, defined in terms of efficiency, equity, compliance, revenue, public choice. These conditions make it possible to understand important guidelines to be followed, while finding the right compromises for the adoption of the optimal environmental taxation (Sadler, R. T., 2001).

Of course, no environmental tax will be able to perfectly meet any of the conditions above. To this end, it must be designed in such a way as to satisfy more certain objectives rather than others, for example to discourage pollution, to place the tax burden on polluting producers, minimise administrative and compliance costs as much as possible (including the negative impact of tax evasion), or minimise efficiency losses, increase flexibility in expansionary policies during changing environmental and economic

conditions, and the establishment of an effective enforcement mechanism (Fullerton, 1996).

Given the complexity of the system in which an environmental tax would be applied, both positive and negative indirect effects could arise. An increase in efficiency resulting from the reduction of pollution, for example, could generate, on the one hand an additional revenue flow, on the other hand a reduction in the administrative costs or compliance of the tax system. Increased efficiency with the introduction of an environmental tax could mean less flexibility in adjusting some taxes or increase the tax costs for taxpayers, but at the same time could respond to a higher level of pollution reduction. The balancing choices between the various objectives must be faced on the basis of the nation's characteristics, and on the basis of the current problems it needs to solve (Sadler, R. T., 2001).

Below is a description of the optimal tax criteria, allowing for a more in-depth understanding of tax policy design. It also clarifies the complexity of the environmental tax policy implementation, while identifying guidelines for achieving certain objectives without compromising others.

- EFFICIENCY: Efficiency encompasses all aggregate welfare impacts from environmental taxation, including any environmental effects (Goulder, 1994b). In public finance, when the tax base reaches a target level of revenue, the cost of efficiency will be low (Stiglitz, 2000). Therefore, from a theoretical point of view, the application of an environmental tax, where a potential excessive tax burden happens, would have the capacity to improve the allocation of resources. By linking the environmental tax to a specific company activity that generates pollution, and by setting a marginal rate that exceeds the marginal cost of abatement, the environmental tax will be able to stimulate the reduction of pollution per unit of product created. The implementation of an environmental tax will serve as an incentive policy, as it would involve the polluter implementing methods that reduce production costs. In that sense, the emission of pollutants will be controlled and regulated, taking into account investment in new technologies. Otherwise, a tax amount will be paid on polluting emissions, which would mean a significant sum of additional revenue (Baumol and Oates, 1988).

  If we consider, in terms of labour-leisure choice, the possible negative effects of environmental taxation on the taxpayer, the introduction of an environmental tax,

however, being a fiscal manoeuvre that increases the tax burden, could cause negative distortions (triggering the so called 'Substitution effect', in which, an increase in taxation triggers a decrease in labour supply and an increase in leisure time), as the consumer would prefer not to work (Goulder, 1994). Studies by Bovenberg (1998) state that, if we consider environmental tax as a tool to trigger a revenue-neutral reform effect so as to reduce the tax burden on pre-existing taxes, the revenue from environmental taxes will not be able to finance for long periods lower tax rates. This because the environmental tax would have an indirect negative effect on the real wages of taxpayers. So, the increase in taxation trigger a substitution effect, so that leisure is preferable to labour, and employment fall.

In support of environmental taxation, since the beginning of the 1990s, Goulder theory supports the so-called double dividend effect, in which the environmental tax, on the one hand, reduces pollutant emissions, on the other improves the efficiency of the tax system (Goulder, 1995). According to Terkla's study (1984), a double dividend effect would reduce the deadweight loss, and so future distortions from pre-existing levies can be avoided (Terkla, 1984).

Goulder et al. (1999) focus on fair trade-off to balance the effects of an environmental tax. They suppose that environmental policies, aimed at increasing revenue, can trigger positive economic processes able to generate income and also offset tax interaction effect. Therefore, if the environmental and economic benefits are below a certain threshold, any reduction in pollution without an increase in tax revenue may lead to further inefficiencies in the tax system (Goulder et al., 1999). Goulder et al. concluded that, satisfy to certain conditions, an environmental tax reform will be able to sustain tax reductions thanks to the positive effects generated in the national economy (Goulder et al., 1999).

Given the multiplicity of conflicting theories, if environmental taxation can result in efficiency gains or losses as specific circumstances change, we need to understand which policy will create least loss in terms of social welfare.

- <u>EQUITY</u>: In implementing an environmental tax reform, it is necessary to address the possible effects on businesses, households and industries (OECD, 1995b). Environmental taxes, in particular energy taxes, which affect the decision-making process of households, may represent an excessive burden to be faced. Usually, the tax burden can be lighted by policies aimed to generate the optimal distribution

effects. Without optimal distribution, the possible situation of a particular taxpayer group would limit the effectiveness of environmental tax policy (Sadler, R. T., 2001). The OECD has carried out some research on the subject of environmental taxation for different income household groups. This research points out that, in implementing an environmental tax policy, taking into account the tax burden faced by income groups, the policy maker must consider five relevant issues: costs and benefits, formal and effective incidence, direct and indirect effects, dimensions of distribution and the baseline for comparison (OECD, 1997). If firms pass own abatement costs to consumers, usually with higher selling prices, environmental tax policy will distort consumer choice. Taxation of an asset, for example, can have indirect effects on the price of another asset. In that sense, anyone who buys no taxed goods would be burdened from environmental taxes indirectly, which would imply distortive behaviour of consumers (Kotlikoff and Summers, 1987). The degree of initial tax burden, paid by enterprises or households on taxing products, depends on the elasticity of supply and demand. If supply is relatively flexible but demand is relatively inflexible, the consumer will have to bear a greater burden than the company. On the contrary, if supply is relatively inelastic and demand is relatively elastic, the enterprise will bear a large part of the relative burden. In such a case, the aggregate impact that the tax reform triggers may relate to capital, labour, resource owners and other inputs (OECD, 1995b).

- COMPLIANCE: Another fundamental goal of an environmental tax reform is to minimise compliance costs. Compliance costs are mainly derived from: taxpayer compliance checks; tax evasion; tax avoidance (Fullerton, 1996).

  For those who produce polluting emissions, compliance costs include not only the tax charges to be paid, but also what is behind the payment of the charges, therefore the keeping of records, the search for professional advice, the preparation of the declarations and the dispatch for the payment of the tax (Graetz et al., 1989). An example to understand the importance of compliance costs was given by Fullerton (1996). He describes the cost of compliance of the Superfund Amendments and Reauthorization Act[35], in which corporate environmental tax can have arrived to 100% of total corporate revenue. In that example, the tax system complicates the

[35] Federal Superfund program, administered by the U.S. Environmental Protection Agency (EPA).

pursuit of environmental objectives that reduce pollution by increasing the tax burden of the pollutant, since the cost of compliance would be too high, and would trigger incentive behaviour to tax evasion (Fullerton, 1996).

The design of an environmental tax reform must take into account all the compliance costs that taxpayers could face, especially the costs incurred to evade taxes. When polluters evade environmental taxes, the tax system could face a loss of efficiency due to a greater negative gap between revenues and costs. To compensate for these inefficiencies, an environmental tax reform should also be aimed at discouraging tax evasion. For this reason, it is necessary to resort to some mechanisms that go beyond the introduction of the environmental tax, such as the strategies of control and prevention of tax evasion, able to increase the effectiveness and efficiency in the implementation mechanism of the reform (Sadler, R. T., 2001). The extent that individual polluters comply with the environmental tax policy depends on the marginal tax rate, the probability of detection, and the penalty of evasion. For environmental tax reform to have a positive impact on the national economy, presumably it needs: to increase the tax compliance, to consider lower marginal pre-existing tax rates; to introduce technological innovation incentives; increasing in the chance of detection; increasing in the penalty of non-compliance (Slemrod, 1990). Following this mechanism, a company inclined to evade by not paying taxes, if it should be discovered, it would pay such a high penalty that would no longer escape. In addition, the Italian government has to be able to give the opportunity to innovate its work machine, for example, reducing the tax burden on other types of taxes. Considering this hypothetical reality, the decision to evade the payment of the tax will depend on: how much the enterprise would be averse to the risk; the possibility of being discovered; if discovered, the penalty it will pay. So, the right compromise would be to adopt an environmental tax that, on the one hand is able to totally internalise the social cost of pollution, but on the other hand is able to minimize compliance costs so as not to trigger mechanisms of tax evasion (for example, by providing tax incentives for green investments on the one hand and increasing sanctions for evaders on the other hand). (Slemrod, 1990).

- <u>REVENUE</u>: An optimal tax analysis must take into account some essential features such as yield, the potential benefits of the reform in the long term and the revenue function (Sadler, R. T., 2001). As far as performance is concerned, the yield of the

tax reform is one of the most basic variable, as determines the level of revenue from each tax base. In recent years, environmental input taxes have proved to be an important tax instrument for each country, not only for environmental purposes, but also for increasing its revenues (OECD, 1995a).

Another significant variable that can influence the success of an environmental tax reform is its potential long-term positive effects. One of the main objectives is to improve the environmental quality of the State, and it is made possible thanks to the implementation of less distortive externality taxes on the polluting activity (Baumol and Oates, 1988). Policy effectiveness depends on the tax extent linked to environmental damage (OECD, 1993). In this sense, a marginal tax rate high enough to impact behaviour, not only allows for the tax system to take advantage from higher revenue, but will encourage agents to substitute away from dirty consumption or production (Sadler, R. T., 2001).

The revenue function instead assumes a fundamental role in an environmental tax reform. The potential use of revenue could vary according to national needs. It can simply contribute to the general national budget, or it can aim at the mechanism of Revenue-recycling effect, in which it can be used as a corrective environmental tax to achieve a double dividend effect, by reducing pollution and lowering distortions in the tax system (Goulder, 1995).

- PUBLIC CHOICE[36]: From the public choice point of view, the goal of environmental tax reform must be to seek a compromise between the need for tax revenue and the improvement of environmental and social quality. Some options may change marginal tax rates so as to maximise revenue flow, or apply a revenue-neutral tax reform in order not to decrease or increase other taxes, and thus try not to create distortions. On the other hand, in order to encourage the reduction of pollution, for example, a public incentive could be providing fiscal incentives to make more favourable access to new technologies. The introduction of environmental taxes could provide the incentive for reducing environmental pollution. At the same time, it can be an income instrument to reduce the pressure of the tax system and increase its efficiency (Sadler, R. T., 2001).

[36] Public choices in a context where, both environmental regulators and fiscal authorities, being involved in policy design, must find the right compromise, in terms of the public budget, between revenue adequacy and improvements in environmental quality.

3.3 **At the bottom of tax evasion**

Listed the objectives of an environmental fiscal reform, we will focus our analysis on tax compliance, in particular in the fight against tax evasion.

Adam Smith (1776, Book V, Chapter II) defines an optimal tax system as a system characterized by low administration costs. If we look at modern taxation, the costs of the tax system are mainly attributable to procedures against distortive behaviour by taxpayers, fuelled by the competitive mechanism of market prices. Although, the tax compliance costs of the taxpayer should also be taken into account (Sandmo, 2004). Tax Compliance costs affect the industrial sector, the entrepreneurial structure of a country, investment returns and citizens' gross wages. Given these characteristics attributed to the modern tax system, we need to focus on a possible theory of optimal taxation that minimises compliance costs as well as inefficiencies generated by the system (Sandmo, 2004).

The study carried out by Allingham-Sandmo (A-S model) has allowed to acquire important information about the time of the taxpayers' individual income tax return, revealing the decisions about how much of own income should they report and how much should they evade. The model assumes that, taxpayer behaviours are influenced by factors such as the amount of tax rates (which determine the benefit of evasion), penalties and the likelihood of being subject to a tax assessment (which determine the costs). On the basis of these factors, individuals make a choice: how much revenue to declare and which party to report at the time of the tax return (Allingham e Sandmo, 1972).

Based on the A-S model, Sandmo carries out some studies that will allow us to clarify the study of Allingham and Sandmo previously made. The main points of the model will be summarized below, in order to understand which choices are made by an individual when declaring his income (Sandmo, 2004).

Let $\boldsymbol{W}$ be the gross income of the taxpayer. There is a proportional income tax at the rate $\boldsymbol{t}$[37]. The amount evaded, i.e. the amount of underreporting, is $\boldsymbol{E}$, so that the reported income is $\boldsymbol{W}$-$\boldsymbol{E}$. If the tax evasion is not detected by the tax authority, the net income of the taxpayer is accordingly:

1. $\mathbf{Y = W - t(W - E) = (1 - t)W + tE}$

[37] In this model the amount of income evaded has been used as a decision variable of the taxpayer, as a natural behaviour that leads to more unequivocal results.

If, however, it is discovered that the taxpayer has underreported his income, he will pay **?,** a penalty rate of tax on the evaded amount, so that his net income in this case is:

2. $\mathbf{Z = (1 - t)W + tE - ?\,E = (1 - t)W - (? - t)E}$

In this model, the assumption is that all income is equally unknown to the tax collector. The taxpayer's subjective probability of detection is $\boldsymbol{p}$. Taxpayer chooses the amount evaded so as to maximize his expected utility, which is:

3. $\mathbf{V = (1 - p)U(Y) + pU(Z)}$

It is assumed that $\boldsymbol{U}$ is increasing and concave, so that the taxpayer is risk averse. The first order condition for an interior solution is:

4. $\mathbf{\frac{U'(Z)}{U'(Y)} = (1 - p)t/p(? - t)}$

To see the empirical implications of the model, he has differentiated the first order conditions with respect to the exogenous variables[38] $\boldsymbol{W, t,}$ **?** and $\boldsymbol{p}$. It turns out that the signs of the derivatives $\boldsymbol{?E/??}$ and $\boldsymbol{?E/?p,}$ are both unambiguously negative; a higher penalty rate or a higher probability of detection always tends to discourage tax evasion. Intuitively, this is seen from the equation (**4**), by noting that the right-hand side of the equation can be interpreted as the relative price of income in the states of detection and non-detection, and this depends negatively on **?** and $\boldsymbol{p}$. When **?** or $\boldsymbol{p}$ increases, $\boldsymbol{Z}$ increases relative to $\boldsymbol{Y}$, which implies that there must be less evasion[39]. Sandmo assumes that a higher gross income will increase evasion, also because people become more willing to engage in risky activities as they get richer.

Regarding to the effect of the regular marginal tax rate, the A-S model highlights that an increase of the tax rate generates an ambiguous effect on tax evasion: on the one hand it generates a negative income effect, as the taxpayer will become poorer and therefore less willing to take risks with increasing taxes; on the other hand, it generates a substitution effect, the effect of which would increase tax evasion (Sandmo, 2004).

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[38] The exogenous variable is an economic variable that affects the equilibrium represented in the model, but is not influenced by the equilibrium itself.

[39] In this regard, Christianity (1980) states that, if the expected gain from tax evasion is held constant, an increase of the penalty rate combined with a decrease of the probability of detection will always reduce tax evasion.

To give an answer to the ambiguity generated by the A-S model, we take the cue from the study carried out by Yitzhaki (1974). It emphasized that, the result of the increase in taxes will depend mainly on the size of the penalty imposed on the amount of income evaded. In this study, Yitzhaki takes as an example the American and Israeli tax laws, in which the amount of the sanction allows to have no substitution effect and consequently no ambiguity[40]. For this reason, by inserting the right changes to the model, is necessary to redefine the rate that determines the sanction of the tax evaded, so that the relative price of income is independent of t. In this way, we would have only the income effect, which in our case would have a positive effect on tax evasion. The substitution effect in the A-S model occurs because the penalty rate is kept fixed when the evaded tax rate increases. This stimulates the underestimation of income (Yitzhaki, 1974). The theory is confirmed by a second study by Yitzhaki (Yitzhaki and Slemrod, 2000), in which he argues that the fixed probability (p) that an amount of unreported taxable income will be recognised and subject to a proportional penalty (?), in addition to the payment of the real tax itself, would lead to dissuade an individual from tax evasion.

To sum up, it is known that high marginal tax rates have a negative effect on tax evasion, as they encourage taxpayers to evade. If Yitzhaki's theory is applied, the penalty rate will increase with the tax rate evaded. In the A-S model, we observe how the substitution effect, caused by a fixed penalty rate, generates a negative effect on tax evasion, as it would increase the likelihood of evasion at the increase of the tax rate[41]. Yitzhaki theory, applied to the A-S model, helps us to understand how a higher sanction and a higher probability to discover non-compliant behaviour restrain the propensity of taxpayers to tax evasion (Yitzhaki, 1974; Yitzhaki and Slemrod, 2000; Sandmo, 2004).

Focusing on the tax evasion of the indirect taxes[42], Sandmo (2004) highlights the company's independence role, as they would act as real tax collectors for the government. The study by Marrelli (1984) allows us to understand the role of companies in tax evasion, through an analysis of an ad valorem tax[43] outside the value added system of a company.

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[40] Under US or Israeli tax laws, the fine is imposed in proportion to the amount of tax evaded.

[41] The study by Clotfelter (1983) of tax return data for the United States found a strong positive association between marginal tax rates and the amount of evasion.

[42] Indirect taxes are taxes that affect wealth, but only when it is consumed or transferred. Indirect taxes are, for example, VAT or excise duties.

[43] Ad valorem tax is a tax for which the tax base is defined in monetary terms and the tax rate is defined as a percentage of the base.

Analysing the Marrelli's study is of paramount importance, because if we applied the study to the implementation of environmental taxes, it would allow to understand how environmental taxes can be evaded by the polluter. Marrelli argues in his model that, the problem of indirect tax evasion may be at the final stage of production, that is the sale of final goods to consumers. (Marrelli, 1984). He illustrated his model describing a firm in a competitive industry with a product $\boldsymbol{X}$, selling it at a price of $\boldsymbol{Q}$, including taxes, which amount is equal to $\mathbf{t}$ per unit of product. It is assumed that the enterprise does not declare a certain amount of product equal to $\mathbf{e}$. If discovered, the enterprise will have to pay a fine for $?(\boldsymbol{e})$, such that $?'(\boldsymbol{e}) > \boldsymbol{t}$ (the marginal fine must be higher than the tax), and $?''(\boldsymbol{e}) > \mathbf{0}$, so that the marginal fine is increasing (Marrelli, 1984). Following this model, regardless of the output decision, company behaviour does not change in any case, both the probability of detection and the penalty function. This implies that, for example, if the tax rate has been imposed to achieve a specific objective (in our example to reduce the consumption of a good with negative externalities), the optimal tax rate is not influenced by the possibility that the company evades or does not evade. In this sense, an environmental tax reform will impose a tax rate to internalise their cost, and at the same time it will use appropriate resources to increase the likelihood that possible evasive actions will be identified or prevented. Following, the penalty rate will increase in proportion to the tax evaded (Marrelli, 1984 and Sandmo, 2004).

3.3.1 *Empirical evidence about taxpayer*

After the theoretical sources used in this paragraph, we will mention some empirical studies on the determinants of compliance decisions by taxpayers. Most of these studies are based on data compiled by the American Taxpayer compliance measurement Program (TCMP), led by the National Revenue Agency and based on a 'line by line' audit of a sample of 45,000 to 55,000 tax returns. In these studies, we provided a general picture of the tax payer conformity, and a number of factors as income source, socioeconomic grouping (age, sex, location), detection probability, marginal tax rate and income level, influencing the choice (Franzoni, L. A., 1999)

One of the first studies carried out on TCMP data was Clotfelter (1983), in which through data published by the Revenue Agency in 1969, investigate on decisions that affect the underestimation of the taxpayer's income statement, defined as the difference between the income reported and that assessed by Internal Revenue Service examiners. Clotfelter

(1983) argues that both the marginal tax rate and after-tax income significantly affect the taxpayer. Another study on TCMP data in 1969 was carried out by economists Witte and Woodbury (1985), in which they believe that the undeclared percentage of income is inversely proportional to the probability of an audit by the institution of national revenue and directly proportional to the opportunities for tax evasion.

An important contribution to further enrich the study of the tax evasion is given by information on the attitudes of taxpayers, acquired through field investigations (Franzoni, L. A., 1999). Although a great deal of information has been acquired, it is not always possible to have data that are perfectly aligned with reality. Despite this, five factors have arisen in particular from these investigations, which may have a determining effect on the taxpayer's decision to evade or not to evade taxes: the perceived probability of detection; the severity of informal sanctions; moral beliefs about tax compliance; experience with other non-compliers and past experience with Internal Revenue Service enforcement; demographic characteristics. This shows how the penalty imposed on tax evaders is, once again, proving to be one of the most important variables. Moreover, sociological and ethical factors could give us further confirmation for the development of an environmental tax reform. It would generate greater compliance, as well as would increase a taxpayer's moral conscience (Franzoni, L. A., 1999).

Another important factor is the cost of compliance with the most common taxes of the taxpayer, such as Personal Income Tax or VAT. High compliance costs, mainly due to the high complexity of the tax system, not only converge towards more tax evasion, but risk weakening the moral conscience of taxpayers. As pointed out by Kaplow (1996), it is likely that by reducing the complexity of the tax system, a compromise will be created between containing compliance costs and accuracy in the assessment of the taxpayer's liability.

3.4 **An environmental tax reform in presence of tax evasion**

As we noted during the reading, tax evasion is a significant component of all modern tax systems. In recent decades, the political debate on the implementation of an environmental tax reform has become increasingly popular. Many European countries, especially in Northern Europe, have already used similar policies, which have benefited not only from the environmental point of view, but also from the economic and social point of view (Minambiente, 2016). The political debate focused mainly on the

introduction of environmental taxes, such as carbon taxes or energy taxes, as an alternative means to balance tax deficits (Carbone et al 2013). A carefully planned of an environmental tax reform would allow environmental taxes to generate a positive effect on tax evasion. In this sense, tax evasion could play a potentially decisive role in calculating the cost of reform (Liu, A.A., 2013). Some environmental taxes (as an example, we will take the taxes on carbon emissions and taxes on energy in general) are characterized by a series of properties that make it difficult to evade. In that sense, if we consider a revenue-neutral reform in which environmental taxation would be introduced, changing the source of the tax base, from taxes that are easily evasive to taxes that are difficultly evasive, the total amount of tax evasion in the national system could be reduced (Liu, A.A., 2013).

Over the years, there have been several conflicting views on the introduction of environmental taxes. Policy-makers suggest that such taxes would negatively affect a nation's economic growth, because they increase the costs to businesses, damage profits and diminish the competitiveness (Aldy et. al 2010). Palmer's empirical study (1995) shows instead that environmental taxation does not have a substantial effect on the competitive environment of the domestic industry. Taking US economy as an example, the stringency of its environmental regulation with respect to that of Germany and Japan, which is a lot less costly, did not have any impact on the competitiveness of the US industry. US regulatory programs were more rigid than the German or Japanese ones which were a lot less costly. This stringency in the US environment regulation did not have any impact on the competitiveness. This because the cost of complying with environmental regulation is only a small fraction of the total cost that firms incur (Palmer, 1995).

To learn more about the implementation of an environmental tax reform aimed to contrast tax evasion, we focus on the important study carried out by Antung Anthony Liu (2013). He describes an interesting model that estimates how environmental tax reform will impact in some country's tax evasion level, determining analytically its social impact and estimating its extent. The first results show that, the cost of a 'Green Tax Swap'[44] in a context like the American economy is reduced by about 28%, thanks to the benefits deriving from the decrease in tax evasion. In developing countries such as China and

[44] Fiscal mechanism that improves environmental quality through an environmental tax, while obtaining a higher societal welfare through improved tax efficiency.

India, where tax evasion is higher, the benefit of reducing tax evasion would be far greater, and in turn would decrease the cost of reform (Liu, A. A., 2013).

Antung Liu (2013), in his model, assumes a representative household economy, where each household must divide its time endowment $\boldsymbol{T}$ between leisure $\boldsymbol{l}$ and Labour $\boldsymbol{L}$. In this economy, households work to purchase three consumption goods: $\boldsymbol{X}, \boldsymbol{Y}$ and $\boldsymbol{Z}$. Good $\boldsymbol{X}$ is a polluting good, such as electricity or oil, with an emissions production $\neq \mathbf{0}$. Goods $\boldsymbol{Y}$ and $\boldsymbol{Z}$ are clean goods, but whether for $\boldsymbol{Y}$ taxes are hard to evade, taxes on $\boldsymbol{Z}$ are easier to evade. In this model, Liu assumes that good $\boldsymbol{Y}$ is produced by large corporations, while good $\boldsymbol{Z}$ is produced by small businesses and self-employed. Households receive income from working, from government transfers, and from their ownership of firms. Wages are normalized to 1, so labour income is just the amount of labour supplied. Each household receives lump-sum transfers $\boldsymbol{g}$ from the government, government's revenues resulting from labour taxes and pollution taxes. Firms, as shown below, operate in a perfectly competitive market. Households spend their incomes on purchasing goods $\boldsymbol{X}, \boldsymbol{Y}$, and $\boldsymbol{Z}$, at prices $\boldsymbol{pX}$, $\boldsymbol{pY}$, and $\boldsymbol{pZ}$. Goods $\boldsymbol{X}, \boldsymbol{Y}$, and $\boldsymbol{Z}$ are produced with production functions $\boldsymbol{X} = \boldsymbol{LX}$, $\boldsymbol{Y} = \boldsymbol{LY}$, and $\boldsymbol{Z} = \boldsymbol{LZ}$. While all firms pay labour tax $\boldsymbol{TL}$, only firms producing $\mathbf{X}$ pay pollution tax $\boldsymbol{Tp}$. The tax $\boldsymbol{TL}$ is meant to represent all pre-existing taxes, including sales taxes, labour taxes, and taxes on income. All of these firms can choose to evade taxes. A firm in the **i** sector chooses its evasion rate $\boldsymbol{Ei}$ (evasion rates must be between 0 and 1, so that an evasion rate of 0 means that all taxes owed are completely paid, while a rate of 1 means that no taxes are paid). The evasion rate of the polluting tax is represented by $\boldsymbol{Ep}$. To evade, firms must pay the real costs. A firm producing good $\boldsymbol{i}$ pays $\boldsymbol{Ci}\ (\boldsymbol{Ei})$ per unit produced for evading taxes.

Firms producing $\boldsymbol{i} \in \{\boldsymbol{Y},\boldsymbol{Z}\}$ have profit:

$$\boldsymbol{\pi i = \max(Li, Ei)\ \{pi * i - (1 + (1 - Ei)\ TL)\ Li - Ci\ (Ei)\ Li\}}$$

Under this setup, firms maximize their profit functions with respect to evasion rates by setting the marginal cost of evading taxes equal to the marginal benefit of doing so in the form of taxes avoided. For example, with the labour tax $\boldsymbol{TL}$:

$$\frac{\mathbf{dCi\ (Ei)}}{\mathbf{dEi}} = \mathbf{TL}$$

From this, Antung Liu employs the following assumption:

(1) $\mathbf{Ci\ (0) = 0, C'i(0) = 0}$. When taxpayers are completely honest, the cost of evasion is zero. The marginal cost of hiding a very small amount of evasion is very low;

(2) **C′i (Ei)** is increasing in ***Ei***. While the initial marginal cost of hiding tax evasion is low, it increases as more of the tax base is hidden.

In that sense, Liu assumes that higher marginal tax rates result in higher tax evasion (Liu, A. A., 2013). While the A-S model (Allingham and Sandmo, 1972) estimates an ambiguous impact of marginal tax rates on tax evasion, in the case of the Antung Liu model an immediate negative response from taxpayers due at the increase of the marginal tax rate is assumed, which therefore increases the propensity to tax evasion. The study carried out by Fisman and Wei (2004) documented that tax evasion is proportional to the tax rate applied to a given product. Since firms, how we have said before, are in a perfect competitive market, they optimize its profit function by choosing the same evasion rate (Fisman and Wei 2004). Under these assumptions, the choice of evasion level is an increasing function of the statutory tax rate. In this sense, Liu asks whether firms make profits when they evade taxes. The answer is no, they do not. If we are in perfect competition market, and all firms will choose to evade, the driving prices go down and pushing profits to zero (Liu, A. A., 2013).

At this point, we can see the model from a welfare analysis point of view, introducing the Tax Evasion Effect. How we can deduct from Liu's study (2013), the Tax Evasion Effect is the change in real costs spent in evading taxes. The environmental tax reform that would be introduced by the government through a revenue-recycling system, employs a new tax on pollution and cutting the pre-existing tax, allowing to shift the firm incentives to evade taxes. Taking as an example an environmental tax like a carbon tax, this type of tax allows to make additional statements about the direction of the Tax Evasion effect. Firstly, this type of tax would be more difficult to evade than other taxes like labour or consumption. By comparing the two types of tax and applying the same tax rate, the percentage of environmental tax evaded would be lower than the percentage of tax evaded on labour or consumption. Secondly, the introduction of a possible environmental tax would lead to a reduction in tax rates compared to those previously imposed. On this basis, we assume that the Tax Evasion Effect would decrease the share of tax evaded, increasing social welfare (Liu, A. A., 2013).

Basically, Antung Liu model depends, as well as a market in perfect competition, on two important assumptions:

1. He assumes that tax evasion behaviour incurs in real costs; in the model he has assumed that there are real costs of tax evasion. Real cost means that he has included

both direct and indirect actions on real resources consumption, so that it drives up the price of goods. Moreover, tax evasion and tax avoidance behaviour are included. A possible cost not explicitly designed is the audit costs. He supposes that governments may spend more on audit costs in a high evasion context. In that sense, if governments improve audit activities on higher tax evasion contexts, or it notes that monitoring environmental tax compliance is less costly than monitoring labour or consume tax compliance, an additional benefit will be realized whether the tax evasion decrease (Liu, A. A., 2013);

2. He assumes that environmental taxes are more difficult to evade than other taxes; in this case, given the relatively few available mechanisms, to avoid environmental tax may be difficult and expensive. As a result, environmental tax should provoke a limited tax evasion response. We have several reasons to say why environmental taxes are difficult to evade: they are easy to measure and monitor at the supplier level (in the case of carbon and energy taxes, they can be measured through megawatt hours of electricity, barrels of oil, gallons of gasoline). Most forms of energy must pass through centralized points of infrastructure, like oil or natural gas pipelines, coal grading facilities, or the electricity grid. Compared to other tax bases, such as hours worked, profits earned, or personal income, energy consumed and carbon emitted are easy to monitor. At the same time, they are easy to check, given that commercial users will have powerful incentives to deduct their expenditures in this area, so setup makes it easy to catch cheating suppliers (Liu, A. A., 2013).

To support the analysis on the difficultly to evade the environmental tax, we can take as example data shows by the Swedish government. These data are synthesized from Swedish National Tax Agency publication in 2006. They confirm the difficulty of evading environmental taxes. From these data recorded, less than 1% of total environmental tax are evaded. If you compare it with consumption taxes, such as VAT, we see how the difference between the latter and the rate of evasion of environmental taxes is much higher (about 12%) (Engström and Holmlund, 2009). Another example, whose shows the difficulty in evading the environmental tax respect to other taxes, is the U.K. tax gap measurement program in place, made by HM Revenue & Customs (2011). HMRC defines the tax gap as the difference between the amount of tax that should, in theory, be paid to HMRC and what is actually paid. Official Statistic data have been produced by analysts in HMRC using a range of internal and external data and different

analytical techniques. For the period 2009-2010, the Great Britain reports a diesel duty gap for its excise on tax diesel by 4%. If we compare it with others tax gaps, it seems favourable from a tax evasion point of view. Comparing it with Value Added Tax Gap (13,8%), Personal Income Tax (5,8%), and the Corporate Income Tax (11,7%), we can see the net favourable differences taking into account to tax evasion (HM Revenue & Customs, 2011). According to HM Revenue & Customs (2018), values about 2016-2017 recorded a tax gap percentage of VAT in 8,9%, on CIT of 7,4% and, regarding to an environmental tax (in our case Hydrocarbon oils duties), a tax gap percentage of 0,5% (HM Revenue & Customs, 2018).

Liu (2013) illustrates a simulation to show that the welfare cost of a green tax swap is less when pre-existing tax evasion is present. The goal is to enhance the value of tax evasion for decreasing the costs of a Green Tax Swap mechanism provided by a tax reform. Of course, each country has different tax evasion properties, and so environmental policy can react in different way. It assumes that, at every tax rate, environmental tax evasion is half that of labour tax evasion. This, because evidence from Sweden and UK parameters suggest that environmental taxes have been evaded at a rate much lower than half the rate of other taxes (Liu, A.A., 2013). Adapting the theory previously described with some functional forms to the model, based on the data of the American economy (Slemrod, 2007, U.S. Department of Commerce, 2007), Liu estimates the values of an environmental tax reform, in which he applies a new pollution tax, results in a 10% reduction in basic pollution, coupled with a revenue-neutral reduction in labour taxes. The triggered effect by the polluted good increases the revenue-recycling effect, which is the economic gain generated by the use of revenue from a less distortive tax, such as environmental taxes, to make cuts in other more distortive taxes, such as labour income taxes. (Liu, A. A., 2013). In that sense, the revenue recycling effect occurs, and affects the total cost of evasion.

According to the Liu model, as the pollution tax increases, the amount of resources spent by taxpayers on environmental tax evasion increases. At the same time, as the labour tax decreases, the amount of resources spent on labour tax evasion decreases. Regarding to the recycling effect, the environmental tax reform, according to Liu, aims to introduce an environmental tax because of its difficulty to be evaded compared to other pre-existing taxes, such as labour tax. Environmental tax would recover a higher tax revenue from polluted activity so as to power the revenue recycling process and reduce other more

elusive taxes. In that sense, the total amount of real resources spent on tax evasion in the economy falls, and society increases their real welfare benefits (Liu, A. A., 2013).

Antung Liu applied the theoretical model using three Computable General Equilibrium simulation (CGE) on 30 carbon emitting countries. The result of Antung Liu study shows that developing and developed countries could implement an environmental tax reform so as to contrast tax evasion and improve environmental quality. The results of this study show us how environmental taxation, following the revenue-recycling system, can have extremely low costs. In addition, it would allow part of the revenue from the environmental tax to be used for the reduction of pre-existing taxes. Automatically, it would allow marginal rates to be reduced on those taxes that are easier to avoid in terms of tax evasion. In so doing, the national economy would enjoy an additional advantage, namely that of reducing total tax evasion (Liu, A.A., 2013).

To support Liu (2013), the study carried out in 2018 by Bento, A., et al. (2018), using parameters of the American economy, confirms once again the benefits of a Green Tax Swap. Unlike Liu (2013), the study of Bento A., et al. focuses on the shadow economy (informal sector), the economy represented by the transactions between entities that are not recorded by the national economy and therefore not taxed. Bento et al. stress that the informal sector is a key element in drastically reducing the cost of an environmental tax policy. The study, taking into account individual field of work, shows that the increase in environmental taxes falls on work expenditure that are difficult to evade in the informal sector, so that part of these expenditures shift to formal sector (visible to the national accounts). Bento, et al. use the electricity tax as a tax base to trigger the double dividend effect, in which: firstly, electricity taxes falls indirectly in the informal sector, through the purchase of electricity products easily traceable by national accounts. And in doing so, some activities that produce tax evasion will be taxed to regular environmental taxation. In addition, the tax burden in the energy sector will be increased. As energy sector is subjected to a lower percentage of tax evasion, an increase in total tax revenue will have been achieved; secondly, the effect of a green tax swap would lead to a reduction in the cost of tax reform, while increasing employment in the less environmentally taxed sectors and reducing the pollution into the atmosphere. This positive effect will generate sufficient benefits to compensate for the negative social effects caused by the increase in taxation energy consumption (Bento, A., et al. 2018).

3.5 **Environmental taxation: fiscal efficiency, economic development and environmental benefits.**

The economic, social and environmental events of recent years place sustainable development at the heart of the global community's aspirations (Minambiente, 2017).

For Italy, the definition of a strategic programme for long-term perspective is an indispensable requirement. In that sense, following the theory under study, we mention some studies of the Italian economy (Roson 2003; Ciaschini et al., 2012), that give rise to the implementation of an environmental tax reform. These studies demonstrate the effect of an environmental tax reform on a number of processes, involving in positive economic and social reactions in the national economy. This could be a prerequisite in facilitating economic and environmental development. In these studies, (Roson 2003; Ciaschini et al., 2012), the tax evasion phenomenon is not directly considered, but on the basis of the theories mentioned in the preceding paragraphs, the possible reduction of tax evasion will be considered as a direct effect of environmental taxation.

A study on the impact of an environmental tax, in this case the carbon tax, on the Italian Economy was done by economic researcher Roberto Roson (Roson, 2003). He uses a dynamic general equilibrium model, in which the revenues from the environmental tax on carbon are used to reduce other existing taxes (taxes on labor or income from capital) (Roson, 2003).

The results of the study show that, the introduction of carbon tax generally leads to an immediate reduction in relative consumption levels. The main taxed activities would be the higher energy intensity activities, such as the energy and chemical sectors. In contrast, the decrease in taxation on labour considers an increase in the agricultural and real estate sector's activity, while the decrease in capital income taxation stimulates investment and growth in the building and industrial agricultural machinery sectors (Roson, 2003).

A negative aspect, according to tax revenue system, concerns the possibility of non-recovery carbon tax when certain market conditions arise. On one hand, by replacing national inputs with inputs imported from other international markets, in the case of lower taxation than in Italy, industries and consumers would partly avoid national environmental taxation. This would mean that the tax would not be collected. On the other hand, with the use of imported goods rather than domestic goods, the Italian economy would partly avoid the generation of carbon emissions at source. In this respect, the right

trade-off will have to be assessed in order to maximise the goals set by the environmental tax policy (Roson, 2003).

The study demonstrates from the theoretical point of view the realization of a double dividend. At the aggregate level, it is shown that, in addition to the benefits of cutting pollute consumption, the decrease of the capital income tax has positive effects on long-term economic growth. For labour taxes, the result is different, since simulations emerged do not support the existence of the so-called double dividend (Roson, 2003).

Ciaschini et al. (2012) carried out another study on the introduction of a progressive green tax proportional to each national product. It would base on the corresponding CO2 emission levels. The ultimate goal was to verify the impact of an environmental fiscal reform, able to attain both the reduction of greenhouse gas emissions and the regional double dividend. The first dividend is identified in a reduction of the CO2 emissions, the second is identified in reduction of the unemployment rate. Double dividend is achieved through the adoption of a Green Tax Revenue-Recycling System aims to reduce both income tax and regional asset tax (IRAP).

According to Ciaschini et al. (2012), the price of final goods increases or decreases as a result of the change in the tax burden on the total production. In that that, reducing income tax aims to mitigate the negative effect of higher prices on real disposable income of households. The reduction of regional tax (IRAP) would theoretically reduce the tax impact on prices.

Through the use of the computable general equilibrium approach, Ciaschini et al. have modelled a multi-sectoral income circular flow, in the case of a bi-regional economy as described by a Social Accounting Matrix (SAM)[45] in Italy, for the year 2003. This procedure has made it possible to highlight the differences in regional GDP, regional prices and employment rates, in response to the effects between macro-regions. The extended multi sectoral framework clarifies: the economic activities; the imperfect labour market; and institutional sector behaviour in each macro-region (Ciaschini et al. 2012). As pointed out by Takeda (2007), in the presence of regional and social differences, as in the Italian case, the social basis on which a double dividend develops varies from region to region, and could not occur in all regions where environmental tax reform will be undertaken (Takeda, 2007). In fact, the study highlights the existence of a double dividend

[45] A Social Accounting Matrix (SAM) can be defined as the organised representation of all transactions and transfers between different production activities, inputs and institutions (households, business sector and government) within an economy context.

only in specific hypotheses, thus demonstrating a different reaction to the reform among the regions. In particular, the study highlights the presence of the first environmental dividend in the whole country, regardless of revenue recycling. On the other hand, the result of the second dividend on the employment rate is different, as it results in a diversification of results for individual regions. It is reached mainly in the central-northern regions, and less in the southern ones, where in some there is a decrease in the employment rate (Ciaschini et al. 2012).

3.5.1 *The Sweden case*

In recent decades, there has been great interest in fiscal manoeuvres involving the partial shift of the tax burden from ordinary income taxes to environmental taxes. One of the most significant examples, which allows us to summarise the policies adopted by means of environmental taxes, is the tax strategy adopted by the Nordic Council (1990s). The Nordic Council is an inter-parliamentary consultative body established in 1952, aimed at promoting cooperation between the five countries of northern Europe, historically a pioneer in the use of economic instruments for environmental policies. This includes Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Åland Islands, the Faroe Islands and Greenland. The Nordic countries have experienced a significant reduction in most pollutant emissions over the past decades. Reliable information on the net benefits to society, environmental policies, the industrial conversion and the creation of new economic activities, represented the driving forces behind the introduction of environmental policies. Among the strategies of the states belonging to the Nordic Council, one of the most interesting was that undertaken by the Swedish government (Minambiente, 2016).

Historically, energy taxation has always played a central role for Sweden government, both as a source of tax revenue and as an instrument of environmental policy. In the 1980s, the Swedish State faced fiscal difficulties, since in some population groups marginal tax rates reached as high as 80% of the base tax, hindering the economic development. The government decided to give priority to a policy able to reduce the marginal taxes and broadening the tax base, but without resorting to excessive budget deficits. In this context, environmental taxes have played an important role, as they are viewed positively by government and citizens. Thus, in the early 1990s, taxes on energy and transport increased. At the same time, energy taxes in the domestic and transport

sectors have been further increased to avoid excessive costs (Sterner, T., 1994). Additional administrative costs remained the same, since additional costs should not occur when introducing new carbon dioxide taxes, as they can be incorporated into existing schemes (Minambiente, 2016). One of the negative aspects that fiscal reform generated was the tax gap by a distortive consume on some energy source between industrial consumers and other consumers (Sterner, T., 1994).

On the basis of the data available, the impact of the new tax system has been positive, given the reduction in Swedish carbon dioxide emissions to a lesser extent than GDP growth. This was the result of the strategies adopted to encourage innovation and the development of green technologies (Minambiente, 2016). The results of Swedish policies show that, the tax rate for carbon dioxide per tonne has increased over the past 25 years and is now by far the highest in the world at SEK 1.120 (EUR 120) per tonne of CO2 (2016) (EEA, 2016). The main objective pursued by Sweden for the next years is the total elimination of fossil fuels, attainable through a new reform package that includes electrification of the bus fleet, investments in renewable energy and smart electricity networks and preferential tax treatment for cars with low environmental impact (electric, hybrid and gas) (Christensen L. T., 2015). A report published in 2010 by the Swedish Statistical Institute provides a quantitative analysis of Swedish environmental taxes and subsidies. This study shows a 34% increase in Swedish environmental tax revenues from 2000 to 2009, with an absolute value of $83 billion in 2009. Regarding to the Treasury expenses in the form of favourable subsidies, finalized to stimulate the activities for the reduction of the emissions, always in the period 2000-2009 are increased by 50% (Statistiska centralbyrån, 2010). From a tax evasion point of view, the data reported by the University of London for Socialists and Democrats Group in the European Parliament (EEA, 2016), demonstrate how the Swedish tax evasion in 2015 amounted to 16.9 billion euros, among the lowest in terms per capita income. Other studies highlight that environmental tax evasion is much lower than for other taxes (Fay et al., 2015).

Data above shows the great importance of the environmental fiscal policy undertakes by Sweden Government during these years. The government has been able to improve not only social and environmental processes, but also to contrast distortion choice from taxation.

3.5.2 *Study on the Spanish economy*

The feasibility of a double dividend, following a tax reform, is one of the most discussed topics in the environmental public economy, both from a practical and a theoretical point of view. Following the Goulder double dividend theory (1994), we consider environmental tax reforms on the one hand aimed at controlling and limiting pollutant emissions, on the other with the aim of correcting the inefficiency generated by the tax system.

Manresa and Sancho (2005) present an interesting study on a macroeconomic model applied to the Spanish economy, which through a detailed tax structure assesses the allocation of financial resources after tax. The study in question shows whether an environmental tax, accompanied by a neutral (equal) reduction in taxes on labour wages, can be effective in promoting higher levels of employment. This is version of the double dividend hypothesis is known in the literature as an 'Employment double dividend'. According to Manresa and Sancho (2005), the degree of flexibility of real wages and the relationship between the unemployment rate and real wages, assumes considerable importance within the model, as they represent the key variables to achieve the double result.

Manresa and Sancho shows that, under certain conditions on the economic structure, there is a chance to obtain the double dividend effect. The study shows how a budget-neutral environmental tax reform (increasing taxation on environmental emissions, but at the same time lowering taxation on capital or labour for example), can produce better environmental conditions (for example a reduction in CO2 emissions), while improving the employment and efficiency levels of the Spanish tax system[46]. One of the concerns expressed by the authors is the fact that, in a general balance, the introduction of a possible environmental tax in the existing tax system will inevitably interact with the set of indirect taxes. In that sense, it may give rise to a less efficient (more distortive) tax system, and consequently to the failure of the double dividend tax effect (Manresa and Sancho, 2005). The main conclusions that the report summarizes are two: the first is that, a double dividend on employment (lower CO2 emissions and lower unemployment) is empirically verifiable on the basis of a rather standard set of variables used in the model; the second, more flexible labour market would respond better to the stimulus of fiscal policies, this latter aimed to limit emissions and to improve the efficient use of financial resources. To

[46] For further information, see Manresa and Sancho (2005).

achieve this dual objective, neutral fiscal policies are needed, but these are not always sufficient. Nevertheless, the authors emphasize that the results of the simulation will always depend on the structure of the model and the adopted variables (Manresa, A., Sancho, F., 2005).

Despite the limitations of variables taken into account, the authors consider the results obtained as a strength to support energy tax policies, as a unique instrument of choice to achieve better environmental quality and a lower level of inefficiency in the tax system (Manresa, A., Sancho, F., 2005).

3.5.3 *The United Kingdom case*

In the United Kingdom, the government defines environmental taxes as those that meet all of the following three principles[47]:

- the tax is explicitly linked to the government's environmental objectives;
- the primary goal of the tax is to encourage environmentally positive behaviour;
- the tax is structured in relation to environmental objectives, for example: the more polluting the behaviour, the greater the tax levied.

On the basis of these important principles, the United Kingdom has based its environmental tax policy mainly on the following taxes: Climate Change Levy (CCL), Aggregates levy, landfill tax, EU emission trading scheme (EU ETS), carbon reduction commitment energy efficiency scheme and the carbon price support.

The British political system has used an innovative approach to set energy tax rates. At the beginning of the 90s, they designed a method, the fuel-price escalator method, in which environmental tax rates (calculated in real terms) were increased in proportion to the inflation rate (EEA, 2016). Taxation increase was expected by 3% above the current inflation rate, later increased in environmental tax to 5% and finally to 6% above the inflation rate (in 1997). The increase in the environmental tax rate settled in 2000, before resuming in 2009 with an annual increase in environmental tax of 1% above the annual inflation rate. In 2009, the UK's environmental tax policy made some changes, since the rise in international oil prices no longer allowed the fuel-price escalator to be applied (EEA, 2016). Thus, the government announced in the 2011 budget law, then implemented from 2012, a replacement of the fuel-price escalator with the fair fuel duty stabiliser, whose system provides for a variation of the environmental tax to vary the price of oil, or

[47] See: https://www.gov.uk/government/news/definition-of-environmental-tax-published.

increase fuel taxes when the price of oil fell, and vice versa. It aims to maintain a certain balance on the consumption of the fossil resource (EEA, 2016).

An interesting study on the possible macro-economic decarbonisation effects of the British economy were carried out by the Cambridge Econometrics Department (Cambridge Econometrics, 2014). The study focused on the potential erosion of the tax base of the energy tax, due to the effects of a decarbonisation of the economy through a series of carbon budgets. The period under study includes the first four budgets in which environmental policy was undertaken (end of the 1990s), until 2027, the year in which objective of reducing greenhouse gas emissions by 50% compared to 1990 should be achieved. One of the first results was an increase in public revenue of GBP 5.7 billion by 2030, also due to a strengthening of the economy. Nevertheless, the consumption of petrol and diesel is expected to fall, which would result in lower total environmental tax revenue in 2027 than in previous years. However, the planned environmental tax reform will generate an overall increase in public revenues, due to an increase in income tax revenue and Value Added Tax (Cambridge Econometrics, 2014). The results allow to give a positive opinion on the projections. As the combination of environmental taxes and reforms in support of economic development, taken as a whole as environmental tax policy, will be able to stimulate the development and dissemination of eco-innovation, we can deduce to have a positive impact on the overall national economy (OECD, 2010).

A further positive result of the policy choices made by the United Kingdom is the lower tax evasion of environmental taxes than other existing taxes. The UK has a very low rate of tax evasion on environmental taxes. Just think that the percentage of tax evasion of hydrocarbon oils duties, that contributes to the total tax gap on the Excise duties (5.1%), is 0.5% (budget data 2017) (HM revenue measuring & customs, 2019). A lower evasion, automatically involves to face a lower administrative cost for the control and the collection of this type of tax, as opposed to the management of other taxes like VAT or PIT (White, 2008).

These studies on the choices made by the UK demonstrate, once again, the benefit that an environmental policy can offer the country. Given the difficulty of evasion compared to other types of taxes, the environmental tax more than other taxes, can improve the tax compliance, while improving tax system efficiency.

3.6 **Final remarks**

From the report of the Global Bank about the carbon pricing initiatives (2016), it has emerged that environmental taxation is playing a fundamental role to reduce GHG emissions and adapt person's behaviour to the changing climate. Just think that, 40 national jurisdictions and more than 20 cities, States, and regions have put a price on carbon emissions (World Bank Group, 2016). It means «a total coverage of around 7 gigatons of carbon dioxide equivalent (GtCO2 e) or about 13 percent of global GHG emissions» (World Bank Group, 2016, p.11).

The sustainable development needs led to the creation of the 'High-Level Commission on Carbon prices', a commission comprised by economists, climate change and energy specialists from all over the world, established during the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) held in Marrakech, Morocco, in 2016, with the goal to help spur successful implementation of the Paris Agreement. In 2017, the committee published a report that reinforces what was said in previous chapters (Stiglitz, J.E., et al. 2017).

The report explores the subject of environmental tax policy as a means to achieve the future goals set by the Paris Conference (2015). Based on a careful analysis of theoretical studies and the collection of data and information on the ground, the committee confirms the feasibility of implementing an environmental tax on pollution emissions, not only to achieve environmental benefits, but also non-environmental benefits. For instance, «The appropriate value for an explicit carbon price may be higher where it promotes efficiency and growth, for instance, because carbon-pricing revenues can be used to reduce other distortive taxes, improve the efficiency and fairness of the fiscal system, and finance public goods such as infrastructure, education, or health» (Stiglitz, J.E., et al. 2017, p. 21).

Given the complexity of the tax system, there are still many considerations to be made and many additional interactions to be analysed. Future research can focus on other types of tax simulations, considering different policy areas and issues specific to particular economies, especially developing economies. The latter is a key part of this study, as the most growing economies are expected, and still represent the largest source of pollutant emissions.

CONCLUSION

This thesis has analysed the possible effects in economic, fiscal and environmental terms, that tax and environmental policies, if combined, could generate within a national economic system. To that end, the first chapter analysed the Italian tax evasion phenomenon, clarifying the Italian tax evasion during the last decades, the strategies adopted by the Italian State to limit it, the results obtained and the goals to be reached. The second chapter analysed the environmental pollution, clarifying how the environmental policies have been addressed by the global community, and the current Italian environmental policies for protecting the environmental quality and achieving the economic sustainable development. The third chapter analysed the role of environmental tax policies as a tool to penalise polluting behaviour on the one hand, and encourage work, value added creation and business activities on the other. This chapter, firstly, analyses the objectives of an environmental tax policy and discusses tax compliance issue, studying more closely how the taxpayer assesses the choice to evade taxes. Secondly, the effects of an environmental tax reform are estimated, which, through the implementation of a Green Tax Swap that uses green tax revenue to reduce other taxes, positively impacts on the well-being and tax evasion level of the national countries.

Theoretically, we deduced that the implementation of an environmental tax reform, producing a revenue recycling effect[48], could reduce the real costs of environmental tax policies. Analysed studies (Liu, A.A., 2013; Bento et al., 2018) have shown that, a green tax swap on the tax system lightens the tax burden on labour or capital and increases the tax burden on environmental taxes on the same amount. Tax evasion plays an extremely important role in this pattern, as it affects the cost of the environmental tax policy. As it has emerged from empirical evidences in Italy, the United Kingdom, Sweden and Spain, environmental taxation can offer some benefit to the country. Given the difficulty of

[48] The revenue-recycling effect is the economic gain generated by the use of revenue from a less distortive tax, such as environmental taxes, to make cuts in other more distortive taxes, such as corporate income taxes. This effect will increase the level of employment and investment and therefore produces an economic gain (Parry, 1998).

evasion compared to other types of taxes, the environment tax more than other taxes, can improve the tax compliance, while improving environmental quality. Some environmental taxes, including carbon tax and energy tax, have unique characteristics that make them less subject to tax evasion. Considering these characteristics, shifting the tax base from easily evadable taxes to taxes difficult to evade, would reduce the total amount of tax evasion generated by the national tax system. On one side, the decrease in total tax evasion would trigger a decrease in the real resources spent by taxpayers and national bodies, on the other it would create benefits in the economy by lowering the tax burden of taxes that adversely affect the consumer, while creating positive effects on social welfare. However, some theoretical studies are in contrast to this theory (Hamond et al. 1997). They affirm that the introduction of an environmental tax could trigger the so-called 'Tax interaction effect', as an environmental tax could further increase the tax burden generated by taxes already in use, thus increasing the tax burden. In that sense, it would compensate for the potential environmental benefits that the imposition of an environmental tax generates.

In conclusion, environmental taxation could be considered as one of the fiscal instruments capable of reducing environmental pollution on the one hand, and tax evasion on the other. However, studies limited to particular conditions do not allow us to express a definite opinion on the possible positive effects generated. Thus, further studies are needed to strengthen this theory, so as to focus the attention on other particular aspects that could influence social and environmental goals.

BIBLIOGRAPHY

Aldy, J. E., Krupnick, A. J., Newell, R. G., Parry, I. W. H., Pizer, W. A., (2010), "Designing climate mitigation policy", *Journal of Economic Literature,* 48, pp. 903-934.

Allingham, G.M., Sandmo, A., (1972), "Income tax evasion: A theoretical analysis," *Journal of Public Economics*, 1, pp. 323-338.

Andersen, M., S., (1994), *Governance by Green Taxes: Making Pollution Prevention Pay*, Manchester University Press, Manchester.

Andersen, M., S., Speck, S., Mautone, O., (2011), *Environmnetal Fiscal Reform: Illustrative Potential in Italy*, Environmentally-related taxation and fiscal reform conference, Rome, December 2011.

Antich, F., (2003), *Origini ed evoluzione del diritto internazionale ambientale. Verso una governance globale dell'ambiente*, available on https://www.ambientediritto.it/.

Arpac, (2004) "Problematiche ambientali e sviluppo sostenibile", *Seconda Relazione sullo Stato dell'Ambiente della Campania*, Napoli, December 2003.

Arpae, (2015), "Il collegato ambientale, una legge organica per la Green economy", *Ecoscienza,* 6*,* pp. 34-39.

Ballard, C. L., Shoven, J. B., Whalley, J., (1985), "General Equilibrium Computations of the Marginal Welfare Costs of Taxes in the United States," *American Economic Review*, 75, pp. 128-38.

Barbarella, A., (2013), "Affrontare la crisi con un green new deal", in *Ecoscienza,* 6, pp. 30-31.

Baumol, W., & Oates, W. (1988), *The Theory of Environmental Policy*, Cambridge University Press, Cambridge.

Bento, A., Jacobsen, M. (2007), “Ricardian rents, environmental policy and the double-dividend hypothesis”, *Journal of Environmental Economics and Management,* 53, pp. 17-31.

Bento, A., Jacobsen, M., Liu, A.A., (2018), "Environmental policy in the presence of an informal sector", *Journal of Environmental Economics and Management*, 90, pp. 61-77.

Bernardi, L. e Bernasconi, M. (1996), “L’evasione in Italia: evidenze empiriche”, *Il fisco*, 38, pp. 19-35.

Bianchi, D. (2018), *Circular Economy in Italy*, Edizione Ambientale, Milano.

Bontems, P., Bourgeon, J.M., (2005), "Optimal environmental taxation and enforcement policy", *European Economic Review,* 49, pp. 409-435.

Botarelli, S., (2000), “*La progressività dell’IRPEF*”, Quaderni del Dipartimento di economia pubblica dell’Università degli Studi di Siena, No 300.

Bovenberg, A.L., Goulder, L.H., (1996), *Optimal Environmental Taxation in the Presence of Other Taxes: General-Equilibrium Analyses*, American Economic Review, 86, pp. 985-1000.

Bovenberg, A. L., (1998), "Environmental Taxes and the Double Dividend", *Empirica*, 25, pp. 15- 35.

Brennan, G., (2009), “Climate change: a rational choice politics view”, *The Australian Journal of Agricultural and Resource Economics*, 53, pp. 309–326.

Brosio, G., Cassone, A., e Ricciuti, R., (2002), “Tax evasion across Italy: Rational noncompliance or inadequate civic concern?”, *Public Choice*, 112, p. 259-273.

Cambridge Econometrics (CE), (2014), *The Economics of Climate Change Policy in the UK*, Cambridge Econometrics, Cambridge, September 2014.

Carbone, J. C., Morgenstern, R. D., Williams III, R. C., (2013), *Carbon taxes and deficit reduction*, Resource for the future, Washington, August 2013.

Carfora, A., Pansini R., and S. Pisani (2016), *Spatial Dynamics in Tax Gap Determinants*, National Revenue Agency, Discussion Topics, Vol. 01.

Charles D. Patterson III, (2000), "Environmental Taxes and Subsidies: What is the Appropriate Fiscal Policy for Dealing with Modern Environmental Problems?", *William and Mary Environmental Law and Policy Review*, 24, pp. 121-159.

Christensen L. T. (2015), *Country Case Studies on Fossil Fuel Subsidy Reform*, International Institute for Sustainable Development, Geneva, November 2015.

Ciaschini, M., Pretaroli, R., Severini, F., Socci, C., (2012), "Regional double dividend from environmental tax reform: An application for the Italian economy", *Research in Economics*, 66, pp. 273-283.

Cingano, F., and Faiella, I., (2011) *The EU Energy-climate package: an analysis of a carbon tax on transport*, Conference on Environmentally Related Taxation and Fiscal Reform, Rome, 2011.

Climate Focus (2015), *The Paris Agreement: Summary*, available on https://www.climatefocus.com/.

Clotfelter, T.C., (1983), "Tax evasion and tax rates: An analysis of individual returns", *Review of Economics and Statistics,* 65, pp. 363-373.

Coase, R. H., (1988), *The Firm, the Market, and the Law*, The University of Chigago Press, London.

Coase, R. H., (1960), "The Problem of Social Cost", *Journal of Law and Economics*, 3, pp. 1-44.

Confindustria, (2017), *Interventi in materia fiscale, assicurativa e finanziaria sulle tematiche ambientali*, Rome, July 2017.

Confindustria Study Centre, (2018), *Dove va l'economia italiana e gli scenari di politica economica*, Rome, October 2019.

Confindustria Study Centre, (2019), *In riduzione l'evasione IVA?*, available on https://www.confindustria.it.

Confindustria Study Centre, (2019b), *Chi fa più per l'ambiente*, available on https://www.confindustria.it/.

Confindustria, (2019), *NaDEF 2019 al DEF 2019 - osservazioni*, Rome, October 2019.

Cottone, N., (2019), *Manovra, ambiente ed energia: dal Green new deal alla plastic tax*, Il Sole 24ore, 27/12/2019.

Croci, E. and Grasso, D., (2013) “L’Italia ha bisogno di una riforma fiscale verde”, Iefe, Università Bocconi, *Ecoscienza, 6,* pp. 38-39.

D’Andrea, M.A., (2019), *Lotteria degli scontrini 2020: cos’ e come funziona? Premi e novità,* on https://www.money.it.

Daclon, M. C., 2008, “*Geopolitica dell'ambiente: sostenibilità, conflitti e cambiamenti globali*”, Franco Angeli, Milano.

De Mita, E. (2000), *Politica e diritto dei tributi in Italia: dalla riforma del 1971 a oggi*, Il Sole 24 Ore, Milan.

EEA, (2016), "Environmental taxation and EU environmental policies", *European Environemnt Agency Report*, No 17/2016.

Elba, F., (2016), *Fenomenologia dell’evasione fiscale in Italia*, Economia e Politica, 29/01/2016.

Engström, P., Holmlund, B., (2009), "Tax Evasion and self-employment in a high-tax country: evidence from Sweden”, *Appl. Econ.*, 41, pp. 2419–2430.

European Commission, (2013), *European Semester 2013: country-specific recommendations*, Brussels, May 2013.

European Commission, (2014), *CIRCULAR ECONOMY: Connect, generate and preserve value*, Brussels, July 2014.

European Community, (1993), *Fifth environmental action programme of the European Community*, Official Journal of the European Communities, No C 138/1.

European Community, (2004), *Environmental liability for the prevention and remedying of environmental damage,* DIRECTIVE 2004/35/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, April 2004.

Fay, M., Hallegatte, S., Vogt-Schilb, A., Rozenberg, J., Narloch, U., Kerr, T., (2015), *Decarbonizing Development: Three Steps to a Zero-Carbon Future,* World Bank Group, Washington, May 2015.

Feeny, D., Hanna, S. and McEvoy, A.F., (1996), “Questioning the assumptions of the 'tragedy of the commons' Model of Fisheries”, *University of Wisconsin Press*, vol. 72(2), pp. 187-205.

Filippini, R., (2002), "*Johannesburg: solo con confronto e consenso si ottengono risultati"*, *Ambiente e Sviluppo*, n. 4, July-August 2002.

Fisman, R., Wei, S., (2004), "Tax rates and tax evasion: evidence from "missing imports in China", *Journal of Political Economy*, 112, pp. 471-496.

Franzoni, A.L., (1999), '"Punishment and grace: On the economics of tax amnesties," *Public Finance/Finances Publiques*, 3, pp. 353-368.

Fullerton, D., (1996), "Why Have Separate Environmental Taxes?", *James M. Poterba, ed., Tax Policy and the Economy*, 10, Cambridge, pp. 33-70.

Gini, C. (1962), *L'ammontare e la composizione della ricchezza delle nazioni*, Second edition updated by Antonio Giannone, Torino.

GlobalChange.gov, (2019) *Understand Climate Change*, U.S. Global Change Research Program, available on https://www.globalchange.gov/climate-change.

Ghisellini P, Ulgiati S, (2020), "Circular economy transition in Italy. Achievements, Perspectives and Constraints", *Journal of Cleaner Production*, 243, p. 118360.

Goulder, H.L., (1994), "*Environmental taxation and the 'Double Dividend': a reader's guide*", Nber Working Paper No. 4896.

Goulder, L.H., (1994b), "Energy Taxes: Traditional Efficiency Effects and Environmental Implications," *James M. Poterba, ed., Tax Policy and the Economy,* 8, pp. 105-59.

Goulder, L.H., (1995), "Environmental Taxation and the Double Dividend: A Reader's Guide," *International Tax and Public Finance*, 2, pp. 157-183.

Goulder, L.H., Parry, I.W.H., Burtraw, D., (1997), "Revenue-Raising vs. Other Approaches to Environmental Protection: The Critical Significance of Preexisting Tax Distortions," *RAND Journal of Economics*, 28, pp. 708-731.

Goulder, L.H., Parry, I.W.H., Williams, R.C., Burtraw, D., (1999), "The Cost-Effectiveness of Alternative Instruments for Environmental Protection in a Second-Best Setting," *Journal of Public Economics*, 72, pp. 329-360.

Graetz, M.J., Dublin, J.A., Wilde, L.L., (1989) "United States," *Cahiers de Droit Fiscal International*, ed. Administrative and Compliance Costs of Taxation, pp. 311-344.

Hardin, G., (1968), The Tragedy of the Commons, *Science*, 162, pp. 1243-1248.

Hamond, M. J, DeCanio, S.J., Duxbury, P., Sanstad, A.H., Stinson, C.H., (1997) "Tax Waste, Not Work," *Challenge*, 40, pp. 53-62.

HM Revenue & Customs, (2011), *Measuring Tax Gaps 2011 edition*, HM Revenue and Customs, London, September 2011.

HM Revenue & Customs, (2018), *Measuring tax gaps 2018 edition*, HM Revenue and Customs, London, June 2018.

HM Revenue & Customs, (2019), *Measuring tax gaps 2019 edition*, HM Revenue and Customs, London, June 2019.

Imparato, R., (2019)*, Limite contanti a 2.000 euro dal 2020 e 1.000 euro dal 2022,* available on https://www.money.it.

Ispra, (2017), *Rapporto rifiuti urbani – Edizione 2017*, Rome, October 2017.

ISTAT (1951), "Studi sul reddito nazionale"*, Annali di statistica*, serie VIII, vol. III, Rome.

ISTAT, (2010), *La misura dell'economia sommersa secondo le statistiche ufficiali: anni 2000-2008*, Rome, July 2010.

ISTAT (2011), *Economia non osservata e flussi finanziari*, Rome, July 2018.

ISTAT (2019), *Il conto dei beni e servizi ambientali*, National Statistics Institute, Rome, February 2019.

ISTAT, (2019b), *Attività conoscitiva preliminare all'esame del disegno di legge recante bilancio di previsione dello Stato per l'anno finanziario 2020 e bilancio pluriennale per il triennio 2020-2022*, Rome, November 2019.

Kaplow, L., (1996), "How Tax Complexity and Enforcement Affect the Equity and Efficiency of the Income Tax", *National Tax Journal*, 49, pp. 135-150.

Karadeloglou, P. (1992), *Energy Tax versus Carbon Tax*, Amsterdam, March 1992.

Konrad R., Meuleman, L., Parker, J. (2013), "Le politiche ambientali come soluzione alla crisi", *Ecoscienza,* 6, pp. 24-26.

Kotlikoff, L.J., Summers, L.H., (1987), *Tax Incidence*, the National Bureau of Economic Research, NBER Working Paper No. 1864.

Leccese, A. (2007), *Le basi morali dell'evasione fiscale: tutto quello che c'è da sapere sul tallone d'Achille del nostro paese,* Armando Editore, Roma.

Lichbach, M.I., (1996), *The Cooperator's Dilemma*, University of Michigan Press, Ann Arbor.

Liu, A.A., (2013), "Tax Evasion and Optimal Environmental Taxes", *Journal of Environmental Economics and Management*, 66, pp. 656-670.

Mathieu-Bolh, N., (2017), "Can tax reforms help achieve sustainable development", *Resource and Energy Economics,* 50, pp. 135–163.

Mainar-Causapé, A.J., Ferrari, E., McDonald, S., (2018), *Social accounting matrices: basic aspects and main steps for estimation*, Publications Office of the European Union, Luxembourg, October 2018.

MAIORANO, *elusione fiscale*, in Dizionario di Economia e Finanza, Enciclopedia Treccani, (2012a), available on http://www.treccani.it/enciclopedia/.

MAIORANO, *evasione fiscale*, in Dizionario di Economia e Finanza, Enciclopedia Treccani, (2012b), available on http://www.treccani.it/enciclopedia/.

Manestra. S. (2010), *Questioni di Economia e Finanza: Per una storia della tax compliance in Italia*, Banca d'Italia, Occasional Papers No. 81.

Manresa, A., Sancho, F., (2005) "Implementing a double dividend: recycling ecotaxes towards lower labour taxes", *Energy Policy,* 33, pp. 1577–1585.

Marigliani, M. e Pisani, G. (2007), *Le basi imponibili IVA. Aspetti generali e principali risultati per il periodo 1980-2004*, Documenti di lavoro dell'Ufficio Studi dell'Agenzia delle Entrate, n. 7.

Marino, R., Zizza, R., (2008), *L'evasione dell'IRPEF: una stima per tipologia di contribuente,* Italian Society of Public Economy, University of Pavia, September 2008.

Marrelli, M., (1984), "On indirect tax evasion", *Journal of Public Economics,* 25, pp. 181- 196.

Mathieu-Bolh, N., (2017), "Can tax reforms help achieve sustainable development?", *Resource and Energy Economics*, 50, pp. 135-163.

MATTM&UN Environment, (2017), *Rapporto del Dialogo Nazionale dell'Italia per la finanza sostenibile*, Geneva, February 2017.

MEF, (1886), *Annuario del Ministero delle Finanze del Regno d'Italia*, Rome, 1886.

MEF, (2003), *Piano nazionale per lo sviluppo sostenibile: in attuazione dell'agenda 21*, Rome, December 1993.

MEF (2014), *Rapporto sull'Evasione Fiscale*, Ministero delle Finanze, Roma, September 2014.

MEF (2017), *Relazione sull'economia non osservata e sull'evasione fiscale e contributiva 2017*, Rome, September 2017.

MEF (2018), "Rapporto sui risultati conseguiti in materia di misure di contrasto all'evasione fiscale e contributiva - anno 2018", *Nota di aggiornamento del documento di economia e finanza 2018*, Rome, September 2018.

MEF (2019a), *Principali aspetti che connotano i fenomeni dell'economia sommersa e dell'evasione fiscale*, Commissione Istruttoria I – Economic policies, Rome, October 2019.

MEF (2019b), "Relazione sull'economia non osservata e sull'evasione fiscale e contributiva - anno 2019", *Nota di aggiornamento del documento di economia e finanza 2019*, Rome, October 2019.

Minambiente, (1993), *Piano Nazionale per lo Sviluppo Sostenibile: in attuazione dell'Agenda 2021*, December 1993.

Minambiente, (2002), *Strategia d'azione ambientale per lo sviluppo sostenibile in Italia*, July 2002.

Minambiente, (2013), *La Green Economy nel contesto dello sviluppo sostenibile e della lotta alla povertà*, Rome, July 2013.

Minambiente, (2016), *Catalogo dei sussidi ambientalmente favorevoli e dei sussidi ambientalmente dannosi 2016*, Rome, December 2016.

Minambiente (2017), *Strategia Nazionale per lo Sviluppo Sostenibile*, Rome, October 2017.

Minambiente, (2017b), *Verso un modello di economia circolare per l'Italia*, Rome, November 2017.

MISE (2017), *Strategia Energetica Nazionale*, Ministry of Economic Development, in collaboration with the Ministry of the Environment and the Protection of the Territory and the Sea, November 2017.

Ministry of Finance (2018), *Nota di Aggiornamento del Documento di Economia e Finanza: Rapporto sui Risultati Conseguiti in Materia di Misure di Contrasto all'Evasione Fiscale e Contributiva*, Rome, September 2018.

Montanino, A., (2019), "Incentivare l'uso della moneta elettronica e disincentivare il contante: una proposta", in *NOTA DAL CSC - Number 11/19,* Rome, September 2019.

Murphy R., (2012), *Closing the European tax gap, a Report for Group of the Progressive Alliance of Socialists & Democrats in the European Parliament*, available on https://www.yumpu.com/en/document/read/10318363/closing-the-european-tax-gap-group-of-the-progressive-alliance-.

Muzzarelli, C. G., (2013), "Green Economy, tre condizioni per il decollo", *Ecoscienza,* 6, pp. 3.

Nicola F., (1909), "Il sistema del contingente nell'imposta di ricchezza mobile", *L'economista di Firenze*, 1909.

Oates, E.W., (1995), "Green Taxes: Can We Protect the Environment and Improve the Tax System at the Same Time?", *Southern Economic Journal*, 61, pp. 915-22.

OECD, (2001), *Sustainable Development: Critical issues*, OECD publishing, Paris.

OECD, (2003), *Organization for economic co-operation and development*, OECD workshop on national plans for sustainable development, Paris 2003, available in http://www.oecd.org/officialdocuments.

OECD, (2003b), *OECD Environmental Performance Reviews: Italy*, OECD, Paris.

OECD (2005), *Environmentally Harmful Subsidies: Challenges for Reform*, OECD, Paris.

OECD (2006), *Subsidy Reform and Sustainable Development – Economic, environmental and social aspects*, OECD Publishing, Paris.

OECD (2010), *Taxation, Innovation and the Environment*, OECD Publishing, Paris.

OECD (2011), *Towards Green Growth: Monitoring Progress: OECD Indicators*, OECD Publishing, Paris.

OECD (2012), *Reducing opportunities for tax non-compliance in the underground economy*, OECD Publishing, Paris.

OECD (2013), *OECD Environmental Performance Reviews: Italy 2013*, OECD Environmental Performance Reviews, OECD Publishing, Paris.

OECD (2016), *Italy's Tax Administration: A Review of Institutional and Governance Aspects*, OECD Publishing, Paris.

OECD (2019), *OECD Economic Surveys: Italy 2019*, OECD Publishing, Paris.

Ostrom, E., Gardner, R., and Walker, J. M., (1994), *Regole, giochi e Common-Pool Resources*, University of Michigan Press, Ann Arbor.

Ostrom, E., (2002), "Common-Pool Resources and Institutions: Toward a revised theory", chapter 24 in *Handbook of Agricultural Economics*, Volume 2, Edited by Gardner, B., and Rausser, G., 2002.

Ostrom, V. (1991), *The Meaning of American Federalism: Constituting a Self-Goveruing Society*, Institute for Contemporary Studies Press, San Francisco.

Ostrom, V. (1997), *The Meaning of Democracy and the Vulnerability of Democracies: A Response to Tocqueville's Challenge*, University of Michigan Press, Ann Arbor.

Palmer, K., Oates, E.W., Portney R.P., (1995), "Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm?", *Journal of Economic Perspectives,* 9, pp. 119-132.

Pantaleoni, M. (1882), *Teoria della traslazione dei tributi. Definizione, dinamica e ubiquità dei tributi*, Rome, (reissue of 1958, edited by G. Ugo Papi).

Parry, I., (1997), *Revenue Recycling and the Costs of Reducing Carbon Emissions*, Climate Issues Brief, No 2, Washington.

Perdriex, P. (1910), *Les fraudes dans l'impôt italien sur les revenues de la richesse mobilière,* Letters Sorbonne Université, Paris.

PIGOU, *The Economics of Welfare*, Macmillan, Londra, 1932.

PIGOU, *A study on public finance*, Macmillan, Londra, 1947.

Pisani, S. e Polito, C., (2006), *Analisi dell'evasione fondata sui dati IRAP. Anni 1998-2002*, Revenue Agency Service, Study Office Working Documents, No. 2, Rome.

Rayner, S. and Malone, E., (1998), *Human Choice and Climate Change*, Battelle Press, Columbus, Ohio.

Revenue Agency Service, (2019), *Gli Indici Sintetici di Affidabilità*, Italian Revenue Agency, Rome, June 2019.

Ricoveri, G., (2013), *Elinor Ostrom e i beni comuni*, available on http://www.ecologiapolitica.org/.

Rosen, S.H., Gayer, T., (2018), *Scienze delle finanze*, McGraw-Hill Education, Milano.

Roson, R., (2003), "Climate change policies and tax recycling schemes; simulations with a dynamic general equilibiurm model of the Italian economy", *Review of Urban & Regional Development Studies (RURDS)*, 15, pp. 26-44.

Rovito, C., (2017), *L'ambiente e la tutela nella Costituzione italiana*, TuttoAmbiente, 2017.

Russo, F. F., (2010), *Tax Evasion and Community Effects in Italy*, Centre for Studies in Economics and Finance, Working paper no. 254.

Sadler, R. T., (2001), "Environmental taxation in an optimal tax framework", *Atlantic Economic Journal*, 29, pp. 215-231.

Sandmo, A., (2004), "The theory of tax evasion: A retrospective view", Norwegian School of Economics and Business Administration, Discussion Paper No. 31/04.

Saturnino, A., and Imperatrice M.L., (2004), *Problematiche ambientali e sviluppo sostenibile*, Second Report on the State of the Environment of Campania, Naples.

Schneider F., Raczkowski K., Mróz B., (2015), "Shadow economy and tax evasion in the EU", *Journal of Money Laundering Control,* 18.1, pp. 34-51.

Schelling, T., (1978), *Micromotives and Macrobehavior*, Norton & Company, New York.

Senate of the Italian Republic, "LEGGE 11 dicembre 2016, n. 232, Articolo 1. comma 540 e seguenti", in *Gazzetta Ufficiale della Repubblica Italiana*, December 11/2016.

Senate of the Italian Republic, (2013), "Attuazione dell'accordo di Parigi sulle emissioni di gas effetto serra", in *Note su atti dell'Unione Europea*, Servizio studi del Senato, Nota n. 85.

Senate of the Italian Republic, (2017), *I danni sanitari e ambientali delle attività economiche in Italia: quanto costa l'inquinamento alla collettività*, Impact Assessment Office, December 2017.

Senate of the Italian Republic, (2018), *Chi inquina, guadagna? Tra SAD e SAF: i bonus che salvano l'ambiente e i sussidi che favoriscono l'inquinamento*, Impact Assessment Office, May 2018.

Severo, (2012), *Rio +20: lo sviluppo sostenibile è possibile. E non può più attendere*, Focus, 14/06/2013.

Slemrod, J., (1990), "Optimal Taxation and Optimal Tax Systems," *Journal of Economic Perspectives*, 4, pp. 157-178.

Slemrod, J., (2007), "Cheating ourselves: the economics of tax evasion", *Journal of Economic Perspectives*, 21, pp. 25-48.

Smulders, S., and Vollebergh, H., (2001), "Green Taxes and Administrative Costs: The Case of Carbon Taxation", in *C. Carraro & G. E. Metcalf (Eds.), Behavioral and distributional effects of environmental policy,* pp. 91 – 130.

Srm (Intesa Sanpaolo) (2018)*, L'economia illegale vale il 23% del Pil, quasi il 30% al Sud,* available on https://ilsole24ore.com, April 2018.

Statistiska centralbyrån, (2010), *Miljörelaterade skatter, subventioner och utsläppsrätter*, Statistics Sweden, Stockholm, December 2010.

Stavins, N. R., (2011), "The Problem of the Commons: Still Unsettled after 100 Years", *The American Economic Review*, February 2011.

Sterner, T., 1994, "Environmental tax reform: The Swedish experience", *European Environment*, 4, pp. 20-25.

Stiglitz, E.J., (2000), *Economics of the Public Sector*, W. W. Norton Company, Inc., New York.

Stiglitz, E.J., Rosengard K. H., (2015), *Economics of the Public Sector,* W. W. Norton Company, Inc., New York.

Stiglitz, E.J., Stern, N., Duan, M., Edenhofer, O., Giraud, G., Heal, G.M., (2017), *Report of the High-Level Commission on Carbon Prices*, International Bank for Reconstruction and Development and International Development Association, Paris, April 2017.

Sustainable Development Foundation, (2018), *Relazione sullo stato della Green Economy – 2018*, Rome, October 2018.

Sustainable Development Foundation (2019), *Relazione sullo stato della Green Economy – 2019*, Rome, October, 2019.

Terkla, D., (1984), "The Efficiency Value of Effluent Tax Revenues," *Journal of Environmental Economics and Management*, 11, pp. 107-123.

Tfm Group, (2017), *The Financial Complexity Index 2017*, Meeting the global challenge of local accounting and compliance, June 2017.

UNFCCC, (2008), *Kyoto Protocol: reference manual*, Bonn, November 2008.

UNFCCC, (2012), *The future we want*, Brazil, July 2012.

UNFCCC, (2015), *Adoption of the Paris Agreement*, Paris, 30 November to 11 December 2015.

UNFCCC, (2015b), *Paris Agreement*, Paris, December 2015.

UNEP, (2011), *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, available on www.unep.org/greeneconomy.

United Nation, (1992), "*Report of the United Nations Conference on Environment and Development*", Publications of the United Nations, Mexico, August 1992.

U.S. Department of Commerce, (2007), *U.S. Bureau of Economic Analysis – 2007*, National Income and Product Accounts of the United States. Washington, 2007.

USGCRP, (2018), *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment,* available on https://nca2018.globalchange.gov/.

Vanoni, E., (1948), *Discorsi pronunciati alla Camera dei deputati e al Senato della Repubblica*, cit., pp. 19-20.

Vatn, A., (2005), *Institutions and the Environment*, Edward Elgar, Cheltenham (UK).

Valsecchi C., ten Brink P., Bassi S., Withana S., Lewis M., Best A., Oosterhuis F., Dias Soares C., Rogers-Ganter H., Kaphengst T. (2009), *Environmentally Harmful Subsidies: Identification and Assessment*, Final report for the European Commission's DG Environment, November 2009.

Von Weizsäcker, E.U., (1994), "Sustainable economy", *The Science of the Total Environment,* 143, pp. 149-156.

White, J., (2008), *Value-Added Taxes: Lessons Learned from Other Countries on Compliance Risks, Administrative Costs, Compliance Burden, and Transition*, United States Government Accountability Office, Washington DC, April 2008.

Witte, D.A., Woodbury, F.D., (1985), 'The Effect of Tax Laws and Tax Administration on Tax Compliance: The Case of the U.S. Individual Income Tax", *National Tax Journal*, 38, pp. 1-13.

World Bank Group, (2016), *State and Trends of Carbon Pricing,* World Bank Group, Washington DC, October 2016.

World Bank Group, (2017), *Paying Taxes 2018,* World Bank Group & PWC, Washington DC, 2018.

Yitzhaki, S., (1974), "A note on Income tax evasion: A theoretical analysis", *Journal of Public Economics,* 3, pp. 201-202.

Yitzhaki, S., and Slemrod, J., (2000), "*Tax avoidance, evasion, and administration"*, National Bureau of Economic Research, Working Paper No. 7473.

Zizza, R., (2001), "Metodologie di stima dell'economia sommersa: un'applicazione al caso italiano", in *Senza regole non esiste economia irregolare*, Banca d'Italia, Study Department, Rome, 2001.