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Exploring the Role of Public Attitudes in Carbon Tax Policy Design and Implementation: A Comparative Perspective

Noémie Yuki Narisawa

Master in Political Economy,

Supervisor:
Professor Helena Maria de Sousa Lopes, Full Professor,
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Resumo

Apesar do compromisso partilhado por muitos países de reduzir as emissões de gases com efeito de estufa (GEE), existe uma divergência notória na seleção das medidas nacionais de política climática. Embora numerosos estudos tenham explorado a relação entre a opinião pública e a implementação da taxa carbono, e outros tenham analisado os contextos nacionais que influenciam as atitudes do público, apenas alguns examinaram a importância relativa da opinião pública e do contexto nacional em termos de cobertura da taxa carbono. Esta investigação colmata esta lacuna e contribui para a literatura existente sobre o tema, examinando a relação entre as atitudes do público e a conceção e aplicação da taxa carbono, centrando-se em dois grupos de países com características geográficas, estrutura económica e padrões de consumo de energia semelhantes: Os países nórdicos e a Península Ibérica. Através de uma revisão da literatura sobre os determinantes dos obstáculos à aplicação da taxa carbono, especificamente os factores que contribuem para a resistência do público, este estudo fornece uma análise empírica da relação entre as atitudes do público e as políticas de impostos sobre o carbono. A análise investiga a ligação entre as atitudes do público relativamente à consciência climática, preocupações financeiras e impostos sobre o carbono, utilizando dados da oitava ronda do Inquérito Social Europeu realizado em 2018. Além disso, os resultados do inquérito são comparados com os dados sobre a cobertura da taxa carbono de 2018 e 2021 obtidos da OCDE. Os resultados empíricos sugerem que a aplicação da taxa carbono é influenciada por factores contextuais externos, enquanto a conceção das políticas está associada às atitudes do público. A principal implicação política é que os países fortemente dependentes dos combustíveis fósseis devem desenvolver estratégias para aumentar a aceitabilidade pública, a fim de promover a conceção de sistemas robustos e eficientes de tributação do carbono.

Palavras-chave : Taxa Carbono, Atitude pública, Políticas climáticas, Consciência ambiental, Preocupação financeira.

Código JEL : H23, H31, Q58

Abstract

Despite the shared commitment among many countries to reduce greenhouse gas (GHG) emissions, there is a noticeable divergence in the selection of national climate policy measures. While numerous studies have explored the relationship between public opinion and the implementation of carbon taxes, and others have analyzed the national contexts that influence public attitudes, only a few have examined the relative importance of public opinion and the national context in terms of carbon tax coverage. This research addresses this gap and contributes to the existing literature on the topic by examining the role of public attitudes in the design and implementation of carbon taxes, focusing on two groups of countries with similar geographical characteristics, economic structure, and domestic energy consumption patterns: Nordic countries and the Iberian Peninsula. Through a comprehensive literature review on the determinants of obstacles to carbon tax enforcement, specifically, the factors contributing to public resistance, this study provides an empirical analysis of the relationship between public attitudes and carbon tax policies. The analysis investigates the link between public attitudes toward climate awareness, financial concerns, and carbon taxes using data from the eighth round of the European Social Survey conducted in 2018. Additionally, the survey results are compared with the carbon tax coverage data from 2018 and 2021 obtained from the OECD. The empirical findings suggest that the implementation of carbon taxes is influenced by external contextual factors, while policy design is associated with public attitudes. The main policy implication is that countries heavily dependent on fossil fuels should develop strategies to increase public acceptability in order to promote the design of robust and efficient carbon tax systems.

Keywords: Carbon Tax, Public attitude, Climate Policies, Environmental Awareness, Financial Concern.

JEL code: H23, H31, Q58

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Introduction

The 6th IPPC report published in 2022 reinforces the existing consensus on climate change. Firstly, it reiterates the scientifically established human influence on the environment, emphasizing that the magnitude and pace of climate change are directly linked to the CO2 emissions that we are emitting. Secondly, the report predicts that the global warming target of limiting temperature increase to 1.5 degrees Celsius, as set by the 2015 COP21 agreement, will be exceeded sooner than anticipated. In order to mitigate the pace of global warming, it is imperative to rapidly implement solutions to reduce greenhouse gas (GHG) emissions. Given the significant contribution of fossil fuel usage to GHG emissions, a reduction in its consumption is unavoidable to attain the climate goal. Carbon taxation is widely recognized as the most effective and quickly implementable policy instrument for achieving this aim (Levi et al., 2020). In practice, this measure has two main favorable aspects: the incentive benefits on the one hand and the tax revenues generated that can be allocated towards climate change mitigation on the other (World Bank, 2015). However, the implementation of a carbon tax faces numerous country-specific factors, which hinder its adoption. Consequently, although European countries have pledged commitment to the Kyoto Protocol and acknowledged the necessity of climate mitigation policies, only a few countries have implemented strong incentives to reduce emissions (Andersen, 2019). Moreover, countries have implemented varying designs of carbon taxes based on their specific situations and contexts, which may influence the effectiveness of emission reductions (Harrison, 2010).

In this context, it is essential to further identify the drivers that discourage governments from implementing an effective carbon tax, sometimes resulting in the abandonment of carbon tax proposals at advanced stages, as seen in the case of France in 2000 (Criqui et al., 2019). Extensive literature explores the factors that facilitate or impede the implementation of carbon pricing policies: historical influences, economic circumstances, and political contexts contribute to disparities in policy choices (Harring et al., 2019). Recent research highlights public attitude as a significant factor driving the adoption of environmental policies, with public resistance often being a key reason for governments' reluctance to utilize taxes as policy tools (Carattini et al., 2018). It is worth noting that carbon taxation, particularly among environmental policies, often encounters significant public resistance (Rhodes et al., 2017). These studies suggest that country-specific

contextual factors and public preferences for environmental protection influence both the desire for environmental policies and the public's acceptance of various policy approaches.

However, few studies have explicitly compared the relative importance of public opinion and contextual factors in the design of carbon taxes. In light of these considerations, this master's thesis aims to test two hypotheses: 1) Countries with greater public support are more likely to implement carbon taxation, and 2) Higher public support for carbon taxes corresponds to fewer exemptions. To achieve this, a comparative analysis will be conducted, examining the experience of two groups of countries. The first group comprises Sweden and Finland, while the second group consists of Portugal and Spain. These countries have been selected based on their notable similarities in certain aspects, while also exhibiting distinct policy frameworks. The first part of the thesis will begin by defining the concept of the carbon tax and providing an overview of the barriers associated with the adoption and enforcement of carbon tax policies. Following the review of general barriers, we will conduct a comprehensive literature review, focusing on country-specific contextual factors that have impacts on public opinion towards carbon taxes. After having identified the key attitudes that shape public opinion on carbon taxes, the study aims to compare these findings with data on national emission coverage, average tax rates, and exemptions. To achieve this goal, we will be relying on data from round 8 of the European Social Survey (ESS8) and OECD data on carbon pricing coverage. A quantitative analysis will explore the relationship between public attitudes and the presence of exemptions within carbon tax policies and a qualitative analysis will further examines the relationship between public attitudes and the implementation of carbon taxes. In the last part, the research will seek to establish a relationship between public attitudes, the implementation process and the design of carbon tax while identifying context-specific factors that significantly influence policy formulation and implementation process in national contexts.

Chapter 1 **Understanding the Carbon Tax Concept: Definition and Main Features**

1.1 Purpose and Mechanism

The calculation of the carbon tax is typically based on the quantity of carbon dioxide (CO2) emissions produced. By imposing a price on carbon, the tax gives a price signal to all economic actors, encouraging them to reduce their use of fossil fuels and to transition towards the use of cleaner energy. In this context, the carbon tax operates as a Pigouvian tax, and intent to capture the social cost associated with GHG emissions. It internalizes the external costs associated with these activities by incorporating them into the overall cost of production and consumption.

It is worth noting that the term "carbon tax" is often misused to encompass various forms of carbon pricing. However, there are two distinct categories: emissions trading schemes (ETS) and carbon taxes. Both approaches share the common goal of reducing emissions by internalizing the cost of climate change. But while a carbon tax functions like a Pigouvian tax, an ETS is a right to emit a certain amount of emissions. The ETS consists of limiting the total volume of GHG emissions within specific sectors of the economy, allowing entities subject to the limits to buy and sell emission permits. The price of these permits fluctuates based on supply and demand dynamics. Consequently, we can observe three main differences between these carbon pricing tools. Firstly, while an ETS provides a certain level of certainty regarding the environmental impact, the carbon tax guarantees a consistent flow of tax revenue within the economic system. Secondly, the implementation of an ETS requires significant government resources to ensure monitoring compliance. In contrast, a carbon tax is levied directly at the emission source, eliminating the need for complex control tools. Finally, there is a notable difference in how the costs of emissions are distributed to consumers. In the case of the ETS, the cost of emissions is indirectly passed on to the consumer through the market, as entities integrate the price of emission permits into their products or services. On the other hand, the cost of a carbon tax is directly visible to taxpayers, as it is imposed on activities that generate carbon emissions. It is important to note that countries vary in their approach to carbon pricing, with some opting for a carbon tax, some adopting an ETS, and

others implementing both systems. This thesis will focus exclusively on the carbon tax framework excluding an in-depth examination of the ETS.

1.2 An Attractive Environmental Policy

The carbon tax has several notable features, which contribute to its appeal as a policy tool. The first significant aspect, which we mentioned earlier, is its remarkably low administrative cost, differentiating it from environmental regulations that rely on command-and-control mechanisms. The implementation of a carbon tax is relatively simple, and its resources can be directly utilized. Moreover, the price signal emitted by the tax makes the cost of carbon transparent to taxpayers, making it a strong incentive for individuals and entities to reduce their energy expenses.

Another interesting aspect of the carbon tax is its possibility to be predictive. Typically, countries declare their targets for carbon emission reduction over a specified period, conjointly announcing the planned trajectory of the carbon tax rate to reach these targets. This predictive element emits a signal to economic agents inducing them to modify their behaviors while providing time to adapt and anticipate in the long term. By offering a forecast of the tax rate's evolution, the carbon tax facilitates a proactive approach to emission reduction.

Finally, the carbon tax generates a significant source of revenue for governments. Its appeal arises from the extensive use of fossil fuels in various sectors and all segments of society, from transportation to power generation. As a result, carbon tax becomes an attractive tool for policymakers, beyond the simple pursuit of climate objectives. An illustrative example can be observed in the countries of the former Soviet Union during their effort to join the European Economic Community (previously the European Union). In order to accompany their transitions from a planned economy to a market economy, these nations needed to implement significant structural and institutional changes. These changes required significant investments that could only be made when the economy recovered. In this context, the introduction of a carbon tax anticipated the forthcoming accession to the EU by demonstrating a commitment to financial stability policies (Andersen, 2019).

1.3 Policy Design

1.3.1 Determining a Tax Rate

Determining the optimal tax rate that effectively reduces GHG emissions in a sustainable manner is proving to be a complex tax. (Aldy et al., 2008) propose a range for an effective tax rate, suggesting that it should fall between $5 to $20 per ton of CO2. According to their analysis, a higher tax rate has the potential to induce behavioral changes. On the other hand, a lower range can still generate revenue to support carbon mitigation programs, albeit with a lesser impact on emissions reduction incentives. The High-level Commission on Carbon Pricing concluded in 2018 that achieving the Paris Agreement's goal of full decarbonization by 2050 necessitates a higher tax price, ideally between $40 and $80 (World Bank, 2019). The attainment of these recommenced tax rates has remained an accomplishment limited to a small number of countries (World Bank, 2023).

1.3.2 Predictability

The implementation of a carbon tax with a transparent and announced trajectory increase acceptability among economic actors and enables them to adjust their investments over time to reduce their carbon footprint. Thus, launching a carbon tax with an initially low rate does not necessarily indicate a lack of commitment to achieving the objective of the Paris Agreement. Switzerland has developed an innovative mechanism that allows for the forecasting of the carbon tax rate, which is adjusted based on the achievement of the annual GHG emission reduction targets. This approach ensures transparency by clearly announcing the trajectory of emission reduction targets for each year. If the predetermined targets are not met, the tax rate increase to a predefined value. Conversely, if emissions fall below the target, the tax rate remains unchanged. However, the implementation of such a mechanism may in some cases face institutional barriers. For example, in France, the adjustment of the carbon tax rate requires yearly ratification by Parliament, which can slow down the process (De Perthuis & Elbeze, 2011).

1.3.3 Determining the Target

Determining the audience for a carbon tax involves careful consideration of the tax’s affordability across all segments of society and entities within the country. Notably, fossil fuel-dependent industries and low-income households will be the most affected by the carbon tax, although the

magnitude of the impact varies depending on the economic context of the country. As a result, the implementation of the carbon tax is rarely uniform and further elaboration on this aspect will be detailed in the following chapter of this thesis.

1.3.4 Revenue Use and its Effect on Public Opinion

The way in which the tax revenues are redistributed can significantly impact the sustainability of the tax (Flues & van Dender, 2020). We can classify the uses of tax revenue into three categories.

Firstly, the revenue generated from the carbon tax can be directed toward specific decarbonization programs (Klok et al., 2006). By allocating funds to targeted initiatives, policymakers can actively support efforts to reduce carbon emissions. Additionally, the use of revenues in decarbonization programs can be a strategic way to gain public support. Indeed, these initiatives can win the support of those who may doubt the influence of carbon taxes on behavior but are supportive of climate-related spending.

Secondly, policymakers have the option to redistribute the tax revenue to individuals that are more vulnerable to the effect of energy transition policies. To gain public acceptance, policy design that incorporates elements such as low-income rebates and revenue neutrality, plays a crucial role (Dominioni et al., 2019). Directing rebates to households in need can help mitigate the burden on disadvantaged populations and address concerns regarding the fairness of the policy. These mechanisms make the carbon tax more feasible and more acceptable to the public while encouraging consumers to change their behavior. Therefore, when the goal is to increase public support, it is advisable to choose a revenue-recycling mechanism that has a visible impact. This ensures that citizens recognize the tangible outcome of revenue recycling.

An alternative option for allocating carbon tax revenue is to direct it towards the government budget, where it can be utilized for purposes, such as reducing public debt or investing in various sectors. However, the use of tax revenue in public budgets, although the most common approach, can potentially contribute to public resistance against the carbon tax (Douenne & Fabre, 2022). This was evident in the context of the yellow vest movement in France, where one of the main demands was total transparency regarding the utilization of tax revenues to ensure that the funds generated by the carbon tax were not used solely to replenish the state's financial resources.

Chapter 2 **What are the Obstacles to the Enforcement of a Carbon Tax?**

"The most suitable instrument depends on the specific circumstances and context of a given jurisdiction, and the instrument's policy objectives should be aligned with the broader national economic priorities and institutional capacities." (World Bank, 2015, p27)

Implementing a global environmental goal necessitates considering various country-specific factors that can influence the implementation process and the effectiveness of the policy design. These factors can first determine a state's willingness to adopt such a policy tool, and once the implementation process has been initiated, they play a crucial role in shaping the policy design of the carbon tax.

2.1 Economic Context

Addressing the environmental challenge presents a common dilemma, as they compete with national policy priorities. However, some countries are better positioned than others to effectively integrate climate change mitigation issues into their agendas. While some countries have achieved significant social progress through the intensive use of fossil fuel during the industrial revolution, they now question the long-term sustainability of this system. Data from (World Bank, 2023) reveals that the European Union accounts for 22% of the total accumulation of emissions, while China, the largest emitter of CO2 in 2022, is responsible for 13%. Considering the cumulative nature of GHG emissions over time, it becomes evident that Western countries have contributed significantly to worldwide emissions. This raises the dilemma of preventing other countries, such as China, from prioritizing their economic development over climate change mitigation efforts. In order words, countries that have achieved a high standard of living are now seeking to pursue sustainable development by addressing not only economic growth but also global environmental issues. As a result, implementing a carbon tax can be an obstacle for developing countries, at a time when they are faced with other pressing political priorities such as reducing extreme poverty and improving infrastructure.

2.1.1 Resource Endowment and Energy-intensive Industry

The fight against climate change is particularly challenging for countries endowed with abundant natural resources and reliant on energy-intensive industries. Some nations have built their economic development models around activities that heavily depend on fossil fuels. Consequently, they face the difficult task of transitioning their economic structures and reducing their financial dependence on fossil fuels to align with ambitious environmental policies. Norway provides an illustrative example of a country in a conflict between its energy-intensive economic structure and its commitment to an ambitious environmental policy. In the 1970s, Norway started the exploitation of large oil reserves, becoming one of the major oil exporters. On another hand, Norway became one of the pioneering countries to implement a carbon tax two decades later. Presently, it has one of the highest carbon tax rates globally. However, the country has introduced several tax rebates, with the lowest carbon tax rate set at 7EUR/tCO2e. These measures highlight the gap between the ambitious climate policies pursued by successive Norwegian governments and the persisting emission-intensive institutional and economic structures within the country (World Bank, 2023).

2.1.2 Carbon Leakage

Carbon leakage is another significant concern associated with carbon taxation. It occurs when energy-intensive industries opt to relocate their production to regions with lower emission constraints. This strategy allows them to reduce production costs by avoiding the carbon tax imposed in their original territory. The consequences of such actions can impact a country's economy, leading to reduced wealth production and potential job losses. As a result, governments may become reluctant to impose carbon taxes or grant exemptions to specific sectors in order to mitigate the risk of carbon leakage. The case of Sweden illustrates the compromises that need to be found when designing a carbon tax. With its economic structure reliant on large and easily mobile companies, the country implemented a differentiated tax rate for such entities until 2016, exempting them from the full tax burden. In contrast, the transport sector, consumers, and small industries were subjected to the most significant carbon tax globally to meet the country's environmental ambitions. This illustrates the need for policymakers to carefully consider the potential economic impact of carbon taxation on different sectors while striving to achieve their environmental objectives (Criqui et al., 2019).

2.1.3 Poverty and Income Inequality

High levels of income inequality and poverty rates undoubtedly play a role in the ability of countries to introduce a carbon tax. The introduction of such policy tools can have adverse effects on low-income communities, as they can significantly impact their household budgets. Additionally, these communities are particularly vulnerable to economic change such as job loss making them even more vulnerable. Under these conditions, it is necessary for policymakers to carefully consider the social implications of implementing a carbon tax and develop well-designed policy frameworks that minimize the potential negative effects on low-income individuals and households. However, we can observe that the successful implementation of offset policies, which aim to mitigate the social consequences of carbon taxation, depends on the presence of certain institutional qualities and the political stability of a country, which is the next point we will address.

2.2 Institutional and Political Context

2.2.1 Political Instability and Institutional Quality

Political instability and the quality of institutions play crucial roles in determining the adoption and sustainability of a carbon tax. Factors such as frequent changes in government, high levels of corruption, and dysfunctional institutional systems contribute to political instability (Criqui et al., 2019). Political instability not only hinders the adoption of a carbon tax but also creates uncertainty regarding its long-term viability. Alberta, a Canadian province, provides an illustrative example. Alberta initially implemented a carbon tax in 2007 but saw it repealed by a new government in 2019. Such frequent changes in government send a signal to consumers that a policy can be adopted by one administration and then repealed by a subsequent one. This kind of political volatility and uncertainty discourages investments in low-carbon technologies or behavioral changes.

2.2.2 Democracies and Political Organizations

The type of government and the political organization significantly influence a state's ability to implement and enforce a carbon tax. Indeed, the political system is closely linked to the state's ability to impose climate policies and the achievement of consensus among the various economic actors (Böhmelt et al., 2016). Autocratic regimes are generally reluctant to commit to climate-related policies, including the carbon tax, as they prioritize the interests of a small elite over the

public good. These regimes provide limited space for public and non-governmental organizations to express environmental values and contribute to policy and governance processes. As of 2023, only two authoritarian countries, Ukraine, and Singapore, have implemented a carbon tax (World Bank, 2023). It is noteworthy that Ukraine is undergoing political reforms toward a more democratic system and has the lowest carbon tax rate in the world at $1/tCO2. Singapore stands as a unique case among autocratic regimes, having introduced an evolving carbon tax.

The specific political systems and electoral systems within a country also influence the adoption of a carbon tax. Proportional electoral systems and concentrated executive power tend to favor the adoption of such policies (Karapin, 2016). On another hand, scholars agree that states operating under a federalist system, where power is shared between the central government and regional entities, are more likely to face challenges (Criqui et al., 2019). Implementing a uniform carbon tax policy may be opposed and blocked by local legislatures. This has been evident in Canada where the heterogeneous resources endowment of its ten provinces has led to resistance and legal disputes against the federal government's constitutional authority to impose a carbon tax. Disparities in resource availability, such as hydroelectric resources versus petroleum resources, and the interests associated with these resources have created obstacles to achieving consensus on carbon taxation measures.

2.3 Political Resistance

2.3.1 Lobby and Interest Groups

The transparency of the carbon tax, which allows stakeholders to plan for their transition efforts, also makes it more susceptible to political resistance compared to other environmental policies. One significant source of political resistance arises from industry lobbies. Energy-intensive industries, fearing potential reductions in competitiveness and revenue losses, may strongly oppose the carbon tax. These interest groups, when have enough power, form coalitions that have significant influence on the tax policy design (Stevens, 2021). Several Latin American countries are illustrative examples where lobbying has played a significant role in shaping carbon tax policies. In the case of Chile, during the 2020 parliamentary decisions, a remarkable one-third of the stakeholders participating in the hearings concerning the carbon tax were lobbyists representing

the agricultural sector. The lobbyists successfully modified tax legislation, resulting in the exclusion of their sector from the tax application.

2.3.2 Public Opinion

The direct impact of the carbon tax on household spending can raise concerns about the proportion of income allocated to energy expenses. It appears that countries experience various levels of public hostility toward carbon taxation, influenced by factors such as recognition of the environmental problem, perception of the cost implications, and trust in political institutions.

Firstly, some taxpayers do not feel personally responsible for the climate problem, leading to a lack of recognition in addressing it (Gough et al., 2011). Additionally, the environmental benefits of the measure may be underestimated, with skepticism about its effectiveness in reducing oil consumption (Dresner et al., 2006). Secondly, the resistance to carbon taxation also arises from concerns over personal costs, as individuals tend to resist measures that increase their financial burden (Douenne & Fabre, 2022; Dresner et al., 2006). This resistance is fueled by a tendency to overestimate the economic cost associated with the carbon tax (Douenne & Fabre, 2022). Lastly, the lack of trust in political institutions plays a significant role, as citizens need to have confidence in the government's ability to fulfill its promises and not perceive environmental issues as serving economic interests (Klok et al., 2006).

The economic and political context interacts to reinforce and explain public resistance, creating barriers to the implementation process of a carbon tax. Understanding these factors is crucial in analyzing the dynamics of resistance and developing strategies to address public concerns and enhance acceptance of carbon tax policies.

2.3.3 Factors Shaping Public Resistance to Carbon Taxation: Economic Context

Scholars have identified a correlation between a country's level of economic development and public interest in climate change mitigation (Diekmann & Franzen, 1999). This relationship can be attributed to the fact that individuals prioritize meeting their basic economic needs before considering other concerns. Similarly, research finds a parallel between the global economic recession of the 2000s and a decline in environmental awareness, suggesting that economic insecurity negatively impacts environmental concerns (Scruggs & Benegal, 2012). Consequently,

the standard of living not only influences the perception of the economic implications associated with such measures but also shapes the public's interest in climate change mitigation. In countries where individuals can comfortably meet their basic needs and engage in leisure activities, the financial burden of a carbon tax is comparatively lower. Additionally, due to the regressive impact of the tax, higher levels of inequality in a country are associated with lower acceptance of the tax, as individuals tend to empathize with those disproportionately affected, particularly low-income people (Carattini et al., 2018).

Another factor influencing public attitudes toward carbon taxes is the existing level of energy pricing. Research suggests that individuals residing in countries with already high taxes are less inclined to perceive further tax increases as justified (Harring et al., 2019). Similarly, individuals' acceptance of carbon taxes decreases when fossil resource prices rise (Baranzini et al., 2017).

The resource endowment of the country's oil and gas extraction is a key constraint in shaping public opinion due to the influence exerted by fossil fuel extraction lobbies. In some cases, these lobbies have the capacity to control national communication channels and emphasize the potential negative consequences associated with supporting climate-friendly measures, often highlighting the possibility of job losses (Harring et al., 2019). Strong coalitions formed by these lobbies not only influence policy decisions but also shape the public opinions.

2.3.4 Factors Shaping Public Resistance to Carbon Taxation: Political Context

As mentioned earlier, the level of trust in the political system emerges as a crucial factor in the acceptance and implementation of tax reforms. Countries with high corruption rates often experience low levels of trust in the government, which can contribute to greater resistance toward policy implementation with visible financial implications (Dolphin et al., 2019). Additionally, a nation's level of commitment to address environmental issues influences public resistance toward carbon tax (Fankhauser et al., 2015). When a government is perceived as uncommitted to combating climate problems, the imposition of a carbon tax may be viewed as a profit-making endeavor rather than a genuine environmental measure.

The level of public engagement in policymaking processes also influences environmental awareness. When individuals have the power to influence political decisions, they

are more likely to seek out information and become aware of climate issues, fostering a greater sense of concern and involvement. The accessibility of political systems can act either as an obstacle or a driver of citizen politicization. Electoral systems generally offer more accessibility than parliamentary systems, and federal systems provide greater opportunities for public engagement compared to unitary systems. Additionally, the awareness and concern of citizens regarding climate change can be influenced by the climate policies adopted in their respective countries (Obydenkova & Salahodjaev, 2017). Strong and ambitious climate policies tend to increase public awareness and concern, whereas less ambitious policies may lead to lower levels of awareness.

The influence of leaders' opinions on public perception of environmental issues is another contextual element to consider. Leaders have the power to influence the opinions of those who identify with them. Their positions on global warming can therefore shift people's opinions to a stronger or weaker position (Baiardi & Morana, 2021). For instance, research shows a decline in climate awareness following the presidency of Donald Trump, who held a climate-skeptic stance. Conversely, public opinion rose after Greta Thunberg's speech on climate change during the "Friday for Future" movement. Similarly, the position of right-wing parties on climate change plays a significant role (Brulle et al., 2012). These parties are often reluctant to recognize climate change as a crisis, and individuals who align themselves with these parties may incorporate this position prioritizing national economic interest over environmental concerns.

2.4 Understanding Public Opinion as a Key Factor

The increasing awareness of climate change has rendered the implementation of climate mitigation policies appealing to policymakers, especially as the emergence of environmentally conscious voters encourages political leaders to include climate-related measures in their agendas. However, the specific case of carbon taxation highlights the significant influence of public resistance on the feasibility and effectiveness of such policies (Burstein, 2003). Public opinion directly affects the attractiveness and the effective implementation of carbon taxes, posing a dual challenge for policymakers: achieving decarbonization objectives while also ensuring their popularity with the electorate. Notably, several European countries have emerged as leaders addressing climate mitigation issues by intensifying their efforts to reduce emissions. However, despite the well-

established effectiveness of carbon taxation as a tool to mitigate emissions, some of these countries have either not implemented carbon taxes at all or have introduced them with limited coverage. This divergence highlights the complex interplay between political will, public opinion, and policy implementation in the context of carbon taxation.

From this observation, we put two hypotheses:

1) The application of carbon taxation occurs in countries where the public is more receptive to such measures.
2) Exemptions on carbon taxes are marginal when there is greater public support.

Chapter 3 **Methodology and Data**

For the purpose of this research, a comparative approach has been adopted, focusing on four countries that share common characteristics as Western democracies and members of the European Union. These countries, namely Finland, Sweden, Portugal, and Spain, are committed to addressing global climate issues through their participation in international climate agreements such as the Kyoto Protocol and the Paris Agreement, as well as their involvement in the EU Emissions Trading System (EU ETS). The selection of Finland and Sweden as one pair, and Portugal and Spain as another pair, allows us to examine and compare public attitudes towards carbon tax measures and to explore the variations in their approaches to carbon tax design and implementation process. This choice is motivated by the presence of similarities in terms of their geographical characteristics, economic structure, and domestic energy consumption patterns. Despite notable differences in their economic and political contexts, each pair of countries have implemented carbon tax measures around the same context and period. The first set of cases focuses on the Nordic countries, Finland, and Sweden, which have been extensively studied and have shown significant progress in developing frameworks for carbon taxes. The second set investigates the Iberian Peninsula, Portugal, and Spain, which have received less academic attention and have displayed diverse outcomes in their approach to carbon tax implementation.

In order to answer to the hypothesis, we will investigate whether the differences in carbon tax coverage observed across countries can be attributed to disparities in public opinion using a survey from Cycle 8 of the European Social Survey (ESS8). The ESS conducts surveys every two years since 2001, covering various social sciences topics. The survey implements various specifications to ensure data quality and comparability across countries. Data are collected through face-to-face interviews conducted in individuals' homes. The ESS8 survey took place over the years 2016 to 2017 and included for the first time questions about people's views on climate change and energy. The survey gathered data from 23 countries, mainly from the EU including Finland (n= 1904), Portugal (n= 1242), Spain (n=1800), and Sweden (=1526), providing cross-national evidence on individual attitudes toward carbon taxes, climate awareness, financial concern. In the next section, we will focus on the characterization of the case studies to give us an idea of the outcome with can expect.

Climate Awareness

1) How worried are you about climate change? Respondents could indicate their concern on a fully labeled 5-point scale ranging from 1 (Not at all worried) to 5 (Extremely worried).
2) To what extent do you feel a personal responsibility to try to reduce climate change? Respondents could indicate their opinion on a 10-point scale from 0 (not at all) to 10 (a great deal).

Financial Concern

3) How worried are you that energy may be too expensive for many people in [country]? Respondents could indicate their concern on a fully labeled 5-point scale ranging from 1 (Not at all worried) to 5 (Extremely worried).
4) During the next 12 months how likely is it that there will be some periods when you don't have enough money to cover your household necessities? Respondents could indicate their opinion on a fully labeled 4-point scale ranging from 1 (Not at all likely) to 4 (Very likely).

Carbon Tax Opposition

5) To what extent are you in favor or against increasing taxes on fossil fuels, such as oil, gas, and coal in [country] to reduce climate change? Respondents could indicate their support for the policies on a fully labeled 5-point scale ranging from 1 (strongly in favor) to 5 (strongly against), with 3 (neither in favor nor against) as the midpoint.

After having identified the key attitudes that shape public opinion on carbon taxes, the study aims to compare these findings with data on national emission coverage, average tax rates, and exemptions. To facilitate this analysis, we rely on data provided by OECD, which offers valuable information for the years 2018.

3.1 Case Selection

3.1.1 Institutional System

All four countries adhere to parliamentary democracies, where government formation often involves the creation of coalitions comprising multiple political parties. Consequently, economic,

energy and environmental policies often emerge as the result of agreements among the dominant political parties within the national parliament. However, they differ in the degree of centralization within their governance structures (John, 2001). Spain, in comparison to the other countries, exhibits a relatively decentralized government structure. It operates as a constitutional monarchy with autonomous communities that possess significant powers and responsibilities, including regional governments and parliaments. The autonomy granted to these communities varies and allows for substantial local decision-making. Nordic countries share similar government structures with a substantial level of regional and local self-governance. While Finland's government structure provides a considerable level of decentralization, it is slightly less decentralized than that of Sweden. Conversely, Portugal exhibits a more centralized government structure compared to the other countries. Despite having administrative regions and municipalities, the central government holds broader control over national policies and decision-making power.

3.1.2 Governance Indicators and Trust in Institutions

The Nordic countries are characterized by strong governance indicators, with favorable scores in corruption control. This success can be attributed to their long history with democracy and institutional frameworks that actively involve citizens in societal decision-making processes. Consequently, there is a considerable level of trust in political systems within this European region (Kasa, 2005). The Iberian Peninsula has taken steps to improve governance indicators and combat corruption through increased transparency and accountability in public administration. However, challenges persist in these areas. The economic crisis followed by the sovereign debt crisis from 2008 to 2014 had a significant impact on the economies of these countries and led to a decline in political trust (Torcal, 2014). Additionally, political polarization and regional tensions, such as the situation in Catalonia, have further affected trust in political institutions in Spain.

3.1.3 Economic Context and Welfare States

Finland and Sweden adhere to the "Nordic model," characterized by a combination of a market economy and a strong welfare state, supported by high tax rates that facilitate significant resource redistribution to citizens. As a result, the standard of living in these countries is among the highest in the world, and a relatively low wage differential. However, the Nordic model has undergone substantial changes since the 1990s, including the introduction of strict tax regulations,

deregulation measures, and cuts in social benefits due to systemic crises. In contrast, Spain and Portugal transitioned from dictatorships in the 1970s. Both countries experienced economic marginalization within Europe, with their industrial and agricultural sectors lagging behind those of the European Economic Community member states (ECC). Although they joined the ECC in 1986, Spain and Portugal faced obstacles in achieving economic convergence with more advanced nations (Royo & Christopher Manuel, 2003). To help in their transition to economic and monetary union, they received support from the Cohesion Fund established by the Maastricht Treaty of 1992. This assistance included provisions for implementing environmental protection policies aligned with EU objectives. These reforms led to positive economic growth and improved living standards relative to other developed nations. However, Spain and Portugal struggled for a while with high unemployment rates and per capita income below the average observed across developed nations. Both countries were severely affected by the 2008 recession but managed to rebound economically, with increased GDP growth between 2014 and 2019 and improved unemployment rates, although still higher than the OECD average (IEA, 2021a, 2021b).

3.1.4 Domestic Energy Use

The Nordic countries have shown early adoption of greener energy mixes and the implementation of robust energy efficiency policies. This can be attributed to the harsh northern European winters combined with their heavy dependence on foreign countries for fossil fuel imports, which became a pressing issue during the oil crisis of the 1970s (IEA, 2000, 2004). Finland, in particular, experiences a cold climate that necessitates extended periods of heating and lighting during the limited daylight hours of the winter season, significantly impacting consumer energy expenditure (Harrison, 2010). The share of fossil fuels in Finland's energy consumption has decreased from 68% in 1990 to 47% in 2021, representing a reduction of 21 percent. Similarly, Sweden has taken early measures, as evidenced by the low share of fossil fuels in their energy mix since 1990, which dropped from 40% in 1990 to 28% in 2021. The two countries have developed one of the world's highest shares of combined heat and power and district heating, meeting the majority of heating needs for households and industries through this system. District heating networks provide an efficient means of heating buildings through centralized heat production and the utilization of household and wood waste heat, with co-generation playing a significant role in energy efficiency (IEA, 2000, 2004). Conversely, in 1990, Portugal and Spain had a high share of primary energy

derived from fossil fuels, reaching 85% and 78% respectively. Both countries began reducing these proportions in 2009, and by 2021, they had reached 68%. While Portugal's energy network is currently not efficient (IEA, 2021a), the Spanish energy sector underwent significant changes in the 1990s due to the country's economic growth and subsequent increase in energy demand. To diversify its fuel sources and reduce dependence on imports, the Spanish government promoted the use of combined heat and power generation and invested in the construction of nuclear reactors (IEA, 2021b). Consequently, while the Nordic countries have made extraordinary progress in reducing emissions since 1990, Spain and Portugal have experienced relatively modest reductions: it was not until 2020 that they managed to lower their emissions below the levels observed in 1990, with Spain decreasing emissions by only 4 percentage points since 1990 and Portugal by 3 percentage points.

3.1.5 Industrial Sector

As of 2016, Finland and Sweden demonstrated low carbon intensity in their industrial sectors, with measurements of 16gCO2/MJ and 15gCO2/MJ, respectively. However, there are notable differences between the two countries. Sweden's industrial sector primarily comprises a small number of large and mobile companies (Andersen, 2019). In contrast, Finland's industrial production is dominated by energy-intensive industries, accounting for 80% of the total. Additionally, Finland hosts a prominent refinery in the Nordic region and exports specific oil products. These distinctions are reflected in their respective CO2 emission indices, which are 72 for Sweden and 83 for Finland (IEA, 2023). The economies of the Iberian Peninsula heavily rely on agriculture and tourism, with a GDP per capita below the EU average. Despite Spain's high carbon intensity of industrial energy consumption at 38gCO2/MJ, its economic structure contributes to a relatively lower CO2 emissions index of 86, similar to Finland's. Similarly, Portugal's industrial CO2 intensity levels exceed the EU average at 29gCO2/MJ, but the country manages to keep its CO2 emissions below the EU average of 80. This achievement is attributed to the structure of the Portuguese economy, which is oriented toward the service sector (IEA, 2021a).

3.1.6 Expectation

Firstly, the accessibility of political systems can have implications for citizen politicization, with federal systems offering greater opportunities for public engagement compared to unitary systems.

As a result, Portugal's centralized governance structure is anticipated to result in a lower level of environmental awareness compared to the other three countries under examination.

Secondly, the economic context in the Iberian Peninsula is expected to directly impact climate change awareness and the perceived fairness of the carbon tax, thus indirectly shaping attitudes toward the carbon tax. Conversely, the higher standard of living and relatively low wage differentials in Nordic countries are likely to contribute to a more positive attitude toward public interest in climate change mitigation and the perceived affordability of the tax, fostering acceptance of the carbon tax.

Thirdly, due to the Iberian Peninsula's greater reliance on fossil fuels, the implementation of a carbon tax would have a more extensive impact across various sectors. This broader impact is likely to directly influence the acceptance of carbon tax measures within the region, potentially leading to increased resistance or skepticism. Notably, it is plausible to anticipate a more favorable attitude toward the carbon tax in Sweden compared to Finland.

Lastly, Sweden's economic structure is characterized by a limited presence of carbon-intensive industries, which reduces the influence of lobbying groups or trade union coalitions that could control national communication channels. Consequently, the potential negative consequences associated with supporting climate protection measures, such as job losses, are less likely to be emphasized in Sweden, contributing to a more positive perception of the carbon tax.

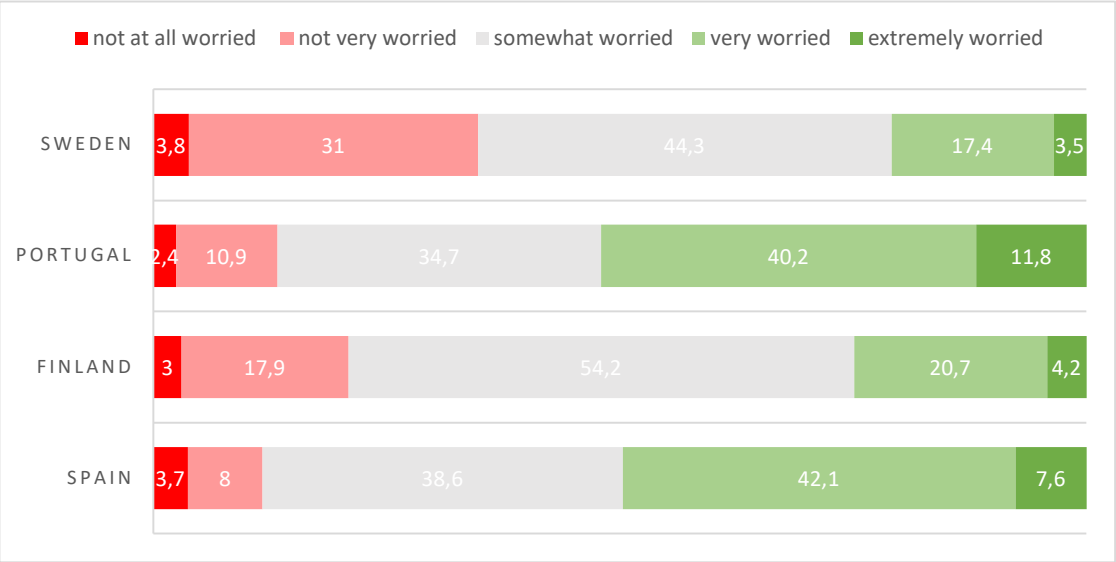
In summary, we expect climate change awareness levels to be lower in the Iberian Peninsula, particularly in Portugal due to its centralized governance structure. In addition, we expect greater financial concerns to negatively influence attitudes towards carbon taxes in the Iberian Peninsula, compounded by the region's greater dependence on fossil fuels. Conversely, we expect greater acceptance of carbon taxes in the Nordic countries, with Finland expected to show lower levels of acceptance than Sweden, due to its economic structure and greater dependence on fossil fuels. Given the significant relationship of public opinion with political decision-making processes, we anticipate a correlation between the extent of carbon tax coverage and the survey results obtained.

Chapter 4 **Result**

4.1 Result of ESS8 Survey

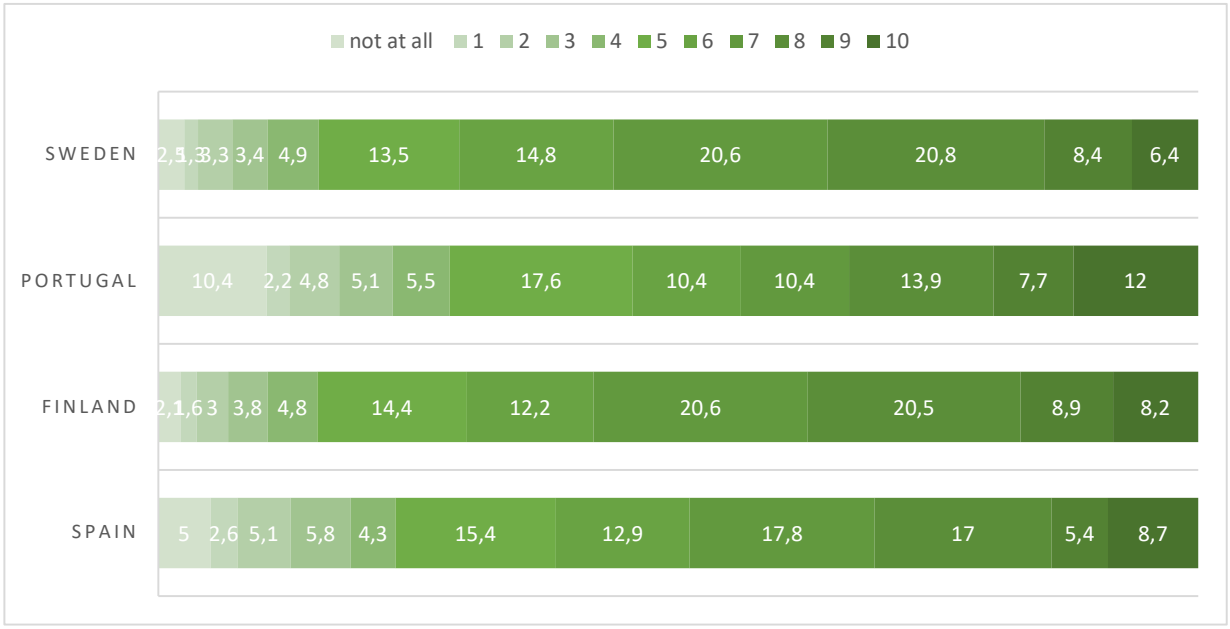
4.1.1 Climate Change Awareness

Figure 4.1 How worried are you about climate change? (Source: ESS ERIC, 2020)



According to Figure 4.1, Finland and Sweden demonstrated lower levels of climate change concern compared to Spain and Portugal. In the case of the Nordic Countries a larger proportion of individuals tend to express a "somewhat worried" stance, with Sweden manifesting the highest percentage of individuals expressing low concern (34.8%). In contrast, Spain and Portugal exhibited significantly higher levels of concern, with a substantial number of individuals categorized as "very worried" (50%).

Figure 4.2 To what extent do you feel a personal responsibility to try to reduce climate change? (ESS ERIC, 2020)



According to Figure 4.2, the average scores of the level of personal responsibility to reduce climate change, indicated a greater sense of personal responsibility among respondents in Finland (11.9) and Sweden (11.7) compared to respondents in Spain (10.9) and Portugal (10.4).

Table 4.1 Spearman coefficients of correlation between variables in Finland

		1	2	3	4	5
1	How worried about climate change					
2	To what extent feel personal responsibility to reduce climate change	.47**				
3	How worried, energy too expensive for many people	.06**	.0			
4	How likely not enough money for household necessities	.035	-.01	.19**		
5	Favor increase taxes on fossil fuels to reduce climate change	-.31**	-.28**	.10**	.12**	

*Note. *p < .05; **p < .01*

Table 4.2 Spearman coefficients of correlation between variables in Sweden

		1	2	3	4	5
1	How worried about climate change					
2	To what extent feel personal responsibility to reduce climate change	.41**				

3	How worried, energy too expensive for many people	.07**	-.01			
4	How likely not enough money for household necessities	.04	-.07**	.17**		
5	Favor increase taxes on fossil fuels to reduce climate change	-.27**	-.29**	.19**	.01**	

*Note. *p < .05; **p < .01*

Table 4.3 Spearman coefficients of correlation between variables in Portugal

		1	2	3	4	5
1	How worried about climate change					
2	To what extent feel personal responsibility to reduce climate change	.42**				
3	How worried, energy too expensive for many people	.20**	.04			
4	How likely not enough money for household necessities	-.12	-.05	.20**		
5	Favor increase taxes on fossil fuels to reduce climate change	-.15**	-.21**	.08**	.09**	

*Note. *p < .05; **p < .01*

Table 4.4 Spearman coefficients of correlation between variables in Spain

		1	2	3	4	5
1	How worried about climate change					
2	To what extent feel personal responsibility to reduce climate change	.48**				
3	How worried, energy too expensive for many people	.32**	.18**			
4	How likely not enough money for household necessities	.05*	-.0.23	.13**		
5	Favor increase taxes on fossil fuels to reduce climate change	-.13**	-.15**	.05*	.04	

*Note. *p < .05; **p < .01*

In order to analyze the interconnection between the variables studied, we used the Spearman coefficients of correlation (Table 4.1, Table 4.2, Table 4.3, and Table 4.4). The study first examined the relationship between individuals' attitudes towards climate change through the level of concern about climate change, the sense of personal responsibility, and the opinion on a higher tax on fossil fuels. The findings reveal a consistent negative relationship between individuals' levels of concern about climate change and opposition to a higher tax on fossil fuels. In other words, as individuals expressed higher levels of concern about climate change, their support for increasing taxes on fossil fuels is more likely to increase. We observe that the correlation coefficient between concern about climate change and support for increasing taxes on

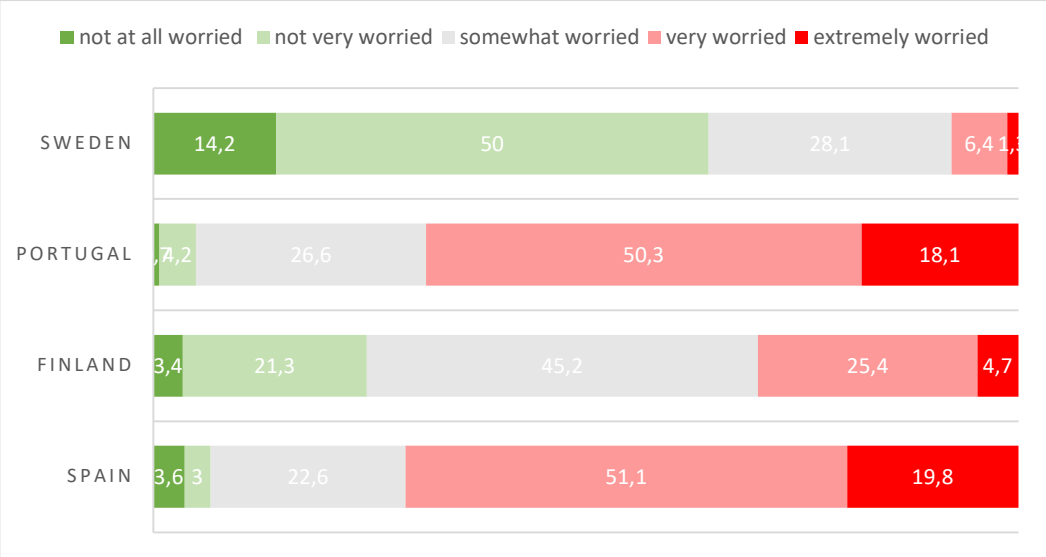
fossil fuels is relatively stronger in the Nordic countries (Table 4.1 and Table 4.2) compared to the coefficient correlation in the Iberian Peninsula (Table 4.3 and 4.4). This result suggest that the association between the variables examined is more pronounced and consistent in the Nordic countries compared to the Iberian countries.

We observe a similar negative relationship between individuals' sense of personal responsibility to reduce climate change and opposition to a higher tax on fossil fuels. As individuals felt a higher sense of personal responsibility, their support for increasing taxes on fossil fuels is more likely to increase as well. The association between the variables examined is here only slightly more pronounced and consistent in the Nordic countries (Table 4.1 and Table 4.2) compared to the Iberian countries (Table 4.3 and Table 4.4).

Lastly, the Spearman correlation coefficient between the two variables of climate change awareness is positive and moderate in all countries (Table 4.1, Table 4.2, Table 4.3, and Table 4.4) suggesting that the variables are only moderately related: a change in climate concern only predict a balanced change in responsibility to try to reduce climate change.

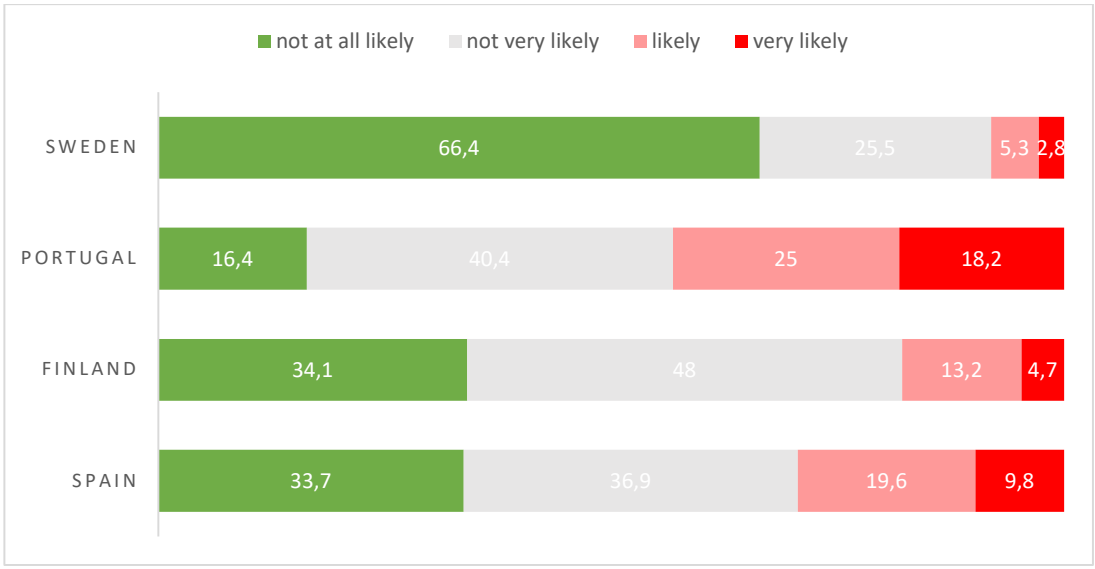
4.1.2 Financial Burden of a Carbon Tax

Figure 4.3 How worried are you that energy may be too expensive for many people in [country]? (Source: ESS ERIC, 2020)



According to Figure 4.3, The Iberian Peninsula demonstrate a significantly higher level of concern compared to the Nordic Countries. The majority of respondents in both Spain and Portugal expressed significant worry (around 94%), with 50% falling into the "very worried" category. In Finland, the level of concern was high relatively to Sweden, with 75.3% of respondents expressing some degree of concern. Notably, in Sweden a significant proportion of respondents (64.2%) expressed low levels of concern.

Figure 4.4 During the next 12 months how likely is it that there will be some periods when you don't have enough money to cover your household necessities? (Source: ESS ERIC, 2020)



When examining Figure 4.4, it is challenging to discern the Nordic countries with the Iberian Peninsula. Sweden stood out with the highest percentage of respondents(91.9%) expressing few concerns about facing financial difficulties. On the other hand, Portugal had the highest percentage (43.2%) of respondents who considered it likely to experience financial difficulties, followed by Spain (29.4%) and Finland (17.9%).

As expected, the results of Table 4.1, Table 4.2, Table 4.3, and Table 4.4 indicate that as individuals tend to express greater concern about energy costs, their support for increasing taxes on fossil fuels is more likely to decreases. While in the Iberian Peninsula, the relationship between concern about energy costs and support for increasing taxes on fossil fuels indicate a very weak relationship (Table 4.3, and Table 4.4), the Nordic countries indicate a relatively stronger relationship (Table 4.1, Table 4.2).

In contrast to the initial hypotheses, the findings indicate that concerns about the financial burden of the carbon tax are not associated with lower levels of climate change awareness (Table 4.1, Table 4.2, Table 4.3, and Table 4.4). Instead, the data reveals a positive relationship between climate change concerns and worries about energy costs for many people across all four countries. This implies that individuals who express greater concern about climate change are also more likely to be concerned about the energy costs faced by others. While the association is very week in the Nordic countries (Table 4.1 and Table 4.2), this positive relationship is particularly pronounced in the Iberian Peninsula (Table 4.3 and Table 4.4), suggesting that individuals in these countries who are worried about climate change are also highly concerned about energy costs.

Spain (Table 4.4) stand with a relatively strong relationship between personal responsibility for climate change and concerns about energy costs for many people, suggesting that individuals who feel a stronger personal responsibility for addressing climate change are also more likely to be concerned about the energy costs faced by others.

4.1.3 Carbon Tax Acceptability

Figure 4.5 To what extent are you in favor or against increasing taxes on fossil fuels, such as oil, gas, and coal in [country] to reduce climate change? (Source: ESS ERIC, 2020)

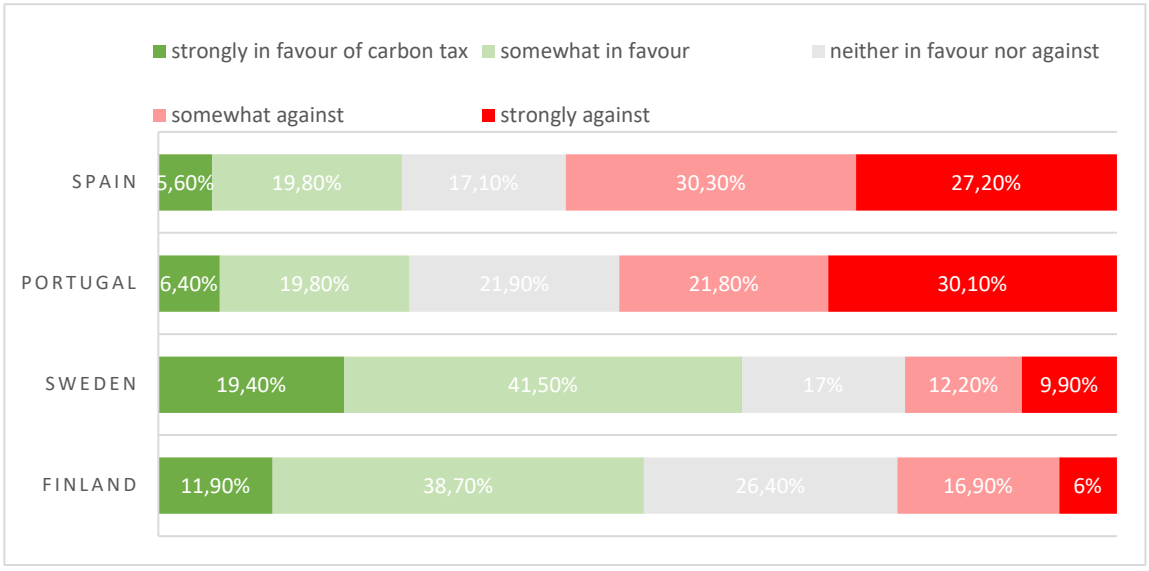


Figure 4.5 revealed a clear opinion opposition between Nordic countries and the Iberian Peninsula. In Nordic countries, more than half of the respondents expressed support for higher taxes, with a

higher percentage in Sweden (60.9%) than in Finland (50.6%). In the Iberian Peninsula, the trend was reversed, with a significant percentage of respondents strongly opposing increasing taxes on fossil fuels in Spain (27.2%) and Portugal (30.1%).

4.2 Carbon Tax Coverage

Finland took the lead in 1990 by introducing the first carbon tax in the world. Initially, the tax rate was relatively low compared to neighboring countries (World Bank, 2023). However, in 1997, Finland doubled the tax rate, which remained unchanged until 2010 when it reached 24EUR/CO2. Over the next three decades, Finland significantly increased its carbon tax rate, reaching 59EUR/tCO2 by 2020, a level that has been maintained since then. In contrast, Sweden implemented a carbon tax in 1991 directly at a high rate of 25EUR/tCO2 and continued to gradually increase it. By 2020, Sweden's tax rate reached an impressive 110EUR/tCO2. Portugal introduced a carbon tax in 2015 the rate being based on historic price trends of Emissions Trading Scheme (ETS) allowances. Thus, the tax rate began at 5EUR/tCO2 and steadily increased to 22EUR/tCO2 by 2020. Spain, on the other hand, introduced a carbon tax targeting only fluorinated gases (f-gases) in 2014, with a tax rate of 23EUR/tCO2, which decreased to 14EUR/tCO2 in 2019 and remained constant until 2020. It is noteworthy that the structure of carbon taxes varies among countries due to differences in the sectors covered, specific exemptions, and offset methods employed. The tax rates also vary depending on the type of fuel, with a preference for lower-emission fuels like natural gas or domestic fuels such as biofuels. This observation highlights the need for a more in-depth study of the average implementation of carbon taxes and the extent of coverage of GHG emissions. To facilitate this analysis, we rely on data provided by OECD, which offers valuable information for the years 2018.

Figure 4.7 Share of GHG emissions subject to a carbon tax, 2018 (Source: OECD, 2023)

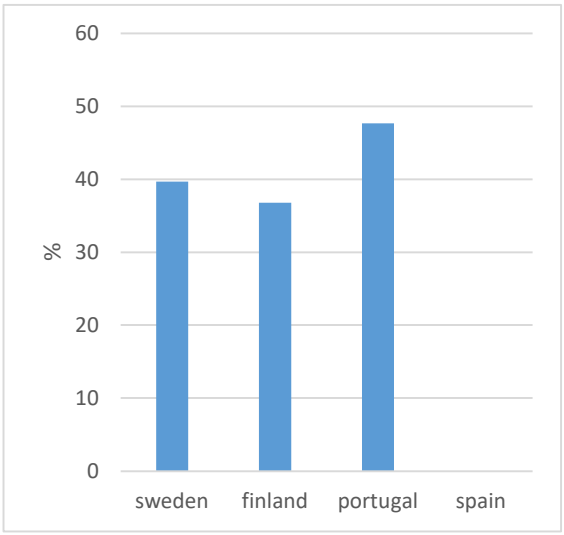


Figure 4.6 Average effective carbon prices by instrument, 2018 (Source: OECD, 2023)

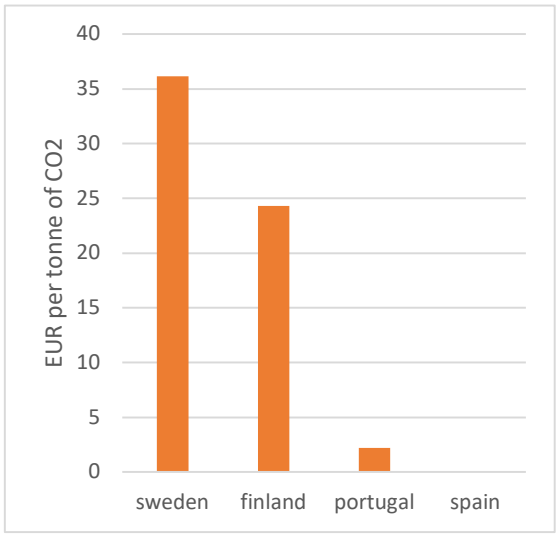


Figure 4.6, highlight some disparities between countries. Portugal covers half of its emissions with a carbon tax, surpassing Sweden by 8 percentage points and Finland by 11 percentage points. The analysis of figure 4.7 counterbalances the finding of figure 4.6, and clearly distinguish the Nordic countries and the Iberian Peninsula. It shows that despite slightly exceeding emissions subject to a carbon tax, Portugal maintains a considerably lower average carbon tax price of 2.2EUR/tCO2, comparatively to Finland's rate of 24EUR/tCO2 and Sweden's rate of 36EUR/tCO2. It is worth mentioning that the Spanish f-gas tax, targeting a specific fuel, is not considered in this analysis as it does not cover emissions as a whole. Additionally, it is noteworthy that a large share of unpriced emissions in Finland and Sweden arises from the combustion of biomass (OECD, 2023). When excluding emissions from biomass combustion, it appears that Finland priced approximately 97% and Sweden priced about 91% of their carbon emissions from energy use which contributes to a notable increase in the average tax rate.

4.2.1 Carbon Tax Exemption in Industrial Sector

Figure 4.9 Share of industrial GHG emissions subject to a positive price (all carbon prices combined), 2018 (Source: OECD, 2023)

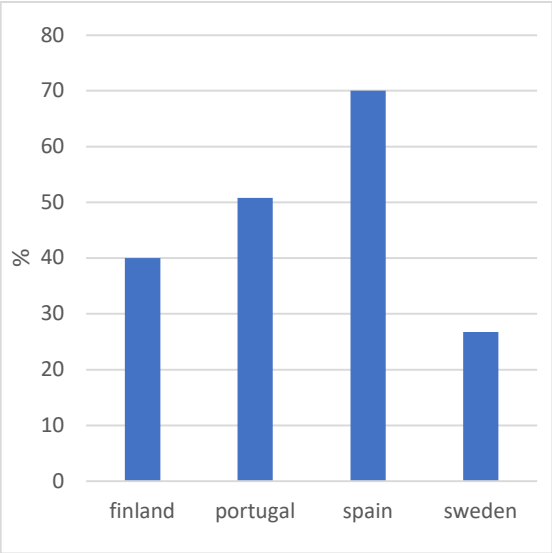


Figure 4.8 Average effective carbon tax in industrial sector by instrument, 2018 (Source: OECD, 2023)

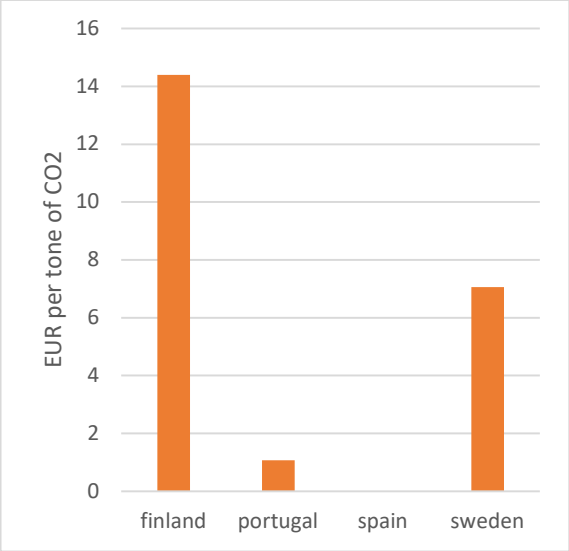


Figure 4.8 illustrate emissions resulting from industrial energy usage. This sector generally receives the least taxation coverage. Sweden covers the smallest share of emissions (26.8%), followed by Finland (40%), Portugal (54%), and Spain leading at 70%. The difference between the Iberian Peninsula and the Nordic countries lies in the biomass which is not covered by a carbon tax in the latter (OECD, 2023). The comparison of emission coverage between Spain and Portugal can be explained by their respective economic structure, Spain having a more important share of industry subject to EU ETS than Portugal (IEA, 2021b, 2021a). The analysis of figure 4.8 clearly manifest a distinction between the Nordic countries and the Iberian Peninsula. The average price rates are in Finland (14EUR/tCO2) and in Sweden (7EUR/tCO2) while in Portugal and Spain the average price rates is negligible.

Chapter 5 **Discussion**

As anticipated, the study distinctly demonstrates a differentiation between the degrees of relationship with individuals' attitudes on climate awareness, financial concern, and carbon tax opposition in the two sets of countries. In Nordic countries, it is evident that concerns about climate change and a sense of responsibility for addressing it are strongly related to support for carbon tax increases. Interestingly, almost all the variables analyzed in the Nordic countries show a relationship with the opinions on carbon taxes. It is noteworthy that Sweden expresses slightly less responsibility and climate concern compared to Finland but exhibit higher support for carbon taxes. This can be explained given the low levels of concern about energy affordability for others.

On the other hand, the results in the Iberian Peninsula present a more nuanced picture. Spain and Portugal exhibit significantly higher levels of concern about climate change, potentially influenced by the intensity of heat waves in the region and the significant number of individuals employed in agriculture. However, this doesn't seem to be reflected in individuals' attitudes to the carbon tax in this region. Comparatively, the sense of responsibility toward climate change seems to be more related with the acceptability of carbon taxes. It is worth noting that the Iberian Peninsula experiences a high level of concern about energy affordability, particularly in Portugal. However, we did not find any strong relationship with resistance to the carbon tax. Interestingly, in Spain, the concern about energy affordability is not directly related to a support for carbon tax increases but could be linked to a lower sense of responsibility for climate change. Overall, the relationships are weaker in the Iberian Peninsula, and no variables is strongly related to variations in attitude toward carbon tax increases. In other words, the strong public opposition observed in the Iberian Peninsula is difficult to explain solely based on the analyzed variables. Thus, these findings highlight the need for further research in countries that have received less scholarly attention regarding public attitudes toward taxation.

Comparing the survey results with the extent of carbon tax coverage in the respective countries, a noteworthy alignment between policy and public opinion emerges. When we compare both groups, the tax average rates reflect public sentiment. In other word, higher coverage is related to more acceptance of an increase in the carbon tax. This is particularly visible in the Nordic countries. Sweden, characterized by its higher average taxation rate compared to Finland,

demonstrates a greater level of public support. On the other side, the classification of biomass as a non-fossil fuel coupled with its widespread utilization in these countries, results in a significant portion of emissions remaining unpriced by a carbon tax. Considering the extensive use of non-taxed biofuels in the Nordic countries, notably in industries and electricity generation, it is worth further analyze how it may influence public perceptions of carbon taxes. As the weight of carbon taxation is comparatively less important than in economies more dependent on fossil fuel, it raises questions about whether positive survey responses are driven by the recognition that biofuels play a significant role in their energy consumption, thus making an increase in the carbon tax have only a minimal impact on their energy costs. If this is indeed the case, public support may not be rooted in a perception of necessity and acceptability but rather aligns with the exemption for biofuels.

In another hand, the relationship between survey results and carbon tax coverage is less straightforward in the Iberian Peninsula. While Portugal exhibits stronger opposition to carbon tax compared to Spain, it paradoxically has a higher level of carbon tax coverage. The reasons behind this disparity can be found in the implementation context of the carbon tax. Portugal, along with Sweden and Finland, implemented a carbon tax during a period of financial crisis that necessitated fiscal reform (Anderson, 2019). Specifically, Portugal faced a sovereign debt crisis from 2011 to 2013, which resulted in a significant external debt burden, exerting dangerous fiscal pressure on the economy. The Troika, consisting of the European Commission, the European Central Bank, and the International Monetary Fund, offered bailout deals subject to budget cuts and political reforms. The involvement of the Troika played a crucial role in overseeing and implementing economic reforms and austerity measures to address budget deficits and restore economic stability in Portugal. These measures included reducing public spending, tax increases, and the enforcement of fiscal discipline. In this context, an environmental tax reform project gained support from the center-right government to form a committee of experts specializing in green tax reform. The acceptance of carbon taxes by political parties was partially driven by the perception that environmental taxes were more favorable compared to alternative sources of revenue, and the desire to attract environmentally conscious voters.

Similarly, Spain also received assistance from the Troika, although the nature of the aid primarily targeted the banking sector, in contrast to the more comprehensive economic bailouts witnessed in Portugal. As a result, the austerity requirements imposed on Spain were relatively

less stringent. Additionally, the Spanish decentralized governance structure has created notable challenges in potential carbon tax implementation process (Anderson, 2012). While the central government is responsible for formulating national energy efficiency policies, autonomous regions can establish their own environmental taxation policies. On top of this, energy planning in Spain was predominantly delegated to the energy industry, necessitating an institutional framework to coordinate efforts between the national and regional governments, which posed a challenge in implementing a carbon tax. Last but not least, Spain exhibited a tax-to-GDP ratio below the EU average (OECD, 2023). The country had revenues from indirect taxes ranked second lowest within the EU with relatively low shares of VAT, social security contribution, and environmental taxes to GDP. Spain relies on taxes levied on transport fuels, but the tax rates on gasoline and diesel were relatively low compared to neighboring countries. This characteristic has limited the capacity of the country to make an environmental tax attractive by reducing other tax burdens on taxpayers. Despite expressing the need for a "new green tax" aligned with environmental impact in 2021, Spain's energy taxation system continues to revolve around value-added tax (VAT) and additional special taxes on f-gases, coal, and electricity. The political structure in Spain poses challenges in the implementation of a carbon tax, coupled with the absence of external pressure and limited capacity to implement comprehensive tax reforms. In this context, public opinion was closely associated with the extent of carbon tax coverage in the country, particularly in comparison with Portugal, which implemented the tax despite public opposition.

Conclusion

This thesis contributes to the growing body of literature on public opposition for carbon taxes by exploring the role of public attitudes in the policy design and the implementation process. The research aims to fill a gap in the literature by enabling a more nuanced understanding of the factors at play in different policy designs. The research adopts a comparative analysis approach focusing on four European countries: Finland, Sweden, Portugal, and Spain. The empirical study consists of two key components: a quantitative analysis to explore the relationship between public attitudes and the presence of exemptions within carbon tax policies, and a qualitative analysis to further examines the relationship between public attitudes and the implementation of carbon taxes. Thus, the objective of the empirical study is to test two hypotheses: 1) Countries with greater public support are more likely to implement carbon taxation, and 2) Higher public support for carbon taxes corresponds to fewer exemptions.

The first finding of this study confirms the relationship between the extent of carbon tax coverage and public attitudes in the Iberian Peninsula and the Nordic countries. The tax average rates reflect public sentiment, in other word, higher coverage correspond to more acceptance of an increase in the carbon tax. The comparatively lower average carbon tax rates in Portugal and lower carbon tax coverage in Spain align with the level of public opposition towards carbon taxes. In the Nordic countries, a positive alignment between public attitudes and carbon tax policy is observed, as evidenced by the support for increasing the tax. However, the presence of biomass as a significant emission source gives us cause to wonder about the influence of public opinion on the tax, illustrated by the substantial exemption for biomass. Exploring whether incorporating biofuel emissions into the tax framework, could alter public sentiment towards carbon taxes would be an interesting avenue for further investigation. This exploration could provide insights into the factors shaping public opinion and challenge certain assumptions about the widespread acceptance of carbon taxes in Nordic countries.

Regarding the second hypothesis, the findings indicate that the level of opposition in Spain is not stronger than that observed in Portugal. However, the carbon tax coverage is significantly different between the two countries, Spain having implemented a carbon tax only targeting the f-gas. This disparity, can be explained by the context in which the carbon tax has been

implemented. Portugal, similarly to the Nordic countries, implemented the carbon tax during a period of financial crisis as part of a broader financial restructuring initiative. In contrast, Spain did not face external pressures or incentives that would have compelled it to adopt a carbon tax inclination to implement a carbon tax. Thus, our analysis suggests that the implementation of a carbon tax is primarily influenced by external incentives rather than solely public opinion. These external incentives may encompass international institutions imposing penalties on nations failing to enact effective environmental measures or deterring financial investors from high-emission ventures.

Given the general agreement between expectations and Spearman's coefficients results in the Nordic countries, particularly Sweden, and the less consistent results in the Iberian Peninsula, studying public attitude in countries that have received less attention from researchers will provide a better understanding of the factors influencing public perceptions in countries that have not or recently implemented carbon taxes. To enhance the generalization of the findings, future analyses should seek to replicate the observed relation using a broader sample that incorporate additional variables such as existing energy pricing or overall level of countries' commitment to climate change mitigation. Additionally, given the significance of climate change attitudes in the acceptance of carbon tax, scholars should investigate strategies to adapt climate change messages to different audiences in order to foster belief in climate change and a sense of responsibility for mitigation efforts.

The study aimed to contribute to a deeper understanding of the factors that shape climate policy formulation and implementation. By conducting a comprehensive analysis of these factors and their relationship with policy design, it becomes possible to develop strategies that promote the adoption of robust and efficient carbon tax systems.

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