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AIR POLLUTION: AN ANALYSIS OF STATE INTERVENTION

Abstract

The world has undergone many changes in recent decades, changes mainly derived from globalization, which takes business management and even the governance of the country to another level. Globalization and the growing development felt worldwide lead to the economic and social development of states, increasingly concerned and focused on the good environmental practices of an economy. The main objective of this study is to present how the state became the main actor in the treatment of air pollution. To this end, firstly, the field of public economy is briefly characterized and historically contextualized, followed by what constitutes a market failure and common methods of correcting it. There is an emphasis on negative externalities, as this fits in with the central theme of the work. We delve into the case of air pollution by presenting the reason why it is considered an economic problem, analysing how environmental policies can affect GDP and presenting what has been done to combat this problem, both in the European Union and in Portugal.

Keywords: Pollution, environment, state intervention

JEL Codes: F64, H23, N50, O13

1. Introduction

The Public Economy is the domain of public economics to understand the State's role and influence over the economy, from what it is in practice to what it should be in theory. The State has always been a source of contention. The debate ranges from its purpose to the way it is organized, including when it is justified to act and how.

Classical economists such as Adam Smith viewed the State in what might be considered today a minimalist fashion, attributing to it a select few roles, namely as Musgrave (1996) put it "the protection of society against foreign invasion and of each member against injustice from others" and, citing Smith, "erecting and maintaining those public institutions and those public works which, though they may be in the highest degree advantageous to a great society are, however, of such a nature that the profits could never repay the expense to any individual or small number of individuals, and which it therefore cannot be expected that any individual or small number of individuals should erect". In the belief that markets are perfectly capable of self-regulating and that economic agents act in a rational manner, State intervention beyond its reduced list of objectives would be an unjustified distortion of the economy. Musgrave continues: "The mercantilist model with its policy of intervention and enrichment of the state was rejected. Focus shifted to the individual as the driving force in society and to the promotion of individual welfare. (…) Guided by the discipline of a competitive market, the invisible hand secures an efficient outcome, thereby reconciling self-interest with the common good."

Economic thought continued to evolve through the centuries and, the scope of the present work being limited, the next thinker to focus on is John Maynard Keynes. Keynes lived through the Great Depression (circa 1930s), of which the Jahan et al. (2014) claims "existing economic theory was unable either to explain the causes of the severe worldwide economic collapse or to provide an adequate public policy solution to jump-start production and employment" and that influenced his perspective

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immensely. The same source elaborates that, in the short-term, Keynes asserts "free markets have no self-balancing mechanisms that lead to full employment." It naturally follows "Keynesian economists justify government intervention through public policies that aim to achieve full employment and price stability. (…) According to Keynesian economics, state intervention is necessary to moderate the booms and busts in economic activity, otherwise known as the business cycle." Jahan et al. (2014) further declare "The global financial crisis of 2007–08 caused a resurgence in Keynesian thought (…) [the crisis] also showed that Keynesian theory had to better include the role of the financial system. Keynesian economists are rectifying that omission by integrating the real and financial sectors of the economy."

Thus we can observe how since the 18th century the State has been granted an increasingly larger role in the Economy and in societal issues. Musgrave (1996) comments "the welfare state admits distributional concerns. The state now seeks to correct the market determined distribution of income and wealth, moving it towards what society views as efficient or fair (…) the state implements the choice of individuals and their preferences."

A key concept that surged in the last century is the Pareto-optimal, designed by Vilfredo Pareto. Ingham (2019) states "A state of affairs is Pareto-optimal (or Pareto-efficient) if and only if there is no alternative state that would make some people better off without making anyone worse off.", and continues "The concept of Pareto-optimality thus assumes that anyone would prefer an option that is cheaper, more efficient, or more reliable or that otherwise comparatively improves one's condition." The article goes on to explain that the most famous applications of the concept are contained in two fundamental theorems of welfare economics. The first being "the allocation associated with any competitive market equilibrium is Pareto-optimal", and the second "any Pareto-optimal allocation can be achieved as a competitive market equilibrium following the use of lump-sum transfers of wealth."

The more interesting evolution of this line of thought came from Nicholas Kaldor and John Hicks, who together developed the concept of "Kaldor-Hicks efficiency" also known as "potential Pareto-efficiency". Grossman (2018) affirms that "A system is called Kaldor-Hicks efficient if resources are put in the hands of those that value them the most (…) Economists will evaluate potential changes based on whether the net benefit of resources increases as the resources are put to use by all individuals."
Thus State intervention is justified insofar as it is able to uphold values and further objectives that a society perceives as fundamental, allowing for the redistribution of wealth and taxation to achieve ever greater net benefits and increasingly curb net loss – by encouraging healthy and productive behavior and discouraging imposing unreasonable costs upon others. It is important to note that this analysis is not merely from a material wealth standpoint, but focuses also on more intangible ideas such as social well-being – it being, often, the ultimate goal of any society.

It is our aim in this article to show how state intervention (or other levels of public intervention) can contribute to the reduction of air pollution.

For this, we start by presenting the concept of externality as a market failure, relating to the need for public intervention through the use of different instruments. We focus on the study of air pollution, as a negative externality. At the end, we present the main forms of intervention both in the European Union and in Portugal. Finally, we conclude with some observations and present the future research that will be based on all this work.

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2. Externality as a market failure

Ledyard (1989) claims that "Market failure is said to occur (…) when the allocations achieved with markets are not efficient", adding that it is "often the justification for political intervention in the marketplace (…). The standard argument is that if market allocations are inefficient, everyone can and should be made better off." As previously explained, State intervention is, ideally, approved if its perceived benefit outweighs its perceived cost. If it can better the well-being of individuals by increasing market efficiency it reserves the right to do so as long as it does not violate the society's core tenets. There are several market failures, the most studied of which are: public goods, asymmetric information, market power and externalities.

According to Cowen (1992) "A public good involves two elements: nonexcludability and nonrivalrous consumption." The first refers to "the impossibility of preventing non-paying individuals from enjoying the benefits of a good or service"; the second refers to "cases wherein individuals' ability to consume a good or service is not diminished by allowing additional individuals to consume it."

On this topic Musgrave (1996) states "Government is needed, put in modern terms, to overcome the free-rider problem in the presence of public goods." The free-rider problem is explained by Kim and Walker (1984) "in a group which is providing itself with some public or common good, each member of the group will have a strong tendency to be a 'free rider' - to contribute little or nothing toward the cost of the good, while enjoying its benefits as fully as any other member of the group" and "the free rider problem will cause a group to provide itself with no more than a minimal level of the public good, even when every member of the group could be made better off if the public good were provided at a much greater level."

Many classical models of the economy assume that all economic agents have free access to all reliable information, however that is not the case in reality. This leads to decisions that would have otherwise not been made, where it is purely an issue of a lack of awareness. This problem is called asymmetric information.

The core of the problem with market power is that a company might obtain undue influence over the market and use it to distort competition, stifling innovation and hurting the consumer. Hahn (1984) clarifies "The appeal of using markets as a means of allocating scarce resources stems in large part from the assumption that a market will approximate the competitive ideal. When competition is not a foregone conclusion, the question naturally arises as to how a firm might manipulate the market to its own advantage."

Externality theory is one of the most popular theory used to claim that markets fail. It is claimed that because of the existence of externalities, the market will provide too much or too little of a particular good, and that the government must step in and use taxes, subsidies, restrictions on the provision of the good, or take over the production of the good in order to remedy the situation.

Economists are familiar with the concept "externality"; however, others might not be. Therefore, it is important to give a brief, but precise, description of the term here so that one will better understand my analysis of this theory. An externality is a cost or benefit imposed on people other than those who purchase or sell a good or service. The recipient of the externality is neither compensated for the cost imposed on him, nor does he pay for the benefit bestowed upon him. These costs and benefits are labeled "externalities" because the people who experience them are outside of or external to the transaction to buy and sell the good or service.

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Due to Laffont (2008), externalities comprise the indirect effects of consumption or production of a good or service upon parties unrelated to the activity. These effects are an issue as they are not reflected in the pricing transaction system. In the purely private-side of a competitive economy, the market equilibrium will not be Pareto-optimal since only direct private effects will be taken into account by the average economic agent in their decision-making process.

There are two types of externalities. When a person not involved in the production or consumption of a good receives a benefit for which he does not pay, he is said to be the recipient of a "positive externality." The second type of externality is a "negative externality." This exists when a person who has nothing to do with the sale or purchase of a good has a cost imposed on him for which he is not compensated.

Furthermore, Laffont (1989) mentions "Externalities may be positive or negative and are quite diverse. Major examples include pollution activities (air pollution, water pollution, noise pollution ...), malevolence and benevolence, positive interaction of production activities", noting that "From a practical point of view the most significant are negative pollution activities" This is because they are considered a greater evil and easier to focus attention on.

3. Air Pollution: A negative externality

Air pollution, for all the negative consequences it has, especially with regard to public health, is one of the most studied negative externalities.

The relationship between air pollution and public health is so strong that to provide a means of response, the WHO (World Health Organization) launched a guide that aims to analyse the health effects of air pollution and levels for harmful pollutant levels, taking into account the parameters: inhalable particles (PM10), ozone (O3), nitrogen dioxide (NO2) and sulphur dioxide (SO2).

It represents a serious health risk, according to Brunekreef and Holgate (2002) "Exposure to pollutants such as airborne participate matter and ozone has been associated with increases in mortality and hospital admissions due to respiratory and cardiovascular disease. These effects have been found in short-term studies, which relate day-to-day variations in air pollution and health, and long-term studies, which have followed cohorts of exposed individuals over time." and, perhaps more importantly for the present work, "Effects have been seen at very low levels of exposure, and it is unclear whether a threshold concentration exists for particulate matter and ozone below which no effects on health are likely." This last part is relevant because activities which cause pollution exist due to having some economic value. If the activity did not provide value it would not be sustainable under normal conditions, so it follows that policy makers must be careful not to over-tax or unreasonably restrict them but to create conditions that enable an acceptable equilibrium between pollution and the benefit of the activity in question. If there were clear thresholds where non-harmful concentrations were identified, then that might serve as a reference point for policy makers to verify over-production.

Furthermore, Katsouyanni (2005) explains that "The long term effects of particulate air pollution reported so far, exceed those of short term exposures and have a larger impact in terms of years of life lost." It is also mentioned that there is a lack of long-term studies in Europe partly due to its complexity, and these unseen effects weigh severely on the well-being of the population.

This issue has taken on enormous dimensions in terms of the concern of international organizations, this being one of the goals of the millennium: "With respect to the 2030 Agenda for Sustainable Development, agreement was reached on indicators to monitor the targets associated with the Sustainable Development Goals. Targets and indicators for the Sustainable Development Goals in health (Goal 3), cities (Goal 11) and energy (Goal 7) are identified in resolution WHA68.8. Four of those

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indicators are being reported in World Health Organization databases at the present time, and benefit from ongoing international cooperation to ensure their quality and completeness, including through the WHO-hosted Global Platform of Air Quality and Health."

4. Public intervention in correcting externalities

The alleged failure of the market occurs because, it is claimed, the market provides too many goods that produce negative externalities and too few goods that create positive externalities. Too many goods that create negative external effects are allegedly produced because the costs imposed on those who experience the negative externalities are not taken into account in the production of the goods creating the negative side-effects

Given the existence of this flaw, the externality has to be corrected, leading to the intervention of the public sector in the economy, in order to ensure that the parties involved - rather than the unrelated third party.

Laffont (1989) declares "If de-polluting activities are possible the link between the level of pollution and the economic activities generating them must be made explicit." This is important so that the State is able to intervene in a precise manner and have the polluting agents internalize the cost they're imposing on others by virtue of their actions. Furthermore, within a certain industry companies pollute in different proportions. If all of them were punished in the same static manner, that would reward polluters and penalize those who use alternative methods of production because the most polluting methods are usually the most efficient. Laffont (2008) declares "From the point of view of Pareto optimality, the important goal is to modify polluters' behaviors." Thus, when designing policies to deal with negative externalities, they must be constructed in such a way that they focus mostly on what causes the externality and that the agents involved are sufficiently distinguished so that beneficial practices are not penalized unnecessarily – this will provide incentives for better behavior. Such focus and distinctions often have high implementation costs that may exceed their benefit, which is why exercising caution is needed.

The intervention, in order to minimize the effects on third parties, can occur through the use of different instruments.

Taxation of externalities is the most common policy tool, where the polluter must pay for each unit of their activity a tax which equals the marginal cost imposed by this same activity on the other agents. These are generically called "Pigouvian taxes", developed by Arthur Pigou and described by Sandmo (1975) as taxes designed to "confront the generator of the externality with a price reflecting the damage (or benefit, as the case may be) which his production or consumption of the commodity in question inflicts on others." In this approach, the polluter may also be barred from producing at a certain place or time.

Coase (1960) critiques this traditional 'Pigouvian' approach of making the polluter liable for the damage, saying that it "has tended to obscure the nature of the choice that has to be made" and leads to "results which are not necessarily, or even usually, desirable". He elaborates with "The question is commonly thought of as one in which A inflicts harm on B and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm." In this view it is ultimately a question of rights, especially property rights. If each individual knows exactly what they are allowed to do, then they can negotiate independently provided there are no transaction costs. The author continues "What answer should be given is, of course, not clear unless we know the value

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of what is obtained as well as the value of what is sacrificed to obtain it. (…) It goes almost without saying that this problem has to be looked at in total and at the margin." Ultimately, some level of quantification of cost-benefit is involved in both approaches in order to reach the best alternative possible.

To note that another method involves enforcing the use of a certain technology or declaring a maximum the polluter is allowed to produce, both of which can have very adverse consequences that retard what would be the natural evolution of the market.

Fan et al (2019) argues that with green development becoming a global movement, environmental tax has been adopted by many governments to promote green development. This study analyzes the impact of environmental tax on green development.

Laffont (1989) says "One potential solution is to create a market for this externality. Before producing, the firm must buy from the consumer the right to pollute. If both actors were behaving competitively with respect to the price of this right, the competitive equilibrium in the economy with an extended price system would be Pareto optimal, since there is no externality left." The original issue is that the well-being of the environment was never considered to have value in an economic sense, at least in practice. If the consumer has to pay for the pollution, then the problem is resolved since the price will reflect the total production cost of the good or service. Since production costs, right of polluting being one of them, increase then in normal conditions price will increase and the consumers will consume less, causing the producers to adjust and produce less. Thus, pollution will reach a level that is acceptable to the consumers as a whole or, in other words, to society itself.

Additionally, Laffont (2008) declares "One way to suppress an externality between two agents is to have them integrate into a single agent. All externalities would be internalized if the whole economy was integrated." In a situation where the actions of an agent have immediate and noticeable effects on their own dealings, their behavior will be more dynamic and subject to change. If the costs they impose on others are in turn noticeably reflected upon them and they can identify what these costs are along with the respective causes, then change is incentivized. The key is creating a system that is interconnected to the point where the process is automatic and requires the least outside intervention possible.

4.1. Trade off GDP vs air quality

Grossman (1995) ascertains "In most cases minor changes in techniques of production or life-style seem likely to be sufficient to preserve options for future generations, and the total cost should be equivalent to a reduction in GDP of no more than a few percent. There is no reason to believe that long-run economic growth will be adversely affected by environmental policies and, indeed, growth could even be enhanced as new technologies are explored. Overall, economic growth and development are perfectly consistent with environmental protection (…)." The author recognizes the concern that continued expansion of the world economy will seriously harm the Earth's environment and reduce the quality of life for future generations, but adds "the scale of economic activity is but one determinant of the rate of depletion of natural resources and the rate of production of waste materials and gases (...).", stating that "the composition of economic output and the techniques used to produce it" are just as important. In summary, economic growth poses no danger in the future if it is accompanied by a "transformation in the structure of the world economy" and an increasing utilization of "cleaner and resource-conserving technologies". Higher standards of material wealth are possible without compromising other aspects of wellbeing.

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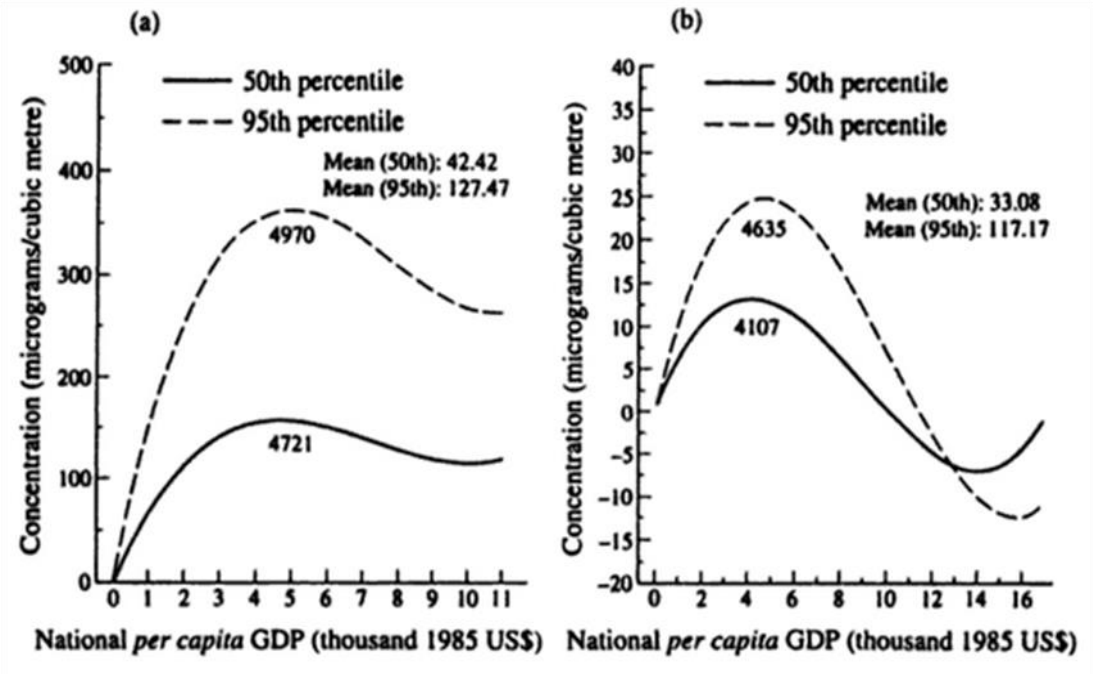
In the following graph, we can observe how national GDP *per capita* correlates to pollution levels, and conclude that after a certain level of wealth the pollution-level actually decreases.

Figure 1. Urban air quality
(a) Suspended particulates (dark matter)
(b) Sulphur dioxide



Source: Grossman and Krueger (1993).

We can also see that *per capita* the middle-class pollutes a lot less than the lower-class. To expand on that idea, Lipfert (2004) explains "In many industrialized nations (including the United States) poverty leads to substandard medical care, substandard nutrition, substandard housing, and reliance on inefficient and excessively polluting vehicles and heating and cooking appliances. It has been estimated that as few as 10% of the vehicles on the road may produce most of the vehicular pollution; however, taking these vehicles off the road would impose intolerable costs on those least able to pay. To make matters even worse, in terms of disposable income, the poor will bear disproportionate shares of the economic burdens of any cost ineffective environmental regulations that unduly increase prices of housing, fuels, vehicles, or appliances. True environmental justice requires the costs imposed by environmental regulations to match their benefits for everyone, not just for society as a whole. Poor people may be more susceptible, but poverty also fosters increased pollution." Thus, to increase median wealth and bring people out of property is in itself a measure to combat pollution. This may seem counter-intuitive, but it is a fact that the collective becomes concerned with the effects of their actions upon the environment on a mass-scale only when a certain standard of life is reached. It is the luxury of developed countries, of which there are only a few – namely Europe, North America, Australia and Japan. These are the regions where these questions are raised and answered the most, despite any recent political developments.

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Shapiro and Walker (2018) conclude that between 1990 and 2008, air pollution emissions from US manufacturing fell by 60 percent despite a substantial increase in manufacturing output. In his paper focuses on US manufacturing and assesses three explanations for why pollution emissions have fallen since 1990. The paper obtains three main conclusions, they are: "First, the fall in pollution emissions is due to decreasing pollution per unit output in narrowly defined manufacturing product categories, rather than reallocation across products or changes in the scale of real manufacturing output. Second, environmental regulation has grown increasingly stringent, and the pollution tax that explains US data roughly doubled between 1990 and 2008. Third, environmental regulation accounts for most of the observed reduction in pollution emissions from manufacturing. Productivity improvements and trade costs play relatively smaller roles."

Over time it was notorious that some researchers confirm that imposing environmental tax causes a series of influences on green development from economy, environment, and resources. Oueslati (2014) argues that "Researches show different effects of environmental tax on economic growth. Green tax reforms are found to growth improving in a rising economy".

Fu and Geng (2019) defend the improvement of corporate regulatory compliance can promote green development. Meanwhile, public participation plays an essential role in achieving green development.

4.2. Public intervention in the European Union and Portugal

The European Union has been developing a lot of legislation regarding air quality for its member-states to follow, established health-based standards and objectives regarding certain air pollutants. For example, the European Commission (2019) writes "The main objectives of EU policy on industrial emissions are to: (i) protect air, water and soil; (ii) prevent and manage waste; (iii) improve energy and resource efficiency; and (iv) clean up contaminated sites. To achieve this, the EU takes an integrated approach to the prevention and control of routine and accidental industrial emissions. The cornerstone of the policy is the Industrial Emissions Directive (IED)."

In 2015 the European Fund for Strategic Investment (EFSI) was created, it's "one of the three pillars of the Investment Plan for Europe and aims to overcome current market failures by addressing market gaps and mobilizing private investment. It helps to finance strategic investments in key areas such as infrastructure, research and innovation, education, renewable energy and energy efficiency as well as risk finance for small and medium-sized enterprises (SMEs)." These funds are only granted if the EU's conditions are met, namely their very high standards pertaining to all-things pollution-related. This serves as a further incentive for strict control of pollution.

Perhaps one of the most iconic policies of the European Union to combat air pollution was the creation of the EU Emissions Trading System (EU ETS), the world's first major carbon market and also the biggest. According to the European Commission (2019), it's a "key tool for reducing greenhouse gas emissions cost-effectively." It works as a "'cap and trade' system, that is to say it caps the overall level of emissions allowed but, within that limit, allows participants in the system to buy and sell allowances as they require. These allowances are the common trading 'currency' at the heart of the system. One allowance gives the holder the right to emit one tonne of CO2 or the equivalent amount of another greenhouse gas. The cap on the total number of allowances creates scarcity in the market."

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In Portugal, and as in any country, concerns associated with the effects of air quality on public health generally take air pollution into account.

Travel and tourism was roughly 5,9%[3] of Portugal's GDP in 2018, and a very large component of that industry has to do with environmental quality. If pollution levels rise in relevant areas, then it's expected that the economic activity in that sector will also decrease. Additionally, Torres et al. (2018) reports that "(i) Lisbon Metropolitan Area presents the most problematic region with regard to the emissions of all the pollutants under study; (ii) the regions of the Alentejo and Algarve showed reduced emissions of the studied pollutants compared to other parts of the country; (iii) Northern regions PM10 (catalogued as 'floating dust', but are best known as particulate matter – PM) concentrations decreased during the two years in analysis."

Slezakova et al. (2011) analyzed air pollution of the Oporto Metropolitan Area, explaining "The results showed that levels of CO (carbon monoxide), PM_{10} and SO_2 (sulfur dioxide) have been continuously decreasing in the respective metropolitan area while levels of NO_x (nitrogen oxides) and NO_2 (nitrogen dioxide) have not changed significantly. Traffic emissions were the main source of the determined polycyclic aromatic hydrocarbons (…) in air of the respective metropolitan area. (…) The health risk analysis of PAHs in air showed that the estimated values of lifetime lung cancer risks considerably exceeded the health-based guideline level. Analytical results also confirm that historical monuments in urban areas act as passive repositories for air pollutants present in the surrounding atmosphere

According to the European Commission (2019) "The emission of several air pollutants has decreased significantly in Portugal (…)", but "air quality in Portugal continues to give cause for concern. The European Environment Agency attributed an estimated 5170 premature deaths in 2015 to fine particulate matter concentrations, 280 to ozone and 610 to nitrogen dioxide concentrations. Levels of nitrogen dioxide (NO2) above EU air quality standards were registered in three air quality zones out of 17 (Lisboa, Braga, Porto) in 2017. Moreover, target values for ozone concentration are also being exceeded."

[3] Taken from pordata.pt – "Travel and tourism account as a % of GDP". Retrieved May 20, 2019.

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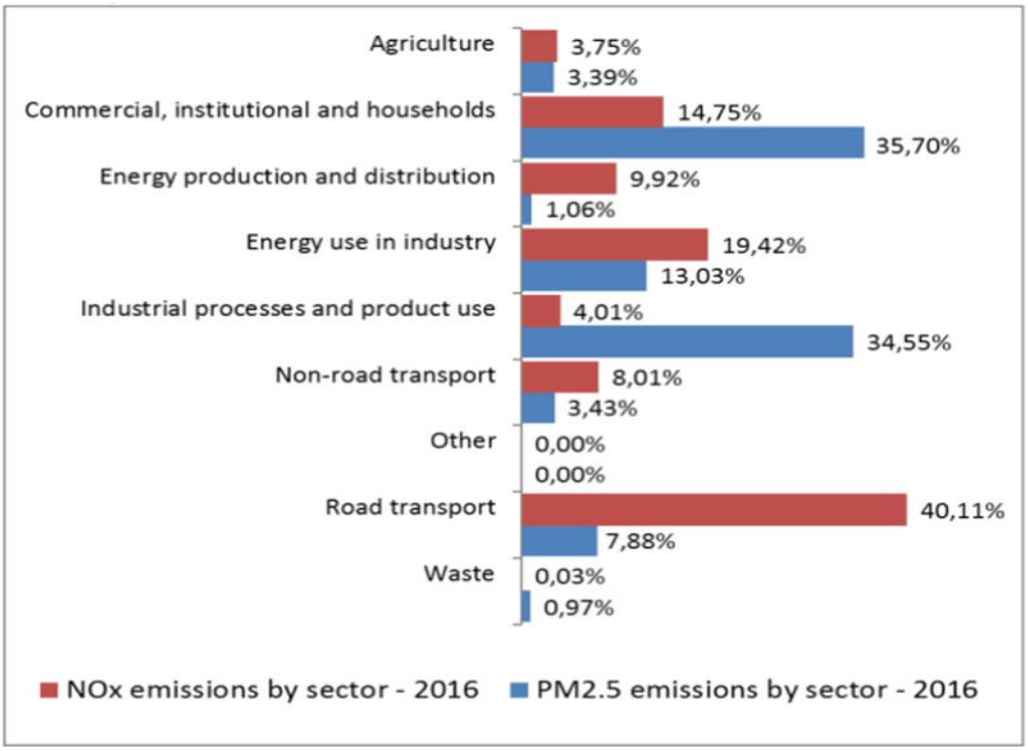
Figure 2. PM2,5 and NOx emissions by sector in Portugal



Source: Environmental Implementation Review 2019 – Portugal.

The single biggest culprit of NOx emissions in Portugal is road transportation, as is expected. Wei et al. (2018) studied key sectors contributing to air pollutant emission in China and found that car ownership is one the top four contributors of air pollution, the rest being coal consumption, coke production and electricity production. Industry prominence varies a lot between countries, but the biggest culprits of aerial pollution remain mostly the same throughout: road transports, industrial processes, energy production and other commercial activities. According to the Portuguese Renewable Energy Association (2019), in Portugal over half of all electricity generation comes from renewable energy sources – which is one of the highest rates in the world.

In this next figure we observe that Portugal has a higher tax revenue as % of GDP than the EU28 average. This is not necessarily a good thing, as depending on how the taxes are designed this may mean that the most prominent industries in the country pollute a lot more than the average – it might simply reflect a lack of regulation or ineffective taxation that hurts economic activity more than it helps reducing pollution.

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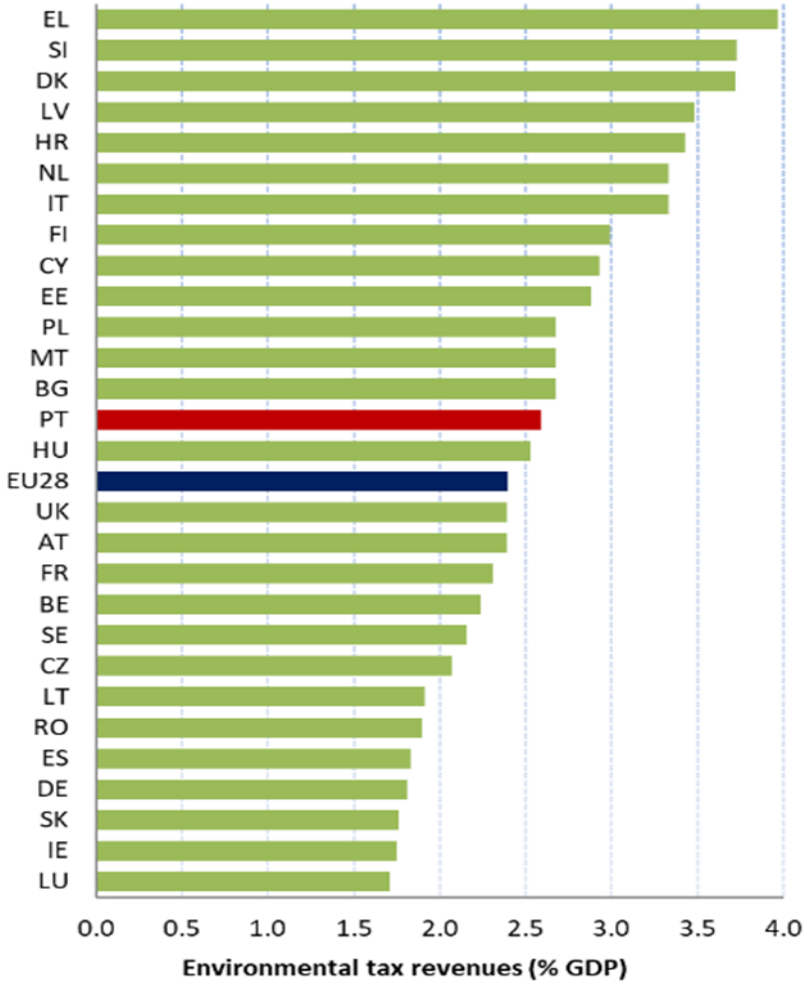
Figure 3. Environmental tax revenues as % of GDP (2017)



Source: Environmental Implementation Review 2019 – Portugal.

According to the European Commission (2019), fossil fuel subsidies and exemptions have increased slightly over the past decade. In 2016, Portugal still had tax exemptions for fossil fuels, which added up to 270 million euros. The source continues "Tax breaks for company cars in Portugal are a cause for concern." and no relevant tax measures relating to company cars were introduced in 2018, though it must be noted that there is a limit to fiscal benefits regarding vehicles under corporate income tax. Portugal has CO2-based motor vehicle taxes involving engine capacity and emissions, as well as an annual road tax for cars registered after 2007. There were incentives to buy cars with lower CO2 emissions in 2016, due to subsidies and lower taxes.

There aren't many incentives to use public infrastructure in preference to private transport, though new measures have been taken in the largest urban areas limiting prices paid for using public infrastructure. Additionally, new vehicles purchased in Portugal are among the most environmentally friendly in the EU and the number of cars running on alternative types of fuel is increasing, but they still account for less than 1% of the total.

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The share of renewable energy in transport has also been growing quite fast, surpassing the EU average. This fact might be attributed to two policies, namely a tax exemption for small producers of biofuels (PPDs) and a biofuel quota for companies supplying fuels for consumption in the market.

Conclusions

Over time, the concern regarding the *trade-off* between pure environment and production has grown. This involved a lot of research and also action, managing, through public intervention, to reverse this relationship.

World Health Organization consider policies to reduce air pollution, therefore, offer a "win–win" strategy for both climate and health, lowering the burden of disease attributable to air pollution, as well as contributing to the near- and long-term mitigation of climate change.

In summary the State plays an important part in guiding economic activity towards sustainability, in this case environmental sustainability – for the short-term and long-term. While aerial pollution is a worrying issue, it is seen that wealth-creation does not necessarily mean ever-increasing pollution indefinitely. Through incentivizing the use and development of alternative technology and techniques by having the economic agents internalize the cost of pollution, the market can be guided to provide higher living standards while at the same time lowering pollution-levels. This would not happen organically, hence the need for State intervention. The European Union has made very significant strides in this sense, and it's safe to say it is the preeminent organization when it comes to such matters. Portugal, being a part of it, benefits immensely from its legislature and funds. While the heavy investment in renewable energies is commendable, there is still a lot of work to be done inasmuch as three major urban areas (Lisbon, Oporto and Braga) have aerial pollution levels above the EU's quality standards. The fact that environmental tax revenue as % of GDP is so high in comparison to industrial giants such as Germany is also concerning and must be investigated, along with alternative policies to cover polluting activities with higher precision.

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