Why Do States Adopt Carbon Taxes When They Do?

by

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DISSERTATION ABSTRACT

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Title: Why Do States Adopt Carbon Taxes When They Do?

With ever-increasing global temperatures and climate change problems, states are faced with the challenge of formulating carbon reduction policies. The objective of this dissertation is to unfold the factors that lead states to adopt carbon taxes to reduce carbon emissions. Despite being considered an effective carbon reduction policy, carbon taxes have been adopted by only 28 states, and the remaining 166 did not adopt carbon taxes. The dissertation aims to understand the determinant factors behind the decision of the adoption of carbon taxes by 28 states and also to understand the timing of their implementation to explore specific circumstances. I have applied mixed methods in this research by conducting a cross-sectional quantitative analysis and two case studies, one on Australia's adoption and repeal of carbon taxes and another on Mexico's adoption of carbon taxes.

The quantitative study of this dissertation found a strong influence of high levels of democracy in adopting carbon taxes, indicating the implication of the institutional features of liberal democracy, such as inclusivity, diverse representation, and accountability, and discussed how they allow room for policymakers to address climate change problems by having strong carbon emission reduction policies such as carbon taxes. It further demonstrated that

proportional representative systems within highly liberal democracies also have strong correlations with the adoption of carbon taxes, indicating that the institutional features of proportional systems in democracies ensure more multiparty representation in the legislature that increases the likelihood of carbon taxes.

The dissertation's case studies confirmed the quantitative study's findings about the positive impact of democratic institutions and proportional systems on the adoption of carbon taxes. Australia has been a highly liberal democracy for many decades, while Mexico democratized in 2000. Australia and Mexico have some proportional representation in their mixed systems, which ensures the representation of many political parties in the legislature. The political-institutional features helped both countries to have more discussions on the policy option of carbon taxes. In addition, both case studies helped to come to the conclusion that if Green or Left parties can form governments to attain decision-making power, the adoption of carbon taxes becomes highly likely.

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Chapter 1: Introduction

Why do states adopt carbon taxes when they do? In this dissertation, I will investigate factors that have led certain states to implement carbon taxes and why that decision has been made at specific points in time. As a result, I have conducted a large n quantitative cross-sectional analysis to discover common trends in countries that have decided to adopt carbon taxes. To address why these countries made their decision precisely when they did - and not before or after - I have conducted research on two case studies using qualitative methods and process tracing focusing on the determinants of carbon taxes in Australia and Mexico.

The rise in global temperatures and its adverse impacts came to attention in the early 1990s, creating concern among the scientific community as well as state leaders. The Intergovernmental Panel on Climate Change (IPCC) started publishing research reports on the problems of climate change and informing the governments about climate change threats to humans and other species. In 1950, 6 billion tons of carbon dioxide were emitted globally (Ritchie and Roser 2024). By 1990, global annual carbon emissions became 20 billion tons, and in 2022, global annual carbon emissions reached 37.15 billion tons (Ritchie and Roser 2024). Over the span of half a century, the amount of carbon emissions had risen drastically. Once emitted into our atmosphere, carbon dioxide remains there for thousands of years, and it has the ability to trap heat, creating a temperature increase on Earth (Clark 2012). About 65% to 80% of the emitted carbon goes into the ocean and stays there for 20-200 years, and it takes several hundred years for some portions of the emitted carbon to disappear from the atmosphere (Clark 2012). Global temperatures have increased, on average, by 0.11 degrees Fahrenheit every decade since 1850 (Lindsey and Dahlman 2024). Since 1982, the global temperature has increased very rapidly by 0.36 degrees Fahrenheit every 10 years (Lindsey and Dahlman 2024). Scientists

determined that carbon emissions are the main cause of climate change and temperature increase (Ritchie and Roser 2024).

To address the growing carbon emissions problem, Finland became the first country to introduce carbon taxes in 1990. Despite having a low greenhouse gas emissions rate of 0.3 percent of the global greenhouse gas emissions (Khastar, Aslani, and Nejati 2020), Finland wanted to address climate change and impose a price on fossil fuel-generated energy consumption for its negative externality. Within several years, other European countries, including Poland, Norway, Sweden, and Denmark, followed suit.

Carbon taxes, a tax levied on each ton of carbon emitted per unit/ton of fossil fuel or coal, came as a solution to carbon emissions (Dole 2013; Metcalf 2021). Carbon taxes differ from other carbon pricing mechanisms - such as the cap and trade or Emissions Trading System (ETS). Whereas ETS is directed solely toward business firms (Environmental Defense Fund 2020), carbon taxes are imposed on all individual citizens and businesses alike (Andersson 2019; Dole 2013; Metcalf 2021). A carbon tax sets a fixed price on carbon emissions that generates price certainty, but it does not guarantee fixed carbon reduction (Dole 2013; Metcalf 2021). With ETS, the government establishes a limit on the total quantity of carbon emissions and sells permits for business firms so that there is certainty in the amount of allowable carbon emissions, and business firms may buy and sell permits among themselves too, if they deem necessary (Dole 2013, 55). However, there is no price certainty in ETS (Metcalf 2021).

Carbon taxes have the benefit of revenue generation, and they offset other tax burdens from citizens (Andersson 2019; Metcalf 2021). Finland, for example, was able to collect $750 million as carbon tax revenues (Sumner, Bird, and Dobos 2011) - which they used to offset income tax and finance the government budget (Khastar, Aslani, and Nejati 2020). They wanted

to offset the income tax on the population to shift the tax burden to different classes/income groups of society who are more responsible for carbon emissions (Khastar, Aslani, and Nejati 2020). Between 1990 and 1998, Finland was able to reduce 4 million metric tons of CO2 emissions (Sumner, Bird, and Dobos 2011). Likewise, Sweden is another successful case where carbon taxes were adopted to reduce carbon emissions in the transport sector. A recent study shows that there has been a dramatic reduction in CO2 emissions in Sweden following the years of implementation of carbon taxes (Andersson 2019). Carbon taxes have the potential to encourage more investment in renewable energy production since they encourage people to make a cost-benefit analysis of fuel and energy price increases and consider cheaper alternatives. Setting up a carbon taxation mechanism also requires no cost, since it can be incorporated into the existing taxation system of a nation, whereas setting up an ETS requires the establishment of an organization with the capacity to allocate permits and monitor and manage compliance (Andersson 2019). Having all these benefits did not spread the adoption of carbon taxes much and only 28 nations seem to be confident in this policy.

The adoption of a carbon tax faces two main challenges: it may adversely affect the competitiveness of companies, and it may affect low-income people because of their dependency on fossil fuel-generated energy (Elkins and Baker 2001). Since the carbon tax is meant to increase the price of fuel and/or energy, business firms will have to bear more cost. Carbon taxes are applied nationally and may thereby impact a country's businesses and their position in the global economy - since many other countries may not have implemented them. In addition, low-income groups rely on energy for transportation, heating, cooling, or other workplace and household amenities. Higher prices for fuel and energy may adversely impact their economic condition. This raises the question of whether or not a nation is ready to bear the cost of carbon

emissions through taxes. Governments do not want to impose more taxes on the population because it risks their popularity too. In general, both high and low-income groups do not want to pay more taxes. These challenges make the adoption of carbon taxes an unlikely option for many countries.

Despite being an unlikely option, there are 28 countries among 195 that have adopted carbon taxes by 2022. This dissertation is going to investigate the factors that led these 28 countries to adopt carbon taxes while the other 166 decided not to.

Table 1a and 1b: Lists of countries with carbon taxes and ETS

Country	Carbon tax year
Finland	1990
Poland	1990
Norway	1991
Sweden	1991
Denmark	1992
Slovenia	1996
Estonia	2000
Latvia	2004
Liechtenstein	2008
Switzerland	2008
Iceland	2010
Ireland	2010
Ukraine	2011
Australia	2012 (2014)
Japan	2012

Country	Carbon tax year
United Kingdom	2013
France	2014
Mexico	2014
Spain	2014
Portugal	2015
Chile	2017
Colombia	2017
Argentina	2018
Canada	2019
Singapore	2019
South Africa	2019
Luxemburg	2021
Netherlands	2021
Uruguay	2022

Source: (The World Bank 2023)

Country	ETS Year
Austria	2005
Belgium	2005
Cyprus	2005
Czechia	2005
Denmark	2005
Estonia	2005
Finland	2005
France	2005
Germany	2005
Greece	2005
Hungary	2005
Ireland	2005
Italy	2005
Latvia	2005
Lithuania	2005
Luxembourg	2005
Malta	2005
Netherlands	2005
Hungary	2005
Portugal	2005

Country	ETS Year
Slovakia	2005
Slovenia	2005
Spain	2005
Sweden	2005
United Kingdom	2005
Poland	2006
Bulgaria	2007
Romania	2007
New Zealand	2008
Switzerland	2008
Iceland	2009
Liechtenstein	2009
Norway	2009
Croatia	2013
Kazakhstan	2013
Republic of Korea	2015
Canada	2019
Mexico	2021
China	2021
Montenegro	2022

Source: (G. Dolphin and Xiahou 2022)

There are four subsequent chapters in this dissertation that analyze the adoption of carbon taxes. The second chapter is a literature review of the determinants of carbon taxes. Here, I have summarized the theories that a small number of literature on the determinants of carbon taxes provides and the key findings by researchers regarding this topic.

The third chapter is a cross-sectional analysis of the determinants of carbon taxes. Here, I have observed variation across all 195 nations in the year 2022 to address the question: Do political institutional factors, such as the level of democracy, type of government, and forms of electoral systems, affect a state's decision to adopt a carbon tax? My dependent variable, the adoption of carbon taxes, has a binary classification: either carbon tax or no carbon tax. I have applied logistic regression analysis because it is more suitable for predicting the relationship between the dependent variable with binary outcomes and multiple independent variables. The independent variables are the political-institutional features, the level of democracy (both

electoral and liberal), proportional versus majoritarian electoral systems, and parliamentary versus presidential government systems. These independent variables are static or time-invariant and are not subject to quick change. Therefore, a cross-country analysis is done. The influence of economic factors, like GDP per capita income and CO2 emissions per GDP as a proxy for carbon intensity, are also measured in this study - though these predictors are not time-invariant. Their influences are measured because they are important factors that need to be considered while evaluating a nation's choice to adopt a carbon tax.

The findings of this cross-sectional quantitative analysis have shown that there is a strong positive correlation between the level of democracy and the adoption of carbon taxes, indicating that the institutional features of democracies allow policymakers to address climate change problems, formulate new policies for carbon reduction, and even have carbon taxes. Within highly liberal democracies with liberal democracy scores above 0.5, proportional electoral systems - where multiple political parties obtain representation in the legislature based on the percentage of their votes - strongly influence the adoption of carbon taxes. The other factors do not explain the adoption of carbon taxes.

In the fourth chapter, I conduct a case study on the determinants of carbon taxes in Australia. My specific research question is: Why did Australia implement a carbon tax in July 2012 and abolish it in just two years in July 2014? I applied qualitative analysis to understand the different factors that influenced the adoption of carbon taxes and the factors that influenced the decision to revoke carbon taxes in Australia. The findings of this case study reveal that the complex process of political institutional factors and electoral politics caused Australia to first adopt a carbon tax in 2012 and then caused it to revoke the tax in 2014. Australia is a highly liberal democracy with a parliamentary form of government and proportional representation in a

mixed electoral sysetm. This enabled the Australian Greens to find a place in the collation government and to influence policymaking in the Parliament in 2010 under the Labor Party leadership. The progressive ideas and values of the Australian Greens pressured the Labor Prime Minister at that time to adopt carbon taxes (Crowley 2013a). The Labor Party, ideologically a social democratic party, on the other hand, was in favor of having an emissions trading system (ETS) (Twomey 2014a). But, the Labor Party agreed to implement carbon taxes under the pressure of the Greens. The Greens becoming a part of the government reduced the influence of the big corporation lobby, making them a weak challenger to the carbon tax initiatives (Crowley 2013a). When the Greens had to step down from their coalition in 2013 after the Labors lost the election, the carbon tax law was repealed by the coalition of the Liberal Party and the National Party - who are aligned with the corporation and business lobby (D. Holmes 2016).

In the fifth chapter, I conducted a case study on the determinants of the adoption of carbon taxes in Mexico and tried to understand the timing of this decision. Specifically, I investigated why Mexico undertook the policy in 2014 and not before or after. In this case study, I used process tracing as a method to understand the detailed sequence of the events leading up to the adoption of carbon taxes and to identify the causes behind the decision. My findings show that the democratization process and electoral politics played a significant role in Mexico's adoption of carbon taxes. Though Mexico has a presidential form of government, it has a mixed system of both majoritarian and proportional representation in its two chambers of the legislature that ensures representation of small political parties. The democratization and multiparty elections that started in 2000 replaced the dominant political party, PRI, that ruled Mexico for 71 years. This change in government and multiparty electoral politics created space to exercise more civil liberties and discuss a myriad of political, economic, social, and environmental issues. The

2006 general election brought an environmentalist from the PAN party to power, who worked for the establishment of Mexico as a climate leader by formulating new climate laws, hosting international conferences, and establishing institutions researching the environment and climate change (Balderas Torres, Lazaro Vargas, and Paavola 2020). In 2012, a change in power occurred as PRI returned to office by making a coalition with PVEM (the Mexican Ecological Party) with promises of reform proposals to bring further change in the nation's political and economic structures(Camp 2013; Flores-Macías 2013; Spoon and Gómez 2017). Electoral politics made PRI transform itself and assume the role that PAN was doing. PRI maintained Mexico's climate leadership role by adopting carbon taxes while also addressing the economic challenges that Mexico faced in the energy sector and with a poor tax collection system.

The objective of this dissertation is to identify the factors that influence the decision to have carbon taxes and the factors that lead a nation to adopt carbon taxes at a specific time. In this effort, the dissertation contributes to the existing literature on the determinants of carbon taxes by showing two general patterns that exist across all cases of carbon taxes. This dissertation also reveals specific aspects of the adoption and repeal decision of carbon taxes while confirming the findings of the cross-country analysis in the specific case studies. It makes the argument that political institutional factors, such as having a highly liberal democracy and proportional representation, increase the likelihood of the adoption of carbon taxes in general. The case study of Australia confirms this because Australia is a century old democracy and a mixed electoral system with proportional representation as a part of it. The study further reveals that it was the Australian Greens who made it possible for the nation to adopt a carbon tax by, despite being a small party, having the opportunity to be a part of a coalition government. The case study gives us the counterfactual that in the absence of the Australian Greens, as the

coalition lost the election within 2 years, the carbon tax of Australia was revoked. The Mexico case study showed that changes or increases in the level of democracy brought changes in electoral politics and initiated a multi-party system of election within a mixed majority-proportional representation structure of legislature. Democratic representation and accountability increased since 2000 - while Mexico was faced with many economic, energy, and political challenges - allowing more room for discussion of all possible reforms in these sectors, including policy-making on climate change and carbon emission reduction, which resulted in the adoption of carbon taxes. The strength of this dissertation is that, within a small existing literature on carbon taxes, it contributes with greater depth and detail to the identification of factors that make non-adopter countries change their policies and adopt carbon taxes.

Chapter 2: Literature Review

Introduction

This chapter has two goals: first, to review the literature to identify the factors that make some states more likely than others to adopt carbon taxes, and second, to review the literature to identify the factors that lead a given state to adopt a carbon tax at a particular point in time, rather than at some prior or later point in time. Researchers have thus far focused mainly on carbon pricing policies, considering carbon taxes and carbon trading policies together. The literature on the determinants of carbon taxes and carbon trading policies is small in numbers too. I will discuss the key predictor variables or factors that researchers have identified as important in understanding the adoption of carbon pricing policies and draw hypotheses for my research on carbon taxes from them in this chapter.

Comparing carbon taxes to alternative climate policy instruments

One policy frequently proposed to encourage emission reductions has been carbon taxes, in which governments impose a tax related to each ton of carbon emitted by its citizens or industries (Driscoll 2021). It is not a tax on the amount of selling or production of fossil fuel, coal, or natural gas (Chikofsky 2021). Rather, it is a tax on the actual amount of carbon emissions produced at any level of the supply process (Pomeleau and Asen 2019). It can be applied at any level where carbon emissions occur from the production level to the consumption level (Pomeleau and Asen 2019).

Although states have known about the harmful impacts of climate change for over 30 years and experts have advised adopting carbon taxes to effectively reduce carbon emissions for a long time, only 28 of the 195 states in the world have adopted carbon taxes. One of the reasons for this reflects the debate over the arguments in favor of and against the carbon tax policy.

Another reason is that states can compare taxes with other carbon pricing mechanisms, such as cap and trade and fuel tax, and differ on which is the most appropriate policy.[1]

Cap and trade is a mechanism where a government sets a fixed limit to carbon emission, and within the fixed limit, it offers permits or allowances for the industries (David Suzuki Foundation, n.d.). The industries buy permits and can sell those they do not use. The price of the permits would be determined by market demand (Center for Climate and Energy Solutions, n.d.). Eventually, in a step-by-step process, the government would reduce permit availability to significantly reduce total carbon emissions. A carbon tax is different from this mechanism because the government does not set any limit to the total amount of carbon emissions but rather sets a fixed tax for each ton of emission to reduce the level of carbon emissions.

Carbon taxes and fuel taxes influence prices differently. Fuel taxes are the price imposed on the production and sale of fuel (Chikofsky 2021). Therefore, the tax is included in the production cost of the fossil fuel and is reflected in the price when consumers buy fuels (Chikofsky 2021). On the other hand, a carbon tax is not included in the production cost of fuels when producers sell the fossil fuel. It is imposed on the amount of carbon emissions. Carbon tax is also targeted at coal, fossil fuel, natural gas, and bioenergy sliders (Chikofsky 2021) and has a wider applicability. Whereas fuel tax is applied to the production of fossil fuels only, (Chikofsky 2021) and is mostly targeted towards the transportation sector. However, the aim of the two

[1] There is a non-market mechanism for carbon emissions reduction, such as command and control, and another market mechanism, such as carbon offsets. Command and control refer to the environmental laws and regulations a local or state government creates to control carbon emissions. A carbon offset is a strategy applied by industries or individuals when they continue their carbon emissions but provide finance to protect nature in another region, like, for example, protecting a forest that would capture carbon (Native, n.d.).

pricing mechanisms is similar. They aim to increase the price of fossil fuel energy to reduce their consumption.

Economists and scholars argue that the carbon tax is a more effective policy compared to the other ones in terms of the low-carbon transformation of the entire society (van den Bergh and Botzen 2020). Since all individuals, producers, and businesses are taxed for CO2 emissions, intersectoral carbon leakage is not possible within a carbon tax structure (van den Bergh and Botzen 2020). Since the price of high-carbon products will increase with a carbon tax, everyone will have less incentive to buy them and switch their interest to low-carbon products, which will be low cost too (van den Bergh and Botzen 2020). However, in a cap and trade or carbon trading system, the target is only the industries and businesses (often large emitters), and all sectors, including individuals, do not get covered in such a system. In the fuel tax system, it is argued that the price increase of fuel may not be very effective in reducing its usage for drivers or travelers because they may not have any alternative option (Baxandall 2019).

Both carbon taxes and cap and trade would make industries and businesses pay more for energy and would encourage them to switch to renewable sources of energy. Nevertheless, a carbon tax faces the criticism that it would not be able to bring the desired outcome if there is not an adequate supply of renewable sources of energy. Rather, it would adversely impact low-income or medium-income people and their consumption, cost of life, and or their income. It may create unemployment, too, and thus, it is unfavorable to individuals (Islam 2022). Small businesses will face economic hardship for paying higher energy costs (Islam 2022). The big industries would incur more profit loss without being able to switch to renewables (Driscoll 2021). Industries may lose comparative advantage too (Driscoll 2021). They may decide to move their business to a place where carbon emissions are not taxed (Driscoll 2021). A carbon tax is

criticized for having political opposition and resistance from the industries and the public too. The adverse economic impacts on the individuals are not there in a cap and trade or carbon trading system where businesses have the flexibility to trade their permits and governments gradually can limit the permits to reduce carbon emissions. However, in a carbon trading system, there is the risk of losing comparative advantage, profit loss, and difficulty changing to renewable sources of energy, and there is a possibility of facing opposition from businesses too.

Table 2:Comparative advantage of carbon taxes

	Price of energy	**Carbon emissions**	**Effects on industries**	**Effects on low-income groups**	**Comparative advantage**
Carbon tax	Increases	Does not have a fixed target	Small industries will pay more for energy consumption and may encounter a loss.	They will face economic hardship due to carbon taxes, and the cost of living will increase, which may cause job loss.	Targets the big carbon emitters. Creates opportunities for revenue recycling and tax redistribution.
Carbon trading mechanisms	Increases	Sets a fixed target	Small industries will pay more for energy consumption and may encounter a loss.	Cap and trade is applied to industries and not to individual people.	Targets reduction of the total CO2 emissions.
Fuel tax	Increases	Does not have a fixed target	Small industries will pay more for energy consumption and may encounter a loss.	Fuel prices will increase, and this may affect living costs.	Targets reduce the fuel consumption of all individuals because of increased fuel prices.

A carbon tax is easier to implement using the existing tax administration of a country, whereas cap and trade needs a new administrative set-up. It creates opportunities for the redistribution of taxes; for example, a carbon tax can be introduced while reducing income taxes, which would be helpful for low-income groups. A carbon tax also generates revenues which creates an opportunity for the government to compensate the affected population as well as to invest in renewable energy production (van den Bergh and Botzen 2020). Therefore, it remains a question of which pricing mechanism is better than the other and under what conditions states choose one over the other or choose both policies. Many European countries applied both carbon taxes and cap and trade, known as the Emissions Trading Scheme (ETS) together.

Researchers have so far treated carbon taxes and cap and trade systems (ETS) as subsets of a broader term, carbon pricing mechanisms, saying that they both are carbon pricing policies to internalize the cost of carbon emissions. With these pricing policies, governments put a price on carbon emissions to correct market failure and externality. My research will treat carbon taxes alone and focus on why and when states choose to adopt carbon taxes over the other pricing mechanisms. Two rationales are behind this research objective. First, the adoption of carbon taxes is an unlikely option compared to other options because of its adverse impact on low-income groups and small businesses and the resistance against any form of new taxes in general from the public and the industries. Despite it being an unlikely option, 28 nations adopted carbon taxes and it would be worth knowing why. Second, many European countries adopted carbon taxes unilaterally in the early 1990s before the EU decision to have an ETS was adopted in 2005. It would be worth investigating why they chose to have carbon taxes. This is the reason this research will be conducted on 28 countries that have carbon taxes and exclude those countries that have ETS or fuel taxes but no carbon taxes.

The chapter is organized in the following way: first, I have identified the political factors that influence the adoption of carbon taxes from the literature. Second, I have identified the economic factors from the literature that influence the adoption of carbon taxes. Third, I have discussed the main focus of my research, which factors are relevant for me to examine based on the literature review, and what would be the key hypotheses.

The influence of political variables in the adoption of carbon taxes

The degree of democracy

Many scholars have researched the influence of the degree of democracy in the adoption of climate change policies and the outcomes of these policies and found a strong connection between them (Bättig and Bernauer 2009; Bernauer and Koubi 2009; Böhmelt, Böker, and Ward 2016; Clulow 2019; Fredriksson et al. 2005; Fredriksson and Wollscheid 2007). According to their research, certain conditions make democracies more likely to formulate and implement climate change policies and attain improvement in environmental and climate performance. One major argument is that democracy ensures inclusivity, participation, and representation of the population in policymaking (Böhmelt, Böker, and Ward 2016; Clulow 2019). There is greater scope for public debates and discussions, litigations for environmental actions, consultations with stakeholders and local communities, participation of environmental actors, and inclusion of expert opinion on necessary and appropriate policy action, etc., in democracies compared to autocracies (Clulow 2019). In addition, the national electoral politics in democracies make political leaders address environmental problems that the electorates would consider as important and also hold them accountable for carrying out the policies (Bättig and Bernauer 2009; Bernauer and Koubi 2009; Fredriksson et al. 2005). In democracies, governments are compelled to provide public goods and services to gain public support to win future elections (Bernauer

and Koubi 2009). Taking actions for the environment and climate change including CO2 emissions reduction policies are part of those public goods that democratic governments often need to take care of (Bernauer and Koubi 2009). A high level of participation of the electorates creates pressure and competition among the leaders to promise more public goods and increases the likelihood of addressing environmental problems and formulating stricter environmental policies (Fredriksson et al. 2005). Some researchers applied these reasonings in their research on the adoption of a carbon pricing policy and they argued that democracies are more likely to adopt carbon pricing mechanisms (Geoffroy Dolphin, Pollitt, and Newbery 2019; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021) and more stringent climate change regulations than autocracies (Geoffroy Dolphin, Pollitt, and Newbery 2019).

Another logic for democracies being more suitable for having climate change policies is that democracies reflect public opinion. People exercise more civil liberties, such as the freedom of expression, association, assembly, protection from the government's use of force against them, and independent media in democracies than in autocracies (Bernauer and Koubi 2009; Böhmelt, Böker, and Ward 2016). People are allowed to be more expressive about their socio-economic development and the improvement of the environment in democracies. Here again, scholars researching carbon pricing argued that there is a significant difference between democracies and autocracies in their decision-making, and public opinion is reflected in democracies in a way that makes it easier to have a carbon price (Geoffroy Dolphin, Pollitt, and Newbery 2019; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). All the factors within a democracy, media, freedom of speech, activism, electoral politics, public opinion, etc., have a positive cumulative impact on creating a support base for a carbon tax and finally implementation of a carbon tax policy (Steinebach, Fernández-i-Marín, and Aschenbrenner

2021). Democracies cooperate with other states in international institutions and enter into climate treaties (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). In addition, if there is a tradition of policymaking based upon consensus or neo-corporatism, taking up everyone's opinion from all political parties, businesses, labor unions, and interest groups, then there is a possibility of adopting a carbon tax if there is strong support (Andersen 2019).

The findings of Bernauer and Koubi (2009) reveal that higher levels of democracy improve air quality in nations. Similarly, Clulow (2019) found that significant reductions in carbon emissions happen in democracies. Dolphin et al. (2019) and Steinebach et al. (2021) found in their research that democracy positively impacts the adoption of carbon pricing policies. Dolphin et al. (2019) further revealed that democracies also adopt more stringent or stronger carbon pricing policies than others. In addition, Bättig and Bernauer (2009) found in their research that democracies have more political commitments toward climate change actions, though the influence of democracy on the reduction of carbon emissions is ambiguous.

The common argument that came out of the literature is that democracy positively influences the adoption of carbon pricing policies, climate change policies, and climate performance. Drawing from these research findings, in my research I want to understand the influence of democracy on the adoption of carbon taxes. I will test the following hypothesis: *Hypothesis 1: The greater the level of democracy, the more likely that a state would adopt a carbon tax.*

<u>The debate over the parliamentary versus a presidential form of government</u>

Researchers worked on how parliamentary and presidential forms of government deal with environmental problems, including climate change problems (Bernauer and Koubi 2009; Bueno de Mesquita, et al. 2005; Persson, Roland, and Tabellini 2000). Two opposing viewpoints

have developed from this research. One view is that parliamentary systems have more legislative cohesion than presidential systems because parliamentary systems have less separation of power between the executive and the legislature, as the prime minister is appointed by the governing coalition or the majority party of the legislature (Dolsak 2001; Persson, Roland, and Tabellini 2000). Legislative cohesion is a form of disciplined voting where members of a governing coalition are forced to take a common stance on the agenda and vote in favor of that together; otherwise, they would face large political losses and even risk breaking up and stepping down from the government (Persson, Roland, and Tabellini 2000). In the parliamentary system, a government needs majority support in the legislature always to remain in power; otherwise, it may face a non-confidence vote (Persson, Roland, and Tabellini 2000). Therefore, the structure of a parliamentary system of government forces governing coalitions to have legislative cohesion on every agenda and pass legislation together. It is also argued that the parliamentary forms of government create more scope for environmental and climate policymaking, including imposing new taxes (Dolsak 2001; Persson, Roland, and Tabellini 2000). It is also argued that parliamentary governments allocate more money to public goods and services because they want to address the needs of the majority, and this creates more opportunities for environmental and climate change policymaking (Dolsak 2001; Persson, Roland, and Tabellini 2000).

In the presidential system, there is more separation of power between the executive and the legislature, and there is no non-confidence vote. There are fewer incentives for having legislative cohesion or disciplined voting in the presidential system. This also makes the passing of government agenda from the legislature a little more difficult, especially passing bills on environmental or climate change regulation, energy policy, or any imposition of taxes is more difficult in the presidential system than the parliamentary system (Dolsak 2001; Persson, Roland,

and Tabellini 2000) because the legislators and the government remain accountable to the voters directly and separately, and the two branches are not held accountable by each other (Persson, Roland, and Tabellini 2000).

Smaller political parties, such as the Green parties and others can share their environmental concerns in a parliamentary system (Andersen 2019). Usually, the larger political parties take up the ideas of the smaller political parties regarding carbon taxes (Andersen 2019). When British Columbia of Canada adopted a carbon tax, there were only two political parties: the Liberal Democratic Party and the Social Democratic Party (Harrison 2013). The Social Democrats had a pro-climate agenda and support for a carbon tax (Harrison 2013). In 2006, the Liberal Democratic Party took up the climate change agenda so that they could gain the popularity and voter support of the Social Democrats and won the election of 2007 and then implemented a carbon tax (Harrison 2013).

Contrary to the above arguments, Bernauer and Koubi (2009) found in their study that the presidential systems in democracies are significantly correlated with the improvement of air quality. They argued, like Bueno de Mesquita et al. (2005), that presidents have large winning coalitions and they have to take into account the interests of large numbers of voters and constituents (Bernauer and Koubi 2009; Bueno de Mesquita, et al. 2005). Presidents promise more public goods to their voters (Bernauer and Koubi 2009; Bueno de Mesquita, et al. 2005). Therefore, the presidential system is more effective in enhancing air quality than the parliamentary system.

Skovgaard et al. (2019) examined the influence of the parliamentary system in adopting carbon taxes. They found that - parliamentary, presidential, different government compositions based on ideological differences, democracies, and non-democracies - everyone adopted carbon

pricing policies. Therefore, they concluded that political-institutional factors have less impact on the decision of carbon pricing policies (Skovgaard, Ferrari, and Knaggård 2019). However, they noted that the government composition mattered in some adopters of carbon pricing systems in Europe. For example, from 1990 to 2006, the left or green parties led governments in Europe, and after 2005, some parliamentary governments in developed countries adopted carbon pricing policies (Skovgaard, Ferrari, and Knaggård 2019).

The debate on the influence of parliamentary versus presidential forms of government on the adoption of climate policies, and performance enhancement are still inconclusive. I want to know how the parliamentary system of government would impact the adoption of carbon taxes and whether or not the arguments about the positive impacts of the parliamentary system of government on climate policymaking and carbon pricing policy can explain the adoption of carbon taxes. My hypothesis is:

Hypothesis 2: States with parliamentary systems are more likely to adopt carbon taxes than states with presidential systems.

Proportional representation

In a proportional electoral system, legislative positions are allocated according to the percentage of votes that each political party receives in an election (Fredriksson and Millimet 2004b; Parsons 2016). A fixed minimum level of percentage of votes is usually required for each party in such a system to be able to ensure representation in the legislature (Fredriksson and Millimet 2004b). The proportional representation system ensures the presence of many small political parties who otherwise would not have been able to win any seats from their constituencies if direct elections had happened (Fredriksson and Millimet 2004b). It ensures diversity and inclusivity in the legislature. Whereas in a majoritarian electoral system, the

representatives of each political party would need majority votes from each of their districts or constituencies to win seats in the legislature. The party that wins the majority of the districts would secure power. The politics in the majoritarian system culminates around local issues and interests rather than national and global issues (Fredriksson and Millimet 2004b). This is the reason environmental, climate change, and carbon emissions policy issues remain off the table in the majoritarian electoral system. Whereas in the proportional system, all the political parties get representation in the legislature according to the total votes they receive in a particular election, and this enables the representatives to address national and global policy issues such as climate change and carbon reduction (Fredriksson and Millimet 2004b).

Andersen (2019) found that small countries in Europe were able to adopt carbon taxes because they had proportional representation systems that allowed the green perspective to enter the policymaking level (Andersen 2019). They noted that large political parties were informed about the carbon taxes and carbon reduction policies by the small parties in proportional systems, and the large parties incorporated the agenda in their political goals. Fredriksson and Millimet (2004) found in their research that stricter environmental policies are generated in proportional electoral systems (Fredriksson and Millimet 2004b).

Contrary to these findings, Clulow (2019) found that majoritarian-presidential systems create more barriers to carbon emissions and reduce them, whereas proportional-parliamentary systems increase carbon emissions (Clulow 2019).

Since I would examine the influence of political-institutional factors in the adoption of carbon taxes, I would like to know the influence of proportional representation in the adoption of carbon taxes given these conflicting findings within this small literature. My hypothesis is:

Hypothesis 3: States with proportional systems are more likely to adopt carbon taxes than states with majoritarian or other electoral systems.

The strength of the progressive political parties in decision-making

Scholars have researched the impact of left political parties or green parties with progressive ideologies on the adoption of environmental policies and carbon tax policies (Andersen 2019; Driscoll 2021; Garmann 2014; Knill, Debus, and Heichel 2010; Neumayer 2004; Skovgaard, Ferrari, and Knaggård 2019). Several authors have studied the impact of the strength of green or left parties on the environmental performance of nations (Jahn 1998; King and Borchardt 1994; Neumayer 2003). They argued that compared to the right political parties, the left political parties are more supportive of progressive ideas, and they support the adoption of climate change policies, including carbon taxes, and they move forward with these policies when they have more seats in the parliament, or they have a share in the government. The green political parties also work as libertarians, and they hold even more progressive ideas than the traditional left political parties (Knill, Debus, and Heichel 2010). The green political parties support the enhancement of human rights and environmental protections and regulations, and often, they are the catalyst for adopting policies of progressive ideas (Knill, Debus, and Heichel 2010).

Knill et al. (2010) found in their study that left parties adopted more environmental policies and regulations than right parties. Similarly, Garmann (2014) found that compared to the right parties, the left-wing parties have more influence on the adoption of carbon emissions reduction policies. Neumayer (2004) studied the election manifestos of all political parties from 25 countries between 1945 and 1998 and found that left political parties were more pro-environment than others. He argued that the left parties wanted more government intervention

and wanted to make the industry owners liable for environmental and climate degradation and pay a price. In addition, the left parties supported more welfare goods and services for the working class because amongst suffered more from pollution and paying for the externalities was severe on them, too (Neumayer 2004).

Jahn (1998) found that increased electoral strength of green political parties, social democrats, or left parties positively influences the creation of environmental regimes and increases environmental performance. King and Borchard (1994) and Neumayer (2003) researched how the increased electoral strength of the green libertarian parties or their share in power resulted in or impacted pollution control. King and Borchard (1994) found a negative relationship between left-party strength and per capita air pollution, while Neumayer (2003) found a strong connection between increased strength of the green/libertarian left parties in the legislature and lowered levels of air pollution among 21 OECD countries. Mourao (2019) has found exactly similar results in his research and argued that there is a strong negative correlation between shares of seats of the green parties in the legislature and the levels of various air pollutants like CO2, N2O, SO2, CH4, and GHG (Mourao 2019).

Several researchers of carbon taxes argued that the power of the left or green political parties in the legislature determines whether they would be able to influence the decision to adopt carbon taxes (Andersen 2019; Driscoll 2021; Skovgaard, Ferrari, and Knaggård 2019). Finland and Ireland are two examples where green political parties were the drivers of the adoption of carbon taxes (Andersen 2019). However, Driscoll (2021) did not find any significant association between the left party's strength and the adoption of carbon pricing policies among advanced economies. Skovgaard et al. (2019) also did not find a strong association between left-party or green-party strength and the adoption of carbon pricing but noted that they had a strong

influence on the adoption of carbon pricing in some developed countries, if not all. In addition, Scruggs (1999) did not find any evidence to support the argument that the left party has more role in environmental policymaking than the right parties (L. A. Scruggs 1999).

Since there are debates on the influence of left parties and green parties on the adoption of climate policies and carbon taxes, it would be very interesting to test the following hypothesis:[2]

Hypothesis 4: The greater the share of the political power of the left or green political parties in the legislature or the government, the more likely the state would adopt carbon taxes.

Leadership role in climate policymaking

One of the theories in the literature of drivers of climate change policy is the ambition for international leadership and enhancement of image in international forums. The theory is applied to explain not only the role of individuals in climate change policymaking but also the role of states, NGOs or non-state actors, epistemic communities, and international organizations in climate policy formulation (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019). The theory argues that sometimes the main motivation in the formulation of climate change policy remains to be a climate leader or a pioneer in the policymaking for an individual (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019). Leaders want to create followers by setting new standards of behavior or by following old standards (Wurzel, Liefferink, and Torney 2019). Whereas pioneers do not seek followers but they want to discover and implement a new policy to test for the first time(Wurzel, Liefferink, and Torney 2019).

[2] I am doing a cross-country quantitative analysis on the influence of political institutional variables on the adoption of carbon taxes. The influence of green or left parties on the adoption of carbon taxes would require a time series data analysis and a different quantitative model, and therefore, I do not test this hypothesis here.

Scholars identified four different types of leadership in climate policymaking: structural, entrepreneurial, cognitive, and exemplary leadership (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019).

Structural leadership refers to the ability and ambition of a country to use its military and economic power to influence the international structure in a way that would make other countries follow its rules (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019). In climate change policy-making or pioneering, structural leadership is viewed as an important factor, especially in the case of the EU or the US (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019). Cognitive leadership means climate leadership through ideational and norm-setting activity (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019). Scholars argue that individuals, countries, NGOs, international organizations, and even activist groups often work as agenda setters, pioneers, and leaders by introducing new norms regarding climate change, and they disseminate their ideas regarding new climate policies to other countries (Finnemore and Sikkink 1998; Gilardi 2016; Oberthür and Dupont 2021; Thisted and Thisted 2020; Wurzel, Liefferink, and Torney 2019). The third category of leadership is the entrepreneurial one and this happens when countries contribute to climate policies through negotiation and diplomacy (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019). The last category is exemplary leadership and this happens when countries set national goals, laws, and targets to address climate change problems and by setting good examples they try to make others follow them (Oberthür and Dupont 2021; Wurzel, Liefferink, and Torney 2019).

All these categories of leadership roles can be influential factors in introducing carbon taxes. Especially, the pioneering and structural leadership roles fits with the first adopters of

carbon taxes of the 1990s in Europe. All these categories can be explored more in the case studies of my research to assess whether or not they can explain the adoption of carbon taxes.

Hypothesis 5: The more a state is ambitious to have a climate leadership role, the more likely it is to adopt a carbon tax.

The influence of economic factors on the adoption of carbon taxes

Economic development

There is extensive literature on the positive relationship between economic development and climate change policy adoption. Scholars argue that higher economic development increases the likelihood of adopting a climate change policy. I shall be applying this argument in the case of the adoption of a carbon tax policy, too, because this policy falls within the purview of a climate change policy. Scholars who have worked on carbon tax policy adoption, such as Dolphin et al. (2019), Levi et al. (2019), Skovgaard et al. (2019), and Steinebach et al. (2021), applied the theory to explain the adoption of carbon pricing policies.

In 1991, Grossman and Krueger introduced the theory of the Environmental Kuznets Curve (EKC) that applied the Kuznets Curve developed by Simon Kuznets (1955) about the growth of income and inequality. Simon Kuznets observed that there is an inverted U-shaped curve in the relationship between the growth of income and inequality in society. Grossman and Krueger (1991) observed that a similar inverted U-shaped curve exists between the growth of per capita income and environmental degradation, which is known as the environmental Kuznets curve (EKC). Many other scholars, , have studied this relationship later and added their findings to the theory of EKC (Clulow 2018; Galeotti and Lanza 1999; Kaika and Zervas 2013; Lieb 2003; Magnani 2001; Martínez-Zarzoso and Bengochea-Morancho 2004; Panayotou 1997; Poudel, Paudel, and Bhattarai 2009; Shafik 1994).

The theory says that with an increase in per capita income, there is an increase in environmental degradation initially (Clulow 2018; Galeotti and Lanza 1999; Kaika and Zervas 2013; Lieb 2003; Magnani 2001; Martínez-Zarzoso and Bengochea-Morancho 2004; Panayotou 1997; Poudel, Paudel, and Bhattarai 2009; Shafik 1994). As a country progresses towards economic growth, its industries need to use more natural resources and burn fossil fuels for energy. Therefore, as a country experiences economic growth, its per capita income increases, and so does its amount of pollution and environmental degradation. Scholars argue that when a country becomes sufficiently wealthy, however, the public increasingly demands that environmental degradation and pollution decrease (Clulow 2018; Galeotti and Lanza 1999; Kaika and Zervas 2013; Lieb 2003; Magnani 2001; Martínez-Zarzoso and Bengochea-Morancho 2004; Panayotou 1997; Poudel, Paudel, and Bhattarai 2009; Shafik 1994). When people become wealthier, they worry less about basic needs and more about attaining a better life. The environment is part of a better life, and they become more interested in investing in the environment. Economically wealthy and high-income countries have more capacity too to invest more for the betterment of the quality of the environment and mitigate problems such as climate change. Wealthy countries also have access to better technologies to reduce pollution and CO2 emissions. Therefore, an increase in per capita income and economic growth decreases environmental degradation and pollution after a certain period when a country becomes wealthy enough to do so (Clulow 2018; Galeotti and Lanza 1999; Kaika and Zervas 2013; Lieb 2003; Magnani 2001; Martínez-Zarzoso and Bengochea-Morancho 2004; Panayotou 1997; Poudel, Paudel, and Bhattarai 2009; Shafik 1994).

In addition, EKC scholars found that economic richness does not automatically bring better environmental quality. It happens when governments take strict policies to mitigate

environmental degradation (Panayotou, 1997); Magnani, 2001). EKC does not stand alone. They say, there has to be some policy intervention (Panayotou, 1997; Magnani, 2001). Economic richness increases the likelihood of such policy intervention. Scholars found a similar inverted U-shaped curve in the relationship between CO2 emissions and GDP per capita income.

The findings of the research on carbon pricing show conflicting results about the influence of GDP per capita income on the adoption of carbon prices. Steinebach et al. (2021) found a significant positive correlation between higher levels of income and the adoption of carbon pricing policies. However, Levi et al. (2019) found that GDP per capita does not explain higher carbon prices, and in some of the quantitative model specifications, they are negatively correlated. Dolphin et al. (2019) found that GDP per capita has positive correlations with the adoption of carbon prices at the national level, though the results are statistically insignificant, and at the subnational level, GDP per capita is strongly positively correlated with the adoption of carbon pricing mechanisms.

The conflicting findings within these small numbers of literature on the adoption of carbon prices make it necessary to look at the impact of GDP per capita or economic development on the adoption of carbon taxes. I will test the following hypothesis in the quantitative study:

Hypothesis 6: The higher the GDP per capita income (a proxy for the economic development of a state), the more likely that the state would adopt a carbon tax.

Carbon intensity

Carbon intensity is carbon emissions per unit of GDP, or unit of energy consumption produced by per unit of economic activity (EarthShift Global, n.d.). It indicates how efficient the economy of a nation is in terms of carbon emissions. Higher carbon intensity indicates

inefficiency and the need for policy action. Carbon intensity shows how each sector of the economy is emitting carbon by each unit of their economic activity and therefore, can indicate the dependency of the economy, the industries, and the people involved in those sectors. It is different from the total amount of carbon emissions that include all direct and indirect forms of carbon emissions by all industries and individuals (Sullivan 2024). Carbon intensity allows us to compare the carbon emissions efficiency across different economic sectors. It helps us understand the trade-off between economic output and carbon emission reduction. Therefore, it is assumed by scholars that carbon intensity is a measure by which we would understand the resistance against carbon reduction policies or actions. Skovgaard et al. (2019) measured the carbon intensity of a country using six variables: carbon emissions per capita, carbon emissions per GDP, carbon emissions by industry and construction, total energy consumption, and oil rents in GDP. Skovgaard et al. (2019) assumed that high carbon intensity would face opposition to carbon pricing initiatives from the industries and the people. Similarly, Dolphin et al. (2019) and Steinebach et al. (2021) measured the influence of CO2 emissions per capita on the adoption of carbon pricing policies with the assumption that nations with high CO2 emissions per capita would not be willing to have carbon pricing policies because there is an economic cost attached to it.

In terms of research findings, Skovgaard et al. (2019) reported that they could not find any negative correlations between the six variables they used to measure carbon intensity and the adoption of carbon pricing policies. Steinebach et al. (2021) found that high CO2 emissions per capita have positive correlations with the adoption of carbon pricing policies. Likewise, Dolphin found that national jurisdictions with high Co2 emissions per capita have positive correlations

with the adoption of carbon prices, and subnational jurisdictions with high CO2 emissions per capita do not.

The conflicting findings about the impact of higher levels of carbon intensity on the adoption of carbon pricing policies within this small number of the literature again make it important for me to explore this variable's impact on the adoption of carbon taxes. Given that a high carbon intensity creates a tradeoff between economic output and carbon reduction, and where industry and individuals have to bear an economic cost for adopting carbon taxes, carbon taxes become a less likely option. I would like to test the following hypothesis in my quantitative study.

Hypothesis 7: The higher the level of CO2 emissions per GDP, the less likely is the adoption of carbon taxes.

Strength of corporate opposition

The fossil fuel industries are very powerful in some countries and can block the adoption of carbon taxes (Driscoll 2021; Levi, Flachsland, and Jakob 2020; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). They manipulate policy formulation by using the political leaders or employees of government agencies(Driscoll 2021). Researchers have found that the fossil fuel industries made monetary investments in publishing research works during the 1980s and 1990s to make false claims that climate change is not real or unimportant (Driscoll 2021). Many people, including powerful political parties and leaders, formed climate denial beliefs and consciously performed activism against any climate change policy formation, including carbon taxes. Thousands of climate skeptics exist at present around the world who support the vested interests of the fossil fuel industries that want to keep the current production systems to maximize profit unhindered (Driscoll 2021).

The countries that are adopting carbon taxes have less powerful fossil fuel industries. For example, Harrison (2013) noted that in the Canadian province of British Columbia, the business community agreed with the liberal democratic government that they would not have any objection to carbon taxes if they were revenue-neutral and had flat rates (Harrison 2013). This agreement would not have been possible there if the fossil industry were too strong. Since the literature on the adoption of carbon taxes is still in the making, it would be worth exploring the role that the corporate sector plays in the adoption of carbon taxes. The following is the hypothesis:

Hypothesis 8: The weaker the corporate opposition, the more likely it is that a state would adopt a carbon tax.

I shall be looking at the influence of this variable in the case studies. In the quantitative study, I shall be looking at the influence of the political-institutional factors on carbon adoption.

Vulnerability to climate change

Vulnerability assessments are considered as a very important step in formulating a climate change policy because they inform governments and the population about environmental or climate change risks. These reports highlight climate change issues, such as sea level rise, extreme weather events, floods or draughts, etc. Different geographical regions are facing different kinds of climate and environmental crises. Several regions experience more severe climate change impacts than others, and populations face grave threats to their lives. Zahran et al. (2006) researched on how climate change policies get public support. The authors argued that when climate change produces physical threats to the population, the high level of vulnerability drives people toward stronger climate change policies (Zahran et al. 2006). However, they

argued that it all depends on how the risks are perceived by the population, and that would determine their action.

Levy et al. (2020) and Steinebach et al. (2021) argued that countries facing high levels of climate change problems have an incentive to adopt carbon pricing policies, including a carbon tax, as they would benefit from spending on climate change mitigation policies. With the increased temperature of the earth, there are extensive amounts of flooding, desertification, increased cyclones, water scarcity, and droughts that are making large segments of populations lose their jobs and causing large displacements in many regions of the world. Some countries are facing climate change problems more than others, and the higher levels of such vulnerability drive those countries to adopt stricter policies like carbon taxes. Levy et al. (2020) found very strong correlations between "public belief" in human-caused climate change and the adoption of carbon pricing policies (Levi, Flachsland, and Jakob 2020).

Sprinz and Vaahtoranta (1994), while explaining their interest-based theory of environmental policy-making, made three arguments: ecological vulnerability and abatement cost together form the basis of an environmental or climate change policy formulation; any such policy generates costs for the population; high levels of climate vulnerability will create urgency for climate action, but it will be made when people will have a cost-benefit analysis and when benefits will be greater than the cost (Sprinz and Vaahtoranta 1994). This theory can be useful in understanding the adoption of carbon taxes because a carbon tax is a strong and ambitious climate policy, too, and involves additional costs for the economy and individual citizens for energy use. States need economic capacity to carry out strategies to deal with ecological problems (Sprinz and Vaahtoranta 1994). In essence, a state would be willing to carry out a climate policy even with high abatement costs when it would face high ecological vulnerability

(Sprinz and Vaahtoranta 1994). Often, states encounter a question of potential comparative disadvantage if a carbon reduction policy such as a carbon tax is implemented. States also face the question of technology availability and investment in new technological innovation to implement mitigation strategies. The authors argued that in all these cases, states need to consider the level of vulnerability and the abatement cost to have an understanding of how to respond (Sprinz and Vaahtoranta 1994).

Often, the support for strong climate policies depends on the individual risk perception or how they become aware of the harmful effects of climate change problems and global temperature increase (O'Connor, Bord, and Fisher 1999). An individual can have a different perceived risk than the actual vulnerability and may support government action based on their perceived risks(O'Connor, Bord, and Fisher 1999).

Ecological vulnerability and perceived risk or awareness of vulnerability are all important and relevant variables in the decision to adopt carbon taxes as well. It would be interesting to test the following hypothesis.

Hypothesis 9: The higher the level of ecological vulnerability, the more likely that a state would adopt a carbon tax.

Learning and emulation

Scholars have explained the different processes through which learning and emulation occur during policy adoption. Researchers argue that learning and emulation take place when a country draws lessons from another country about the success or failure of a policy (Gilardi 2016; Shipan and Volden 2008; Thisted and Thisted 2020). Usually, the reports and research of the epistemic community or the academics inform the decision-makers about the effectiveness, successes, or failures of a policy then decision-makers draw lessons from them (Haas 1992;

Thisted and Thisted 2020). International organizations and international treaties often play a pioneering role in the creation and introduction of policy options (Barnett and Finnemore 2004; Haas 1992; Thisted and Thisted 2020). For example, The Kyoto Protocol of 1997 and the Paris Agreement of 2015 are largely considered a platform for the member countries to discuss and learn about policy options for reducing CO2 emissions. Scholars argue that the commitments made in these agreements made many member countries adopt national climate change legislation to reduce CO2 emissions. Learning and emulation occur within geographically proximate countries or neighboring countries (Shipan and Volden 2008; Skovgaard, Ferrari, and Knaggård 2019; Tews, Busch, and Jörgens 2003; Thisted and Thisted 2020). Policy emulation may occur between countries with close trade relations or trade interdependencies (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). There is a tendency in these situations to follow each other, learn from each other, or emulate (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). Countries sometimes follow what their trade competitors do, too (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). If a trade competitor adopts a carbon tax, it would not harm much because there would not be the disadvantage of adopting it and having an increased fuel price (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021).

Skovgaard et al. (2019), Steinebach et al. (2021), and Thisted and Thisted (2020) investigated the influence of learning and emulation in the adoption of carbon taxes. Skovgaard et al. (2019) and Thisted and Thisted (2020) argued that there are clear geographical and wave patterns in the adoption of carbon pricing policies among states and that the patterns look like diffusion of carbon pricing policy occurred. Thisted and Thisted (2020) identified two waves of diffusion of carbon pricing policy adoption with an intermission period between the two waves. The first wave started with the early adoption among the Nordic countries in 1990 and ended in

2000 (Skovgaard, Ferrari, and Knaggård 2019; Thisted and Thisted 2020). The second wave started in 2008 and ended in 2019 (Skovgaard, Ferrari, and Knaggård 2019; Thisted and Thisted 2020). Skovgaard et al. (2019) noted that during the second wave, Latin American countries mostly adopted carbon pricing policies. Thisted and Thisted (2020) argued that learning about carbon taxes during the 1980s and 1990 from international organizations and UN conferences resulted in the adoption of carbon taxes by several European countries in the 1990s. Skovgaard et al. (2019) argued that during the second wave of adoptions, the enforcement of the Kyoto Protocol, the 2009 Copenhagen, and 2015 Paris Climate Conferences played a significant role in the diffusion of carbon pricing policies.

This discussion about the diffusion of carbon pricing policies and specifically understanding whether or not diffusion of carbon pricing policies occurred is a very necessary and relevant topic for research. However, in my dissertation, I am not going to study this particular aspect of the literature. I will not research this topic because of time constraints and because the topic needs separate or different methodological applications.

Conclusion

This research aims to contribute to the existing literature by providing a better and more comprehensive understanding of the adoption of carbon taxes. This will focus on answering two questions: a) what factors make some states more likely than others to adopt carbon taxes, and b) what factors lead a state to adopt a carbon tax at a particular point in time? The literature on the determinants of carbon taxes is limited in numbers and tends to focus more on the first one and less on the second one. The literature review showed that there are conflicting findings about the influence of several predictors in the literature, which has led to inconclusive arguments and indicates that there is a need for more research on the topic. In addition, scholars have identified

several determinants of carbon taxes and carbon trading mechanisms jointly termed carbon pricing mechanisms. I would research the determinants of carbon taxes separately because it is a policy that stands as an individual choice of nations and has variation in that choice. I will also attempt to test the hypotheses formulated in this chapter based on the literature review to answer the inconclusive and conflicting findings of the existing literature. The research will be divided into two segments, one to capture across-country variation about the adoption of carbon taxes using quantitative methods and another on case studies using qualitative methods to understand which conditions led to the adoption of carbon taxes at a particular time. The quantitative study will give insight into discovering patterns of what makes countries adopt carbon taxes and the case studies will give insight into the details of the conditions of that particular time that made the countries adopt carbon taxes when they did.

Chapter 3: A cross-country analysis of the determinants of carbon tax policy

Introduction

Do political institutional factors, such as the level of democracy, type of government, and forms of electoral systems, affect a state's decision to adopt a carbon tax? Climate change mitigation policies exhibit considerable variation across states. Some states have chosen more robust policy measures, while others have made fewer, less stringent policies. Those who have adopted climate change policies have a wide range of strategies to reduce carbon emissions, including carbon taxes, cap and trade systems, fuel taxes, regulations, and technological improvements. The aim of having carbon taxes is to reduce fossil fuel consumption by increasing the price of fossil fuels and to incentivize the production and consumption of cleaner and more sustainable energy resources. Only 28 countries around the world have adopted and maintained carbon taxes between 1990 and 2022 (World Bank 2023).[3] Scholars have identified several political and economic factors that have influenced the decision of carbon pricing policies that comprise the carbon trading mechanisms and the carbon taxes. Political considerations of having carbon taxes include the characteristics of the political institutions of the state, the lobby from the green or left parties, the activism of environmental groups, or the commitments in international treaties and organizations (Driscoll 2021; Skovgaard, Ferrari, and Knaggård 2019; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). Scholars also have identified several economic factors that may influence the adoption of a carbon price, for example, the level of economic

[3] Australia adopted a carbon tax in 2012 and repealed it in 2014 Therefore, I exclude Australia from all the analyses in this chapter. In a subsequent chapter, I study the Australian case precisely because of the adoption and subsequent repeal of carbon taxes which helps clarify the influence of the independent variable that I study here. The data for carbon taxes are available at: https://carbonpricingdashboard.worldbank.org/compliance/instrument-detail (Crowley 2017).

growth or income of the state, the level of carbon intensity, the oil industry lobby, the level of fossil fuel consumption, trade competition and interdependencies, fiscal crisis, etc. (Driscoll 2021; Skovgaard, Ferrari, and Knaggård 2019; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). Some of the factors are discussed in chapter 2. My aim in this chapter is to understand why some countries have chosen carbon taxes as their strategy instead of having other strategies to reduce carbon emissions and I aim to specifically delve into the relationship between political institutions and the adoption of carbon taxes in search of a pattern of behavior among states regarding their decision to carbon taxes.

One may wonder how political institutional factors, such as the level of democracy, type of government, and type of electoral systems, are connected to the adoption of a carbon tax and how would they influence a state's decision for climate change actions. The main connection is that the political institutions represent the decision-making structures of a nation that are responsible for formulating any climate action. One rationale for this research is that there is a visible connection between the adoption of carbon taxes and the political-institutional factors, such as democracy, type of government, and type of electoral system. Democracies, having inclusive representation, accountability, and freedom of expression, allow climate change and carbon taxes to be discussed and debated among the public, experts, civil society, activists, legislators, and political leaders. This might materialize into a carbon tax policy. Parliamentary systems might allow greater legislative cohesion where climate change actions can be addressed. Presidential systems might allow a leadership who is devoted to climate change actions and would direct the executive body towards carbon taxes. The proportional system allows diverse political parties to be able to secure their representation in the legislature and might enable policymaking that is more reflective of the perception of the section of the population who wants

strong climate change actions like carbon taxes. Therefore, my objective in this chapter is to understand how the time-invariant political institutional factors namely, the level of democracy, the type of government (parliamentary or presidential or other), and the type of electoral system (proportional or majoritarian or other), influence the decisions on carbon taxes across all countries.

A second rationale for this research measuring the influence of political-institutional factors on the adoption of carbon taxes is the previous scholarly research findings that indicate a correlation between political institutional factors and climate policies and the enhancement of climate performance (Bättig and Bernauer 2009; Bernauer and Koubi 2009; Fredriksson et al. 2005; Fredriksson and Millimet 2004b; 2004a; Lachapelle and Paterson 2013), as well as the adoption of carbon pricing policies (Driscoll 2021; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). I investigate whether those findings apply to the adoption of carbon taxes.

The literature on the drivers of carbon pricing is small and the findings are not uniform. Skovgaard et al. (2019) found weak correlations between the political institutional variables and the decision of carbon pricing. They argued that both presidential and parliamentary systems have adopted carbon pricing, and so have both democratic and autocratic countries and left and right-wing governments. The authors noted that the left-wing parties were predominantly the crafters of the early adoption of carbon taxes in Europe though. In contrast to Skovgaard et al.'s (2019) findings, Steinebach et al. (2021) found that democracies have a strong correlation with the adoption of carbon prices. Other scholars found that the parliamentary system of government is more likely to have environmental taxes than a presidential system of government (Fredriksson and Millimet 2004a; L. Scruggs 2003). Driscoll (2021) found that fossil fuel energy consumption and presidentialism, federalism, bicameralism, single-member district presence,

referenda, and judicial review have strong negative correlations with the adoption of carbon pricing (Driscoll, 2021, p.5). It is, therefore, worth conducting more research to understand whether the political-institutional characteristics of a state influence a state's adoption of carbon taxes.

There are notable research findings about the impact of political institutional variables on the adoption of climate change action and the betterment of environmental performance. For example, the research findings of Battig and Bernauer (2009) revealed that democracies impact very substantially and positively towards climate change policy outputs. The research of Bernauer and Koubi (2008) observed that the higher the level of democracy, the more likely it is to have better air quality. In addition, they found that presidential systems of governments are more likely to have better air quality than parliamentary ones and this finding confirms the findings of Persson et al. (Persson, Roland, and Tabellini 2000). Lachapelle and Paterson (2013) researched the effect of time-invariant political institutional variables on the level of CO2 emissions and the choice of climate change policies across countries. They observed that, in the post-Kyoto era, democracies were more likely compared to autocracies to have lower emissions. Contrary to Bernauer and Koubi's (2008) argument about the presidential system, Lachapelle and Paterson (2013) found that parliamentary governments compared to presidential and semi-presidential governments are more likely to have lower CO2 emissions. They further found strong correlations between democracies and five types of climate change policies: regulations, economic incentives, carbon pricing, voluntary agreements, and research and development of technologies. They argued that there is more likelihood of adopting climate change regulations and carbon pricing mechanisms among parliamentary governments. In this chapter, I want to observe whether these findings and theories hold up for the adoption of carbon taxes.

In addition to the political institutional factors, I will examine the effects of two economic factors, GDP per capita income, and CO2 emissions per GDP across different countries and their variation in the adoption of carbon taxes. These economic factors are not static in nature or time invariant, but looking at their effect on the decision of carbon taxes in different countries is important to understand the differences, trends, or patterns in the carbon tax decision making between the countries. GDP per capita income would indicate a state's capacity to bear the expense of carbon reduction actions and the CO2 emissions per GDP would indicate how much carbon is emitted by a state for each unit of economic production.

Although considerable prior work seeks to analyze climate policy generally or carbon pricing policies that include both carbon taxes and emissions trading schemes, this study focuses on the country-level factors that best explain the adoption of carbon taxes in some countries but not others. The findings of this research reinforce the findings of previous research that there is a strong positive correlation between the adoption of carbon taxes and the levels of democracy. I found that there is more likelihood of adoption of carbon taxes among liberal democracies with scores above the 50th percentile. Furthermore, not only are carbon taxes more likely to be adopted in the high liberal democracies, but also in proportional systems within those high liberal democracies. In the subsequent sections, I will discuss the theories about the impact of each of the political and economic independent variables on carbon taxes, the hypotheses, the data sources of the independent variables, the methods, the statistical models and their results, interpretation and analysis of the results, and conclusion.

Theories and hypotheses regarding political-institutional variables

Carbon taxes and other indicators of climate policy

Much of the existing literature on the drivers of carbon taxes has focused on carbon pricing mechanisms generally, not differentiating between carbon taxes and carbon trading systems. I focus here exclusively on the adoption of carbon taxes. I do so because carbon trading systems often involve agreements among multiple countries. By contrast, carbon taxes are adopted at the national level. The European Union (EU) adopted a carbon trading system as a policy requirement for the member countries to mitigate CO2 emissions in 2005, and all EU members adopted carbon trading mechanisms known as Emissions Trading System (ETS) since then. However, a lot of EU countries have carbon taxes in addition to ETS. Finland was the first country to have a carbon tax, which adopted the policy in 1990. It was well before the EU's decision to have the ETS in 2005. Even within the EU, some EU member countries adopted a carbon tax before the ETS was adopted, some adopted a carbon tax years after the ETS was adopted, and some have yet to adopt a carbon tax. In short, it is clear that whether a country adopts a carbon tax or not depends on country-level variables in a way that differs from the determinants of whether countries are part of an ETS. Thus, I investigate in this study the influence that country-level factors have on the adoption of country-level carbon taxes. Carbon taxes are an unlikely policy option for states because they are imposed on every individual, not just businesses, and they increase the price of fossil fuel which may adversely impact the economy and may incur losses for businesses as they would pay extra cost for energy. Therefore, I am researching the adoption of carbon taxes over other carbon reduction strategies to understand how this unlikely policy gets adopted in some countries. This study builds on the work of several authors that seek to explain carbon taxes, namely, Driscoll (2021), Skovgaard et

al. (2019); and Steinebach et al. (2021). I will explain the political-institutional factors here to provide an understanding of how these factors can be connected to the adoption of carbon taxes.

Level of democracy

The first variable considered to influence carbon tax adoption is the level of democracy. Scholars have argued that the electoral dynamics of democracy lead political leaders to prioritize the provision of public goods and services by increasing investment in them (Bernauer and Koubi 2009; Clulow 2019; Fredriksson and Millimet 2004b; Lachapelle and Paterson 2013). Democracy is a system of government where individuals have the freedom to choose their representatives, who, in turn, are accountable to the people. This aspect of democracy incentivizes political leaders to provide a higher level of public goods and services to the population to maintain public support and avoid the risk of losing re-election. This affects the policymakers' decision to have environmental climate change policies if the median voters consider them important. In order to fund these public goods, they may prefer to impose taxes on the public (Fredriksson and Millimet 2004a), including carbon taxes.

To implement environmental and climate change policies that benefit the public, governments often require additional sources of revenue, such as carbon taxes. In democracies, as discussed in Chapter 2, individuals have the opportunity to engage in open debates about environmental issues and potential policy solutions (Clulow 2019; Neumayer 2002). Freedom of expression in democratic societies allows the media and the general public to openly discuss, critique, and analyze environmental problems and policies (Clulow 2019; Neumayer 2002). As mentioned earlier, many studies have found that democracy plays a significant role in shaping environmental policy, promoting stricter measures, and improving environmental performance by providing a conducive environment for environmental policy formulation (Bättig and

Bernauer 2009; Bernauer and Koubi 2009; Clulow 2019; Fredriksson and Millimet 2004a; Lachapelle and Paterson 2013).

Autocracies, conversely, have a structure of governance where public opinion and public representation do not have a lot of influence on state policy. The ruler does not have any accountability to the people. Free and fair elections and a lot of civil liberties are compromised, such as freedom of expression and association, or the freedom of the press and the media. A few elites remain at the center of power in autocracies and policies are made to please the elites to keep them in power for a long time (Bernauer and Koubi 2009, 1356–57). Private goods and services are provided by the ruler to elites for their benefit so that the elites retain their support and suppress any popular demands (Bernauer and Koubi 2009, 1356–57). Without freedom of expression and association, the larger population remains disconnected from issues like climate change and environmental problems and cannot demand any policy action. Adopting carbon taxes for climate change mitigation remains a low priority for autocratic rulers because they do not help the rulers consolidate or increase their power. Carbon taxes are used to provide public goods rather than private benefits to the elites. Scholars have argued that the institutional differences between autocracies and democracies make democracies more capable and favorable for the adoption of any environmental policies (Bättig and Bernauer 2009; Bernauer and Koubi 2009; Clulow 2019; Lachapelle and Paterson 2013). The literature on the drivers of carbon pricing has incorporated political democracy in predicting carbon pricing policy and found strong correlations between democracies and the adoption of carbon prices (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). Therefore, in this chapter, I am going to look at how the level of democracy affects the adoption of carbon taxes.

Hypothesis 1: The greater the level of democracy, the more likely that a state would adopt a carbon tax.

Parliamentary system of government

The second explanatory variable for understanding the adoption of carbon taxes here is the parliamentary and presidential systems of government. Here I will discuss how the arguments about parliamentary and presidential systems of government can be applied to understand the adoption of carbon taxes. Scholars have argued that the structural differences between the parliamentary system and the presidential system create significant differences in the way policies are formulated and adopted (Bernauer and Koubi 2009; Bueno de Mesquita, et al. 2005; Lachapelle and Paterson 2013; Persson, Roland, and Tabellini 2000). The parliamentary and presidential regimes differ in terms of their legislative cohesion and separation of power (Persson, Roland, and Tabellini 2000). As noted by Persson et al. (2000), in the presidential type of government, the executive is directly elected for a fixed term and cannot be removed by any non-confidence vote by the legislature. This makes the separation of power between the executive and the legislature more pronounced in the presidential regimes (Persson, Roland, and Tabellini 2000). If the legislature is controlled by a different party than the ruling party in the government, it may become difficult for the president to pass legislation. There is a potential for a conflict of interest between the President and the legislature in such a situation, and approval of fiscal or tax policies from the legislature may face challenges (Persson, Roland, and Tabellini 2000). Several authors supported this argument through their research findings and said that environmental regulations, carbon pricing, or environmental taxation faced more challenges in presidential systems than in parliamentary systems (Fredriksson and Millimet 2004a; Lachapelle and Paterson 2013). However, several scholars argued the opposite, saying that presidents want

to provide more public goods in democracies because democratic presidential systems require larger winning coalitions than the parliamentary system (Bernauer and Koubi 2009; Bueno de Mesquita, et al. 2005).

Whereas, in a parliamentary system in democracies, the majority winners in the legislature, either a single party or a coalition of two or more parties, appoint the head of the government, and there is less separation of power between the legislative and the executive bodies. The legislature holds the executive by the power of a non-confidence vote. Therefore, the argument is that the government can pass any legislation or make policies if it has the confidence of the legislature, and this structure allows the government to have a policy of large public spending for more welfare and public goods, including environmental ones or even new or increased taxation (Persson, Roland, and Tabellini 2000). Persson et al., (2000) found that the parliamentary regimes did more public spending of their GDP than the presidential regimes. Lachapelle and Paterson (2013) found that the parliamentary system of governments is more likely to adopt all kinds of environmental policies, especially regulations and carbon pricing. Fredriksson and Millimet (2004a) found that parliamentary systems are more likely to have environmental taxes.

In this chapter, I want to address the question of how parliamentary or presidential system of government affect the adoption of carbon taxes.

Hypothesis 2: States with parliamentary systems are more likely to adopt carbon taxes than states with presidential systems.

Proportional electoral system

The third political-institutional explanatory variable for understanding the adoption of carbon taxes in this chapter is the influence of electoral systems, specifically proportional

representation. Here I shall discuss how the proportional system of representation can impact the adoption of carbon taxes. There are significant differences in the structure of proportional and majoritarian electoral systems and the policy choices that the two systems make. Majoritarian electoral systems have one legislative seat per electoral district, and the candidate with the highest number of votes wins the seat (Parsons 2016). By contrast, in a proportional representation system, the percentage of votes for each political party determines the percentage of seats for that party in the legislature (Parsons 2016). Therefore, in the majoritarian electoral system, each individual candidate focuses on winning their electoral district, and they are more driven by local issues of politics and problems in their electoral agenda, paying less attention to national and global issues such as climate change (Fredriksson and Millimet 2004b).

In the majoritarian system, minority group representation becomes difficult in the legislature. Smaller parties, including minority parties, are better represented in proportional representation electoral systems since seats are allocated according to the percentage of votes each party receives (Parsons 2016). Proportional representation systems increase the likelihood of left-leaning and green parties getting represented in the legislature, thereby increasing the chances that their views will be reflected in policymaking (Lachapelle 2011).

The proportional electoral structure provides the opportunity to impose carbon emission taxes whenever the majority of the members of the legislature think it is necessary (Lachapelle 2011). Usually, political parties in a proportional system form a stable coalition, enabling them to adopt more welfare policies and public spending. Imposing taxes becomes easier, and they can also take measures on environmental problems since many political parties, including the greens and the left political parties would have representation (Lachapelle 2011). In a majoritarian system, political parties need to have “50% of the vote in 50% of the districts to win an election”

(Fredriksson and Millimet 2004b, 237), whereas in a proportional system, a political party needs 50% of the national vote to be the winning party (Fredriksson and Millimet 2004b). Therefore, in a majoritarian system, political leaders may have less incentive to address environmental problems and tend not to focus on environmental policymaking as they focus on local political issues (Fredriksson and Millimet 2004b). If local politics emphasize environmental action, then majoritarian systems might incentivize politicians to enact aggressive environmental policies. In sum, scholars have argued that a greater popular representation in the proportional system allows more room for environmental policymaking (Fredriksson and Millimet 2004b; Lachapelle 2011; Lachapelle and Paterson 2013). Lachapelle and Paterson (2013) found that carbon pricing is more widely adopted in a proportional system. Given the relatively small literature on the drivers of carbon pricing, it is difficult to have a clear idea of the effect of the electoral system on the adoption of carbon taxes. In this chapter, I want to examine this.

Hypothesis 3: States with proportional systems are more likely to adopt carbon taxes than states with majoritarian or other electoral systems.

Theories and hypotheses regarding economic variables

GDP per capita

There is a vast literature analyzing the effect of economic factors on the environmental performance of states. Within this literature, the focus has been on the correlation between income and environmental performance as I have discussed in Chapter 2. The major contribution of this literature is the environmental Kuznets curve. Researchers have found that with the increase in economic performance or GDP per capita income, the environmental degradation of countries increases initially, but as time passes and a country experiences high income consecutively, its environmental degradation reduces and environmental quality enhances

(Grossman and Krueger 1995). Other scholars subsequently worked on the theory, and contributed to the literature of environmental Kuznets curve (Clulow 2018; Galeotti and Lanza 1999; Kaika and Zervas 2013; Lieb 2003; Magnani 2001; Martínez-Zarzoso and Bengochea-Morancho 2004; Panayotou 1997; Poudel, Paudel, and Bhattarai 2009; Shafik 1994). The explanation of the finding has been aligned with the assumption that countries experience increases in income with industrialization and increases in trade and business activities, and therefore, their pollution level goes up high. When they attain a certain level of income, they become capable of dealing with fossil fuel burning, technology development to reduce pollution, and environmental regulations and ultimately they can reduce their pollution levels (Magnani 2001; Panayotou 1997). Economically underdeveloped countries concentrate on developing their economic wealth through industrialization and do not address environmental externalities and pollution. In less developed economies, people do not have the luxury to have environmental concerns, rather they remain concerned about daily needs. This assumption has the component of environmental policymaking as a tool to attain good environmental performance and scholars argued that with economic development countries focus on making environmental policies to address the environmental problems (Magnani 2001; Panayotou 1997). However, researchers could not be certain when exactly how much wealth and what level of income is necessary for a country to be able to address environmental problems and adopt policies (Raymond 2004). Researchers have identified different income levels where a country attained a better environmental performance with policies and technological development (Raymond 2004).

Using the theory of the environmental Kuznets curve, researchers have theorized that higher incomes would lead to carbon pricing. Steinebach et al. (2021) found that GDP per capita is positively correlated with the adoption of a carbon pricing mechanism. Here, I am not testing

the EKC curve, but assuming that economic development has a positive impact on environmental performance as well as environmental policymaking. This variable is not time-invariant, but it would be important to look at the variation of income across countries here in this chapter to understand whether countries are different or whether any common pattern exists among them regarding income and the adoption of carbon taxes.

Hypothesis 4: The higher the GDP per capita income (a proxy for the economic development of a state), the more likely that the state would adopt a carbon tax.

CO2 emissions per GDP

The fifth explanatory variable for understanding the adoption of carbon taxes is the CO2 emissions per GDP. Skovgaard et al. (2019) examined the energy intensity, CO2 per capita, CO2 per GDP and CO2 emission by industries to understand their impact on the adoption of a carbon pricing policy assuming that these variables will have negative impact on the adoption of a carbon pricing policy (Skovgaard, Ferrari, and Knaggård 2019, 1179). They did not find any correlations between the adoption of a carbon pricing and energy intensity, CO2 per capita, CO2 per GDP or industry share of CO2 emissions (Skovgaard, Ferrari, and Knaggård 2019, 1179). Steinebach et al. (2021) measured the impact of CO2 per capita as a proxy for carbon intensity in the adoption of a carbon pricing policy with the assumption that carbon-intensive economies are going to be less willing to adopt carbon pricing policies (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021, 6). However, they found that there is a positive correlation between CO2 per capita and the adoption of carbon pricing policies (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021, 6). Here, I am going to examine whether CO2 emissions per GDP affect the adoption of carbon taxes or not. This predictor will give us an understanding of how much CO2 is produced for each unit of GDP output. It will indicate an economy's dependency on

carbon-generating energies for its GDP output. Since a carbon tax would increase the price of carbon-generating energy sources, it is assumed that there will be challenges from the industries and the economic sectors dependent on fossil fuel and other carbon-generating energy sources.

Hypothesis 5: The higher the level of CO2 emissions per GDP, the less likely is the adoption of carbon taxes.

Methods

The dependent variable in this research is a binary categorical variable. The decision to adopt a carbon tax has only two possible answers, yes or no, and can be represented quantitively with the values of 1 and 0. The logistic regression model is the most appropriate statistical model to make a regression analysis of a dichotomous dependent variable. Logistic regression helps us predict the likelihood of an event occurring by understanding the relations between a binary categorical variable and many different independent variables, either categorical or continuous. Here, we are going to observe the odds ratio to make a prediction about the probability of carbon taxes being adopted. The odds ratio is the odds of the adoption of carbon taxes in the presence of an independent variable divided by the odds of the adoption of carbon taxes in the absence of that independent variable.

I conduct a cross-sectional analysis focused on the influence of various political institutional factors and of several economic factors on the adoption of carbon taxes by looking at 195 countries in the year 2022. I will be using a logistic model because the political-institutional features, such as the level of democracy (both electoral and liberal), proportional versus majoritarian electoral systems, and parliamentary versus presidential government systems, are more static and are not subject to quick change. The influence of the economic factors like GDP per capita income, and CO2 emissions per GDP as a proxy for carbon intensity, are also

measured in this study though these predictors are not static in nature. They nevertheless are important in predicting the heterogeneity and general patterns of the cases in their decision to adopt carbon taxes. Statistical analysis to capture the cross-country variation would add value here because the longitudinal fixed effects model absorbs the heterogeneity of the time-invariant variables by incorporating them within the unit-specific intercept terms and resulting in perfect collinearity between the time-invariant variables and the fixed effects (Lachapelle and Paterson 2013).

The data for the dependent variable, carbon taxes (see Appendix 1) and the independent variables, liberal democracy score, GDP per capita and CO2 emissions per GDP, are from the year 2022. Other two independent variables, the parliamentary data is from 2023 and proportional electoral system data covers 2018-2022. These two variables are time-invariant and not subject to much change. Therefore, the study assumes that they represent the same effect as the year 2022.

Table 3: Variables and Data Sources

Variable	Source
Liberal democracy score (2022)	V-Dem Democracy Index (Michael Coppedge et al. 2023)
Parliamentary system of government (2023 data)	The CIA World Factbook 2023 (Central Intelligence Agency 2023)
Proportional electoral system (2018-2022)	Electoral System Design Database. (International IDEA 2023)
GDP per capita (current US dollars) 2022	(The World Bank Group 2023)
CO2 emissions per GDP (2022) expressed in t CO2/kUSD/yr	IEA-EDGAR CO2 Data (Crippa et al. 2022)

The liberal democracy scores are taken from the V-Dem liberal democracy index D (v2x_libdem). According to the V-Dem Codebook v13,[4] the dataset includes data from 1789-2022. I have used the 2022 data here for 174 countries. This is a continuous variable with a scale of low to high (0 to 1). This dataset incorporates all components of the electoral and liberal attributes of democracy. Electoral democracy means that there are voting rights, representation of the population, a free and fair electoral system, freedom of association, freedom of expression, and freedom of the media.[5] Liberal attributes of democracy include equality before the law, individual liberty, and checks and balances in the executive body through judicial and legislative constraints.[6] The V-Dem Liberal democracy Index has assigned scores to each country by looking at their performance in these categories. This research is going to consider the concept of democracy as having both electoral and liberal attributes.

The parliamentary system of government data is used as a dichotomous variable in this study. It is considered as 1 if the type of government is a parliamentary republic, parliamentary democracy, and parliamentary constitutional monarchy.[7] All the other types of governments, presidential or others, are considered as 0. Here a parliamentary system of government would mean that the legislature appoints the prime minister or the head of the government and all the cabinet ministers, and the legislature holds the power of a non-confidence vote to dissolve the

[4] Coppedge et al., 2023. "V-Dem Codebook v13" Varieties of Democracy (V-Dem) Project.

[5] Coppedge et al., 2023. "V-Dem Codebook v13" Varieties of Democracy (V-Dem) Project, p. 45.

[6] Coppedge et al., 2023. "V-Dem Codebook v13" Varieties of Democracy (V-Dem) Project, p. 44-45.

[7] See more on different categories of the types of governments: https://www.cia.gov/the-world-factbook/field/government-type/

government to make the government more accountable.[8] The parliamentary constitutional monarchies are considered as having a parliamentary system here because they have all the features of a parliamentary system, and the monarch remains a symbolic head of the state.

The proportional electoral system data is another dichotomous variable here which is considered as 1 to have a proportional electoral system and 0 if otherwise.

The GDP per capita is a discrete variable measured in US dollars and it is the total value of all productions of a country divided by the midyear population.[9]

The CO2 emissions per GDP is a continuous variable measured in tons of CO2 emissions per unit of GDP.

Results

Table 4 shows the summary statistics of the political and economic factors used in the statistical analysis here. Table 5 depicts the correlation coefficients for the variables used in this study.

Table 4: Summary Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Carbon tax countries	194	0.144	0.352	0	1
Level of democracy	174	0.392	0.263	0.01	0.89
Parliamentary system	194	0.407	0.493	0	1
Proportional electoral system	194	0.397	0.491	0	1
GDP per capita (current US$)	180	1.703	2.716	0.026	24.086
CO2 emissions (kg per PPP$ of GDP)	183	0.240	0.471	0.032	6.232

[8] https://www.cia.gov/the-world-factbook/field/government-type/
[9] https://data.worldbank.org/indicator/NY.GDP.PCAP.CD

Table 5 indicates that there is a moderate positive correlation between the adoption of carbon taxes and the level of democracy (.4917), and GDP per capita (.5173). There is also a moderate positive correlation between the level of democracy and GDP per capita (.5458).

Table 5: Correlations Matrix

	Carbon tax	**Democracy**	**GDP/ capita**	**Parliamentary**	**Propor-tional**	**CO2/ GDP**
Carbon tax	1.0000					
Democracy	0.4917	1.0000				
GDP/capita	0.5173	0.5458	1.0000			
Parliamentary	0.2376	0.4193	0.3171	1.0000		
Proportional	0.2636	0.3103	0.1204	0.1221	1.0000	
CO2/GDP	-0.1385	-0.2154	-0.0413	-0.2644	-0.0265	1.0000

I have two logistic regression models where I have tested the five hypotheses that I have developed in the study. The first model tested the influence of the political factors, namely, the level of democracy, the parliamentary system, and the proportional system as well as the influence of the economic factors, GDP per capita and CO2 emissions per GDP on the adoption of carbon taxes in all countries. In the second logistic regression model, I have tested the influence of the same political and economic variables on the adoption of carbon taxes only in nations that have a level of democracy above 0.5 scores in the liberal democracy index of V-dem Institute.

Table 6: Model 1: Adoption of carbon taxes (n = 162)

Covariate	Odds Ratio	95% Confidence Interval	P Value
Level of liberal democracy	86.370	(3.75, 1990.04)	0.005
Parliamentary system of government	0.925	(0.28, 3.02)	0.897
Proportional electoral system	3.416	(1.01, 11.58)	0.049
GDP per capita (Current US$)	1.442	(1.09, 1.91)	0.011
CO2 emissions per GDP (expressed in tons CO2/kUS$/yr)	1.195	(0.007, 208.89)	0.946

The results reveal that levels of liberal democracy and proportional electoral system are positively correlated with the adoption of carbon taxes and their P values are statistically significant. This means that liberal democratic nations are 86.37 times more likely to have carbon taxes than non-democratic nations. This result is similar to the findings of Steinebach et al. (2021) who observed strong correlations between carbon pricing and democracy.

The results about the effect of a proportional electoral system indicate that nations with proportional electoral systems are 3. 4 times more likely to have carbon taxes compared to nations without proportional electoral systems. This finding is consistent with the finding of Lachapelle and Paterson (2013), who argue that carbon pricing is more likely to be adopted in proportional electoral systems. My study implies that proportional systems allow the representation of many different smaller parties in the legislature, and that aspect creates room for the legislature to adopt a carbon tax.

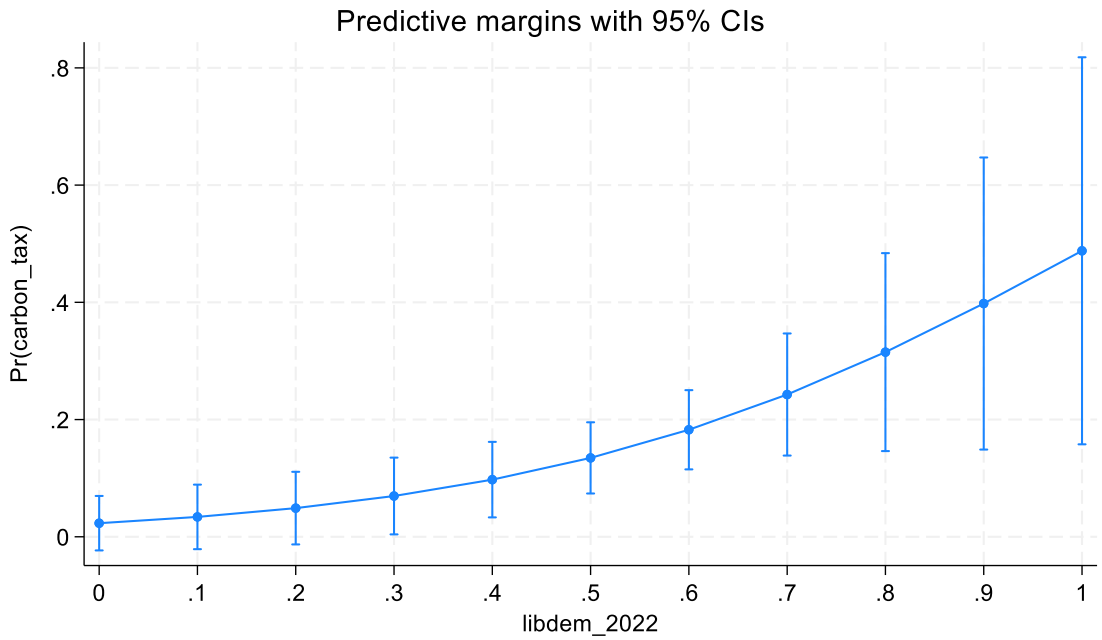
The results of this model indicate that the GDP per capita income is also positively correlated with the adoption of carbon taxes. A 10,000 increase in the GDP per capita income would make a state to adopt a carbon tax 1.4 times more likely. This finding is similar to the

finding of Steinebach et al. (2021), in which the authors found that economic development (GDP per capita) increases the likelihood of the adoption of a carbon pricing policy.

The results further show that the other two variables, parliamentary type of governments and CO2 emissions per GDP do not have any significant impact on the adoption of carbon taxes.

In order to understand the results of this logistic regression, I have calculated the marginal effects of each unit of changes at the level of liberal democracy and the changes at the predicted probabilities of the adoption of carbon taxes. The following graph shows this association of how changes at the margins of the level of liberal democracy bring changes in the predicted probabilities of the outcome variable after accounting for the effect of additional variables, which are held constant at their average values. The slope of the graph depicts that there is a positive increase in the predicted probability of the adoption of carbon taxes with a one-unit increase in marginal effects of the level of liberal democracy. If there is a 20 percent increase in the level of democracy, there would be almost double the likelihood of the adoption of carbon taxes. For example, a country at 0.4 level of democracy has a likelihood of 7% to adopt a carbon tax while a country at 0.6 level of democracy has a likelihood of 13% to adopt a carbon tax. Especially in nations above the liberal democracy score of 0.5, a one-unit increase in the marginal effects of the level of democracy has a significant change in the predicted probability of adoption of carbon taxes.

Figure 1: Margin plot of liberal democracy and likelihood of carbon tax adoption



In order to have a further closer look at the relationship between the adoption of carbon taxes and the political-institutional variables, in model 2 in Table 7, I am measuring the correlations between the adoption of carbon taxes and the political-institutional and economic factors in nations with liberal democracy scores above 0.5. Notably, this excludes only 4 states that adopted carbon taxes since 24 of the 28 states that adopted carbon taxes were democratic. This focused analysis allows for a deeper investigation of the strength of the relationship between the adoption of carbon taxes and the political-institutional variables. This also allows us to assess the effect of proportional electoral systems on carbon tax adoption among liberal democratic states that are already inclined to adopt carbon taxes.

Table 7: Model 2: Adoption of carbon taxes when liberal democracy is >0.5 (n = 59)

Covariate	Odds Ratio	95% Confidence Interval	P Value
Level of liberal democracy	23,717.330	(1.85, 304,000,000)	0.037
Parliamentary system of government	0.763	(0.18, 3.30)	0.718
Proportional electoral system	6.965	(1.45, 33.34)	0.015
GDP per capita (Current US$)	1.994	(0.83, 1.74)	0.341
CO2 emissions per GDP (expressed in tons CO2/kUS$/yr)	1.804	(0.00,1881.21)	0.868

Liberal democratic nations with scores above 0.5 are 23717.33 times more likely to have carbon taxes than non-democratic nations. The results of this logistic regression support the theory that high liberal democracies increase the likelihood of having carbon taxes. In addition, it is revealed that proportional electoral systems in high democracies have very strong correlations with the adoption of carbon taxes. High-liberal democracies with proportional electoral systems are 6.9 times more likely to adopt carbon taxes compared to nations without proportional systems in high-liberal democracies.[10]

The parliamentary system, GDP per capita, and CO2 emissions per GDP do not have any significant impact on the adoption of carbon taxes in high liberal democracies with scores above 0.5. The GDP is not positively correlated with the adoption of carbon taxes in this model because there is less variation in the observations, and the number of observations is also small.

[10] To better understand the conditions under which and mechanisms by which carbon taxes are adopted, analysis of the voter sentiment regarding environmental policy could be conducted by including the Index of Post-materialism from the World Values Survey at https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp (Haerpfer et al. 2022).

Conclusion

The literature on the determinants of carbon taxes is still in the process of theory testing. Researchers mainly focused on understanding the determinants of carbon pricing policies which do not separate carbon taxes and carbon trading mechanisms until now. This chapter has aimed to look at carbon taxes alone as a policy option because carbon trading has been a decision of the EU and EU members adopted that in 2005. Carbon taxes were started in 1990 by a few EU members but largely remain an independent choice of the states. Many EU countries have both carbon trading and carbon taxes. Moreover, I am interested in studying carbon tax alone because it is an unlikely policy for states. Whereas carbon trading is directed towards businesses only, carbon taxes are imposed on all individuals. The carbon taxes increase fuel prices which incur extra costs for every individual for their energy use, and not just the industries. The increase in energy costs may affect an economy adversely and would increase the cost of living for individuals. Despite these effects, some countries adopted carbon taxes, and it is puzzling why they did so. The chapter also aimed at testing some of the dominant theories that exist in explaining the determinants of carbon pricing and climate change policymaking and using a cross-country logistic regression model to understand the heterogeneity or patterns across countries regarding their choice of carbon taxes.

The findings of this research show a strong positive relationship between the level of democracy and the adoption of carbon taxes. This indicates that the institutional features of democracies create conditions favorable for policymakers to address climate change problems with strong CO2 emission reduction policies such as carbon taxes. This research also shows a further pattern within highly liberal democracies that proportional electoral systems, where

multiple political parties get representation in the legislature based on the percentage of votes they receive, have a strong influence on the adoption of carbon taxes.

The chapter also addressed rival theories about the effects of a parliamentary versus presidential system of government, GDP per capita income, and the carbon intensity on the adoption of carbon pricing mechanisms and tested these theories on the adoption of carbon taxes. The research here shows that the parliamentary system and CO2 per GDP do not explain the adoption of carbon taxes. The GDP per capita income is positively and significantly correlated with the adoption of carbon taxes when the number of observations is 162.

The study revealed that proportional electoral systems have positive and statistically significant correlations with the adoption of carbon taxes. Most notably, it is found that proportional systems in high liberal democracies with scores above 0.5 impact the adoption of carbon taxes very significantly. These findings indicate that there is a need for further research on this. Proportional systems allow the representation of green parties and left/progressive parties or many minority parties in the legislature, and this feature can be explored further to see their impact on the outcome of carbon taxes.

Appendix 1

Table 8: Countries included in the quantitative study as having carbon taxes

Country name	Policy	Year of implementation
Finland	Carbon tax	1990
Poland	Carbon tax	1990
Norway	Carbon tax	1991
Sweden	Carbon tax	1991
Denmark	Carbon tax	1992
Slovenia	Carbon tax	1996
Estonia	Carbon tax	2000
Latvia	Carbon tax	2004
Liechtenstein	Carbon tax	2008
Switzerland	Carbon tax	2008
Iceland	Carbon tax	2010
Ireland	Carbon tax	2010
Ukraine	Carbon tax	2011
Japan	Carbon tax	2012
United Kingdom	Carbon tax	2013
France	Carbon tax	2014
Mexico	Carbon tax	2014
Spain	Carbon tax	2014
Portugal	Carbon tax	2015
Chile	Carbon tax	2017
Colombia	Carbon tax	2017
Argentina	Carbon tax	2018
Canada	Carbon tax	2019
Singapore	Carbon tax	2019
South Africa	Carbon tax	2019
Luxemburg	Carbon tax	2021
Netherlands	Carbon tax	2021
Uruguay	Carbon tax	2022

Source: (The World Bank 2023)

Chapter 4: The Determinants of a Carbon Tax in Australia

Introduction

Why did Australia implement a carbon tax in July 2012 and abolish it in just two years in July 2014? This chapter will delve into the reasons behind Australia's initial decision to enact carbon taxes and the factors that ultimately led to its relatively swift abolishment. Australia, a long-standing liberal democracy with a strong economy, is well-positioned to adopt effective climate change strategies such as carbon trading and taxes. Australia has also been identified as the world's second top coal exporter country, having the third largest coal reserves in the world and the world's top fourth coal producer (Worldometer, n.d.-b). It is identified as having a very influential fossil fuel lobby too (Crowley 2013a). These conditions are considered significant barriers to formulating robust climate change policies that include carbon pricing mechanisms (Geoffroy Dolphin, Pollitt, and Newbery 2019; Jenkins 2014; Lachapelle and Paterson 2013) and make Australia unlikely to have carbon taxes. It is unclear and puzzling why the lobby became weak when Australia decided to have carbon taxes in 2012. This case study will help us understand how the opposing forces in Australia played out during the country's adoption of carbon taxes and which forces worked behind their enactment.

Scholars have identified that certain industries, such as energy-intensive industries, oppose and lobby against carbon pricing policies in general because of fear of potential losses associated with their carbon-intensive production and business (Geoffroy Dolphin, Pollitt, and Newbery 2019; Jenkins 2014). They argued that the decision and implementation of carbon pricing mechanisms are highly influenced by the lobbying of energy-intensive industries (Geoffroy Dolphin, Pollitt, and Newbery 2019; Jenkins 2014). The Australian economy is heavily dependent on fossil fuels (coal, electricity, aluminum, petroleum, cement, and minerals),

making it less likely to have carbon taxes (Crowley 2013a). Another argument that scholars make is that high carbon intensity and CO2 emissions per capita make countries less prone to have carbon pricing mechanisms (Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). Australia has high rates of carbon intensity, CO2 per capita, and CO2 emissions per GDP, according to the World Bank, which makes it unlikely to adopt a carbon tax. In this study, I will examine why and what factors became stronger in favor of carbon taxes in 2012 and made it possible for Australia to adopt carbon taxes despite the fact that it is unlikely for Australia with a lot of impediments.

The literature on the determinants of carbon taxes in Australia is very small. There are two notable arguments on the drivers of Australian carbon taxes in this literature. One is the political factors, such as the climate change policy-making perspective of the Labor Party and the Australian Greens, which have been a major driving force for the adoption of carbon taxes (Crowley 2013b); and another is a combination of vulnerability to climate change, obligations under the Kyoto Protocol, and the political landscape where the ruling government of Australia in 2012 wanted to implement a robust climate strategy that paved the way for the adoption of carbon taxes (Chan 2012). The literature does not adequately answer the question of how Australia could pass this robust, far-reaching scheme when it remained a major coal-producing and exporting country.

Several scholars have worked on the causes of abolishing carbon taxes in Australia too (Chan 2015; Crowley 2017; Hudson 2019; Robson 2014). Their main arguments were around the political partisanship of major political parties towards climate change and carbon pricing mechanisms, the negative attitude of the media and the public to carbon taxes, and the possible economic loss that Australia was about to face because of carbon taxes (Chan 2015; Crowley

2017; Hudson 2019; Robson 2014). My aim in this chapter would be to examine comprehensively these factors that could potentially cause the repeal of Australian carbon taxes.

Australia is a case that would help better understand what makes carbon taxes possible or not because many factors, especially the political-institutional factors such as the level of democracy, the type of government, and the electoral representation structure, as well as several economic factors such as economic development or income, carbon intensity, etc., stayed constant between the period before the adoption of carbon taxes and the repeal of it. This would help me focus on the relatively few factors that varied during this time and might have caused the adoption and repeal of carbon taxes.

This case study will contribute, firstly, to the literature on understanding when a country adopts a carbon tax to mitigate climate change and when it fails to do so. Secondly, here I will have an understanding of the tipping points when Australia turned from a noncarbon tax country to a carbon tax country and then changed again to a noncarbon tax country when it repealed the carbon taxes.

Why did Australia adopt a carbon tax and then repeal it?

The carbon reduction mechanism that Australia implemented in June 2012 had an extensive aim to reduce carbon emissions by 5% from its level of carbon emissions of 2000 and reduce 80% of its carbon emissions by 2050 (Chan 2012). It was a combination of carbon taxes and a carbon trading system. Australia implemented a tax of AUD 23 for each ton of carbon emission for all individuals and businesses in June 2012, and the amount was set to increase by 2.5% above inflation annually (Chan 2012). The carbon price would not apply to households, small businesses, and agricultural emissions (Crowley 2013b). It was also decided that a carbon

trading mechanism would be established in place of the carbon tax system in 2015 (Chan 2012). I would examine how this robust and far-reaching policy was possible to adopt in 2012.

Australia's carbon tax is a very interesting case study. It is a major emitter that is very dependent on fossil fuel and a major victim because it was experiencing speedy temperature increase, extreme weather events, heatwaves, droughts, floods, destruction of coral reefs and habitats, species extinction, and sea level rise. It also has a very strong anti-climate change policy and carbon pricing lobby from the big fossil industries. The analysis of the decision of carbon tax would give us knowledge on how a state decides to have a strong carbon reduction policy, like carbon taxes when it has strong challengers to it, and how it fails to implement the policy and abandons it.

In this chapter, I am arguing that the Australian Greens were the ones who pushed for the adoption of carbon taxes in 2012 whereas the Labor Party was more inclined to have a carbon trading system and was cautious in taking any carbon pricing policy. The Australian Greens were able to influence the decision despite being a small party compared to the Labors and the Liberals because the Greens acquired strength increasingly in the legislature since 2004 as they received a steady increase in public support. In the 2010 federal elections, the Labors were compelled to form a coalition with the Greens to form a government and stay in power. This created an opportunity for the Greens to negotiate and force an agreement with the Labors to adopt a policy that would implement carbon taxes in 2012 and then a carbon trading scheme in 2015 and a long-term target of reducing carbon emissions. I am also arguing that the lobby of the big fossil industries and corporations against the carbon tax did not work because the Australian Greens have had the stated goal and mission of freeing the political decision-making of the country from the control of the big corporations in having substantial climate change and

environmental protection legislation and action. However, the Labors lost the election of 2013, and the Greens lost their leverage and power to influence decisions as the coalition with the Labors came to an end. The Liberal Party replaced the Labor government, and it was vehemently opposed to the carbon pricing legislation. The coalition of the Liberal Party and National Party won the 2013 federal election decisively with 90 seats in the parliament, whereas the Labor Party had 55 seats (B. Holmes 2014). The Liberal Party leaders were more aligned with the lobby of the big corporations. The win of the Liberal Party in the 2013 elections gave the lobby of the big corporations greater access and influence in the decision-making, and eventually led to the carbon tax being abolished in 2014 along with the coal mining tax that had been adopted in 2012.

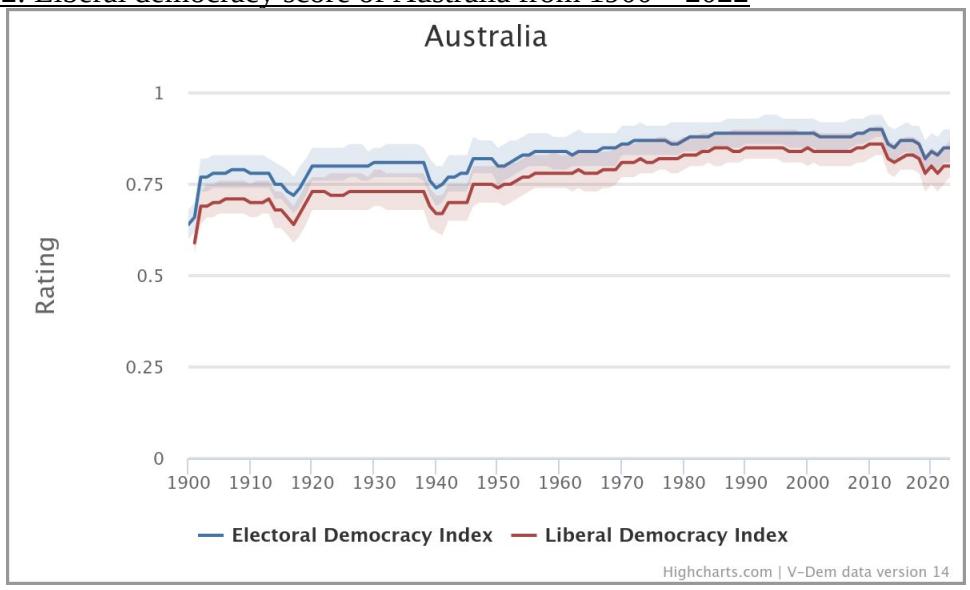
The influence of political factors on the adoption and repeal of carbon taxes

The level of democracy

As discussed in Chapter 2, many scholars have identified democracy as a significant determinant factor in shaping the adoption of climate change or a carbon pricing policy (Bättig and Bernauer 2009; Bernauer and Koubi 2009; Böhmelt, Böker, and Ward 2016; Clulow 2019; Geoffroy Dolphin, Pollitt, and Newbery 2019; Fredriksson et al. 2005; Fredriksson and Wollscheid 2007; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). Democracy provides the institutional capacity of a nation to debate and discuss climate change mitigation strategies such as carbon taxes. Democracy gives greater opportunity for the public, experts, lobbyists, environmental organizations, and activists to converse with political leaders as well as in public debates about climate change and policy options (Clulow 2019). In addition, electoral incentives in democracies play a significant role in climate policymaking because electoral competition creates pressure on the political parties to address climate change issues seriously when voter support for climate actions is high (Harrison and Sundstrom 2007). Also, when

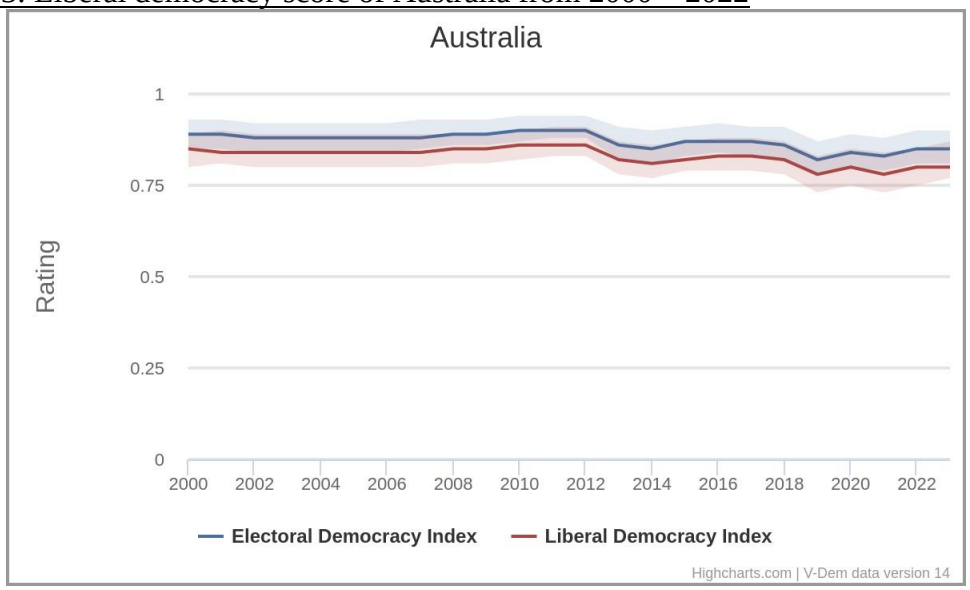
smaller political parties address them, larger parties often come under pressure to incorporate climate policy into their agenda to ensure voter support in democracies (Harrison and Sundstrom 2007).

Figure 2: Liberal democracy score of Australia from 1900 – 2022



Source: (V-Dem Institute 2022)

Figure 3: Liberal democracy score of Australia from 2000 – 2022



Source: (V-Dem Institute 2022)

Australia is a very established democracy with a federal system since the inception of its constitution. In terms of the degree of democracy, too, Australia maintained its position as a

highly liberal democracy with scores above .75 within a 0-1 scale since 1941, according to the V-dem Institute. It remained a stable highly liberal democracy years before the adoption of the carbon taxes and when it was revoked.

The type of government and the electoral system

In addition to democracy, scholars have studied the influence of the type of government and the electoral system on adopting climate change and carbon pricing policies. Scholars have conflicting results in their research though. Some argue that the parliamentary form of government is more favorable to the adoption of climate change policies because of less separation of power between the legislature and the executive as the majority party or a coalition of the majority party appoints a prime minister in the parliamentary system. Moreover, the legislature can hold the prime minister accountable by non-confidence voting if policies do not reflect the majority's preference in the legislature. Meanwhile, in the presidential form of government, more separation of power makes it more difficult for the president to pass legislation on climate change through the legislature. Some scholars found evidence in favor of the parliamentary government's influence on the adoption of climate policies, whereas others found evidence in favor of the presidential governments to be more effective in adopting climate change policies. In the case of proportional representation in democracies, the main argument is that it ensures more diversity in the representation of the population in the legislature. Since seats in the legislature are allocated according to the votes that each party receives in an election, all the political parties have the opportunity to get a place in the legislature. This feature of proportional representation is said to be favorable for the adoption of climate change policies and carbon taxes.

Australia has a parliamentary form of government with proportional representation in a constitutional monarchy. Australia applies proportional representation in the Senate and preferential representation in the House of Representatives. These structural features do not change over time, and they remained the same prior to and during the adoption of carbon taxes as well as during the time of its repeal in Australia. Obviously, they are important factors in allowing more diversity in the legislature and decision-making process and bringing more reason for having a carbon tax, but there were no changes in these factors before the adoption of the carbon taxes and the repeal of the carbon taxes indicating that there must be other changes that caused them. In addition, since the parliamentary and proportional system in Australia did not change, they do not explain why Australia had carbon taxes in 2012 and abolished it in 2014, not before or after that time.

Increasing Strength of the Australian Greens

Several authors have studied the influence of green parties or left-leaning parties in environmental or climate change policymaking in democracies (Garmann 2014; King and Borchardt 1994; Knill, Debus, and Heichel 2010; Leinaweaver and Thomson 2016; Lundquist 2022; Neumayer 2004; Wen et al. 2016). Their findings suggested that the ecological orientation of the green parties has positive impacts on the adoption of environmental and climate change policies, having stringent policies, and enhancing environmental performances. Knill et al. (2010) conducted their study on 18 OECD countries and their adoption of 40 environmental policies between 1970 and 2000. Their findings indicate that left parties adopted more environmental policies than right-wing parties (Knill, Debus, and Heichel 2010). Leinaweaver and Thomson (2016) argued that green and left-wing political parties tend to emphasize the protection of the environment and environmental policymaking in their manifestos in the EU,

and they are the ones who suggest environmental protection policies at the EU level. Lundquist (2022) argued that political parties that have a strong commitment to environmental or climate change policies in their manifestos, irrespective of their ideological belief as green, left, or right, had formulated stringent environmental policies when they formed government. Others (King and Borchardt 1994; Neumayer 2004; Wen et al. 2016) argued that the left-wing parties positively impacted the pollution reduction of countries. The findings of all this research indicate that there would be more likelihood of strong environmental policies when green or left parties would form a government. Overall, as discussed in Chapter 2, many scholars have argued that increased power of the left or green parties in the legislature increases the likelihood of climate change policies and carbon taxes (Andersen 2019; Garmann 2014; King and Borchardt 1994; Knill, Debus, and Heichel 2010; Neumayer 2003; 2004). In the Australian case, I would like to see whether green parties or left parties played any role in having a carbon tax and what made the carbon tax get revoked in two years.

Here I investigate whether the adoption of carbon taxes in Australia in June 2012 can be accurately attributed to the gain in power of the green parties at that time and a carbon trading scheme for the future (scheduled to start in 2015). Australia historically has two main parties, the Australian Labor Party and the Liberal Party, who alternatively formed government in Australia in the 1920s (Miragliotta 2013, 708). The Australian Labor Party is a social democratic left-leaning party while the Liberal Party along with its coalition partner the National Party is a conservative party (Miragliotta 2013, 708). 80% of the voters voted for these two major political parties, the Australian Labor Party or the Liberal Party, according to their affiliation (Miragliotta 2013, 708).

The Australian Greens party goals are based upon four principles: “ecological sustainability, grassroots democracy, social justice, and nonviolence” (The Australian Greens, n.d.). However, their movement is not limited to these four principles. They have set a goal of protecting the environment to provide people with a good life, ensuring that big corporations and business donors cannot block environmental and climate change policies through political leaders (The Australian Greens, n.d.). This goal of freeing the politicians and government from the control of the big corporations has made the Greens different from the two major traditional political parties because the Greens provided a sharp change in their policy agenda and manifesto by highlighting a progressive alternative idea. They appealed to the general population by broadening their agenda from the focus on environmental protection and sustainability to post-materialist values, participatory democracy, grassroots participation, social and environmental justice issues, public education, anti-war activism, etc. (Vromen 2005). Whereas the Australian Labor Party and the Liberal Party were very inconsistent in their focus and commitment to environmental and carbon reduction policies as revealed by the numbers of climate change initiatives from 1972 to 2013 by these two political parties when they were in power (Talberg, Hui, and Loynes 2015). The Labors and the Liberals were reluctant to take up the carbon reduction strategies in the 1980s and 1990s and it was only before the 2007 elections that the Labors took the carbon pricing policy agenda seriously as public support and demand for climate action increased during that time (Crowley 2013a). The Liberals were skeptical about the carbon pricing policies and were concerned about the impact of carbon pricing on the economy (Crowley 2013b).

Studies show that the Greens had a steady increase in their support from the voters since the party's creation in 1992 and the share of votes made very good progress by increasing from

4.9% in 2001 to 12.8% in 2010 (Fredman 2013, 86). One study argued that the Australian Greens became the "third largest political power" because they did very well in the federal election of 2004 (Miragliotta 2013, 706). Another study argued that the Australian Greens continued to increase its support from voters and strength in the parliament in a way that in the 2010 Federal election, the Australian Labor Party had to form a coalition government with the support of the Greens (Fredman 2013). In addition, polling from 2007 to 2011 showed an increase in support for the Greens to the Labor Party (Fredman 2013).

The Greens gradually gained strength in both chambers of the parliament, the House of Representatives and the Senate, in a way that even if it did not win many seats, it was able to become a part of the coalition government in 2010. The parliamentary and proportional representation allowed the Greens to avail themselves of the opportunity to make their way to the decision-making power and make its policy statement clear. In the 2001 elections, the Liberal and National Party formed a coalition government, and during that election, the Greens won only one seat in the Senate (Barber 2017). In the 2004 elections, the Greens secured four seats in the Senate but did not get any opportunity in the government because the Liberal and the National Party coalition sustained their election victory again, and they were historically together to form coalition governments in Australia (Barber 2017). In the 2007 elections, the Labors won the election and formed a government, while the Greens won five seats in the legislature (Barber 2017). In the 2010 elections, the Labors won 72 seats in the House of Representatives but needed 76 seats there to form a government, and the Greens had one seat in the House of Representatives and secured nine seats in total in the legislature including the seats in the Senate (Barber 2017). This gave the Greens a chance for the first time to enter into a coalition with the Labor Party with its one seat from the House of Representatives. Three independently elected

representatives joined the coalition by which 76 seats were secured by the Labor Party to form a government (Barber 2017).

One important factor in the adoption of carbon taxes by Australia in 2012 is the political dynamics of parliamentary and proportional systems. The Labor Party's ability to stay in power from 2007 to 2013 depended, after year 2010, on the formation of a coalition with the Greens. Since Labor had already pledged to reduce carbon emissions but did not have a majority of parliamentary seats, the Green Party was an obvious coalition partner. The Greens could not have pushed a carbon tax through without being a coalition partner. Thus, their influence arose from a) the parliamentary and proportional system, in which b) they had enough voter support to be a potential coalition partner but not enough to win on their own, and c) they had environmental-political commitments that aligned sufficiently well with the more dominant party the Australian Labor Party.

Prime Minister Kevin Rudd from the Labor Party (2007-2010) pledged to reduce carbon emissions in Australia by formulating an Emissions Trading Scheme (ETS) during his election campaign and brought the bill named “Carbon Pollution Reduction Scheme” (CPRS) in the legislature (Hudson 2019; Lo 2013; MacNeil 2021). This proposal initially was criticized from both ends of the political spectrum. It was opposed by opposition political parties in the Parliament. Australian Green Political parties did not support it because the CPRS was too weak a policy in their view as it would give benefits to the carbon-intensive industries by freely allotting permits, and carbon reduction targets are too low (Lo 2013). The Liberal Party leaders argued that CPRS could have consequences of employment layoffs and could cause economic losses (Lo 2013). Nevertheless, he failed to pass the proposal in the Senate as it did not have enough support, and he failed to address Australia’s high per capita carbon emissions and

climate change problems as promised before the election (MacNeil 2021). When Kevin Rudd lost confidence in his political party in 2010, he had to step down from his position as prime minister, and Julia Gillard replaced him from the Labor Party (MacNeil 2021). However, when the Labor Party formed a government in 2010 in coalition with the Australian Greens and the independent members of the parliament, Prime Minister Julia Gillard tried to bring back the emissions trading scheme again, as she promised in her election campaign. The Greens created pressure for more stringent carbon reduction laws, and the coalition decided to have a fixed carbon tax for 3 years at first and then move into an emissions trading scheme or ETS under the Clean Energy Act (MacNeil 2021). Smaller political parties have a greater say in parliamentary and proportional systems because, in the parliamentary system, the Prime Minister needs support from the majority for policy implementation and is held accountable by the parliament by non-confidence vote, and in the proportional system, all political parties, small and large, get representation in the legislature according to the share of votes they receive in a specific election.

The Clean Energy Act was adopted in 2011 and implemented in 2012. Under the Act, approximately 300 carbon-emitter industries were brought under this mechanism (Lo 2013). From July 2015, the government would have a limited number of permits with a cap on pollution to reduce carbon emissions (Lo 2013). Under pressure from Julia Gillard's coalition partners, the Australian Greens, and the independent members of the parliament, Julia Gillard agreed to form a Multi-party Committee on Climate Change (MPCCC), comprising leaders from the Labor Party, the Greens, and the independents (Hudson 2019; MacNeil 2021). The Liberals and the National Party did not join the panel as they opposed any talks about carbon reduction(Hudson 2019; MacNeil 2021). If Australia had a non-parliamentary and non-proportional system, then the Greens would not have been able to become a partner in the government because they had

too few seats. Moreover, if the Greens had not been a coalition partner and if they did not want the carbon tax, the carbon tax would not have been adopted. It was possible only because the system allowed the Greens to create pressure on the Labors to adopt the carbon taxes.

Prime Minister Gillard never originally planned to adopt a carbon tax. She even said clearly before the election of 2010 that there would be no carbon tax, only an emissions trading scheme or ETS if she won (Twomey 2014b). The carbon tax was supported by the Greens, and they were able to pass it through the MPCCC since Gillard had a minority government. The Greens also made sure that the big corporations did not influence any decision-making process and supported the multi-party committee for the evaluation of the design of the carbon tax (Crowley 2013b). The Greens were also able to create pressure for a coal mining tax in 2012 so that there is a very powerful carbon reduction policy in place (Grubel 2012). In addition to the carbon tax, the coalition government, after long negotiations, decided to impose 30% taxes on iron and coal mining profits that would bring the biggest coal companies of Australia under the tax system, generating an Australian $10.6 billion as revenue (Grubel 2012). The Gillard government had no option but to agree to these conditions, and it was determined that a flat rate of carbon tax and coal mining tax would be in place for three years, and then ETS would start.

The parliamentary and proportional representation system allowed the Liberal and the National Party to form a coalition government in 2013 when the Labor Party lost the election (Barber 2017). The Greens did well in the 2013 elections by getting 10 seats in the Senate (Barber 2017) but lost their place in the government and their influence in the nation's decision-making because the Labor Party lost. The winning coalition of the Liberal and the National Party were vehement opponents of the adoption of carbon taxes, and as a result, they repealed the tax

in 2014. The Labors and the Greens were unable to stop the process as they did not have enough power or leverage to do so in parliament.

Ideological differences

Scientific reports on climate change problems and the earth's deteriorating status started to emerge in Australia in the early 1980s. A report was published in 1981 about the probability of sea level rise, deterioration in agricultural production, and the possibility of escalation into civil unrest because of GHG emissions and fossil fuel use (Hudson 2019). The Intergovernmental Panel on Climate Change (IPCC) was created in 1988, encompassing hundreds of scientists around the globe for evidence collection and publication on climate change status, and started to publish reports every 5 years (Oreskes and Conway 2010). Australia did not act effectively on climate change issues early on and made several failed attempts to address carbon emissions. There were discussions about having carbon pricing in Australia as several EU countries started adopting carbon taxes from 1990 onwards. The carbon pricing attempts failed in Australia in 1992, 1994, 2000, and 2003 (Hudson 2019). The Liberal Party and its partner, the National Party, did not support carbon pricing mechanisms. When the Liberals won the election of 1996, John Howard, who opposed climate policies, became the Prime Minister. Climate policies were not considered during his time, and Australia did not ratify the Kyoto Protocol until 2007 (Hudson 2019). Kevin Rudd of the Labor Party replaced John Howard in the 2007 election, and he came to power by making promises to the population to act on climate change. Pro-carbon pricing forces emerged in 2004 and continued to create debates among the major political parties until 2007 (MacNeil 2016). The author further argued that the Labor government of New South Wales in 2003 and 6 more states in 2004 decided to have ETS with or without support from the Federal government (MacNeil 2016). Several reports were

published from 2005 to 2007 that recommended the Australian government take substantive action against its high carbon emissions and address climate change problems. The International Energy Agency urged Australia to consider having an ETS in 2005, while the Shergold Report published by an assessment committee created by Prime Minister Howard recommended adopting an ETS (Talberg, Hui, and Loynes 2015). John Howard also promised to initiate an ETS to gain popular support and compete with Kevin Rudd, who was very committed to bringing climate action and ETS (Hudson 2019). In 2008, the Garnaut Review was published on Australia's climate change vulnerabilities and the proposal of ETS (Talberg, Hui, and Loynes 2015). Within the debate of having an ETS, the Rudd government brought the Carbon Pollution Reduction Scheme (CPRS) in 2009 twice in the legislature but could not pass the law because of opposition from the Liberals (Crowley 2013b; MacNeil 2021). Even the Greens did not support the CPRS because they argued it to be too weak to effectively address the environmental problems (Crowley 2013b). The debate about carbon tax in Australia always surrounded economic loss versus economic benefits/profit, and the politics unfolded into a collapse of the carbon tax policy and the entire carbon reduction regime (Copland 2020; Crowley 2013b; Hudson 2019). It never really had the image of having environmental benefits and benefits of reduction of carbon emissions (Copland 2020; Crowley 2013b; Hudson 2019). News reports projected what the opposition leaders were saying about people losing jobs and the coal industry facing losses that had an obvious impact on creating public opinion against the carbon tax.

One reason for the difference in the position of the Labor Party and the Liberals about the adoption of a carbon pricing mechanism was ideological. Scholars have argued that left-wing parties are more likely to adopt environmental actions and give more priority to the environment than the economy compared to right-wing parties (Garmann 2014; Knill, Debus, and Heichel

2010; Neumayer 2004). The Australian Labor Party is a social democratic left-leaning party who are historically more open to new issue areas (Miragliotta 2013). The Australian Labor Party has set goals to provide affordable housing, invest in more medical and childcare services, and address climate change problems (The Australian Labor Party, n.d.). They would prefer more government intervention, taxation, and public services to enhance equality democratically. Whereas the coalition of the Liberal Party and the National Party is based upon a conservative ideology that is less inclined to government intervention. The Liberal Party prefers less taxes, more jobs, less welfare dependency, and more affordable energy (The Liberal Party of Australia 2022). The ideological difference between the left and the right-wing parties has placed the Labor Party more in favor of carbon pricing mechanisms and carbon reduction policies. In contrast, the Liberal and National Party coalitions remained strong opponents of these. The debate about carbon pricing between the Labor and the Liberal was focused on the economic impact of the policy. The Liberals were concerned about the coal and iron industries, joblessness, GDP loss, etc. if there was a carbon pricing mechanism. The ideology of the Greens matched with the Labor Party, and it was the policy alignment on carbon emission reduction between the Greens and the Labor Party that made the adoption of the carbon taxes possible. In addition, it needs to be noted that the Greens had fewer seats but enough to form a coalition government within a parliamentary and proportional system pushing hard on environmental policy in general and carbon taxes specifically that helped get the carbon tax through.

Opposition from the industries

Some scholars have argued that adopting carbon taxes often faces difficulties from the lobby of powerful fossil fuel industries (Driscoll 2021; Levi, Flachsland, and Jakob 2020; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). Australia has big corporations and

carbon-intensive industries in politics. Speculating that there could be a carbon pricing mechanism soon, the Australian coal and energy industries became involved in delaying climate policymaking and spending huge sums of money as political donations. One report documented political donations from the coal mining industries and published data from 2006-7 to 2015-16 (Aulby 2017). It revealed that the coal mining industry made $16.6 million in political donations from 2006- to 2015, and the Liberal and National Party coalition received 81% of the donation (Aulby 2017). It further noted that the Liberal Party alone received 71% of the donations, and the Labor Party received 3%. Before the 2013 elections there, the Liberal Party in Australia received $1.8 million from the energy industry (D. Holmes 2016). The Liberals won that election and served the biggest interest of the energy industry at that time, repealing the carbon tax, the mining tax, and ETS legislation (D. Holmes 2016).

The election campaign agendas of different political parties are also widely influenced by the energy industry. Often, they are too powerful to manipulate everything. When Australian Green groups and the Labor Party started opposing Australia's coal export, wanted an end to that, and started campaigning for creating support for renewable energies, it became one of the most divisive election campaigns in 2013 (McKibben 2013). The Liberals campaigned against the Green's and Labor's agenda against coal production, arguing that it would destroy the economy, people would lose their employment, it could bring severe starvation among people, and it could be a US plot to bring down Australia's industrial and the employment sector (McKibben 2013).

It is not only the Liberal party in Australia that works to protect the interests of the energy, especially the coal companies (Davies 2015; D. Holmes 2016). Many Labor leaders also do that. The reason is that the energy companies employ leaders from the major political parties

in big positions in their companies, and the individual leaders work for energy companies for their benefit (Davies 2015; D. Holmes 2016). In 2009, former Prime Minister Tony Abbott, then opposition Liberal Leader, called climate change “absolute crap” (Hudson 2019, 584). He emphasized the need for coal by making statements that coal is good for humanity, it need not be demonized, and it is essential for economic prosperity and downplayed the importance of addressing climate change and carbon reduction policies (Crowley 2017).

Many leaders became consultants in energy companies after ending their terms in the government. For example, former resource minister from the Labor Party, Martin Ferguson, became Chairman of the advising committee of the Australian Petroleum Production and Exploration Association (Davies 2015; D. Holmes 2016). The former climate change minister from the Labor Party, Greg Combet, became a consultant in two big gas companies, AGL and Santos (Davies 2015; D. Holmes 2016). Anna Davies (2015) reported that many names from all political parties in Australia have connections with the coal industries. For example, John Anderson and Mark Vaile from the National Party secured chairman positions in two big mining and coal industries (Davies 2015; D. Holmes 2016). Former Liberal Prime Minister John Olson joined Santos for a lobbying position (Davies 2015; D. Holmes 2016).

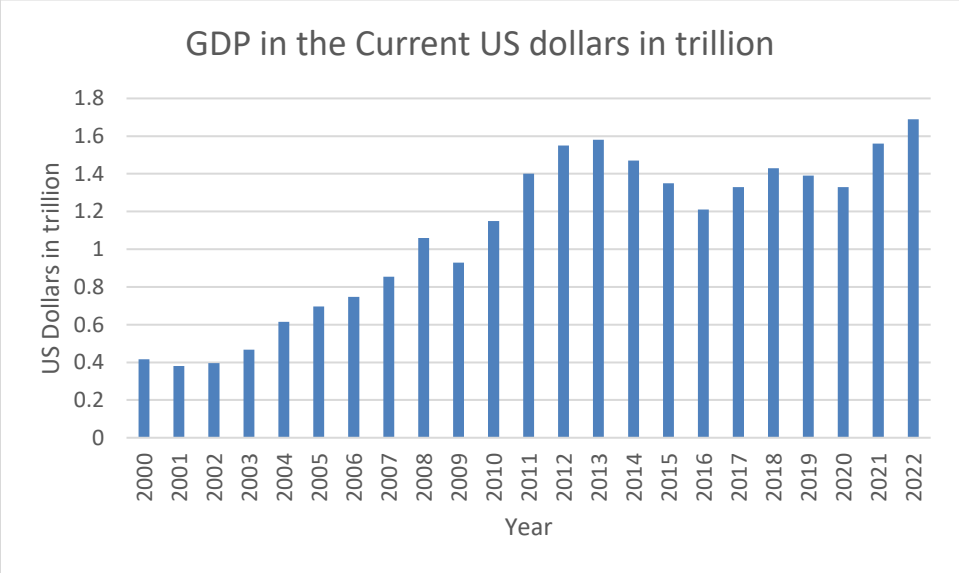
The delaying agenda of the fossil and coal industry protectors became successful. Negative projections about carbon tax incurring economic losses and having no benefits at all while avoiding the talk about the benefits of carbon reduction and reversing the climate change process fueled the negative public perception of carbon taxes. This is the reason that people elected the opposers of the carbon tax in 2013, and Tony Abbot, a very well-known climate denier and a close associate of the coal and gas industry, became Prime Minister. He kept his election promise of repealing the carbon tax. The industry lobby did not work during the Labor-

Greens coalition government from 2010 to 2013 because the Greens are strong opposers of corporate influence in politics and their lobby against carbon taxes or other carbon reduction policies. The Labor Party did not receive as many donations as the Liberals did from 2006 to 2015.

The influence of economic factors in the adoption and repeal of carbon taxes

As discussed in Chapter 2, many scholars have found that economic development and high income are associated with environmental degradation initially, but over time, nations with high incomes have better capacities to adopt various climate change mitigation policies, including carbon taxes (Clulow 2018; Galeotti and Lanza 1999; Kaika and Zervas 2013; Lieb 2003; Magnani 2001; Martínez-Zarzoso and Bengochea-Morancho 2004; Panayotou 1997; Poudel, Paudel, and Bhattarai 2009; Shafik 1994). Australia is an economically advanced country ranked 12th in the global ranking in terms of its GDP of $1.68 trillion and GDP per capita income of $64,491 in 2022 (Silver, Rasure, and Velasquez 2023).

Figure 4: GDP (in current US dollars) of Australia, 2000-2022



Source:(The World Bank Group 2022)

The economic development data indicates that Australia had the capability to introduce a carbon tax anytime it wanted. However, there was no significant change in the GDP prior to the decision of carbon taxes or before the decision to revoke it. Therefore, this data alone does not explain why Australia had carbon taxes in 2012 and not before or after. Also, why did it repeal the carbon taxes in 2014, not before or after?

Australia is ranked as the 14th largest per capita CO2 emitter country according to Worldometer[11] and theoretically, this would negatively impact the adoption of carbon taxes. According to the Australian government, Australia has the largest coal reserve, with 89,012 million tons of black coal and 81,234 million tons of brown coal reserves.[12] Coal export data shows Australia is topping that chart (Parra et al. 2019). It is reported that 54% of the Australian population's electricity is produced from coal, 20% from fossil fuel, and 24% from renewables (Mission Zero Putting Australia First 2021). All these conditions remained constant because the conditions did not change before and after the adoption of carbon taxes and during its repeal. The only change that happened was the entry of the Green parties into the coalition government of 2010 with the Labors, and that made the negative forces against carbon taxes have no influence in policymaking. The negative forces or opposition to carbon taxes regained their access to policymaking when the Greens lost power and were replaced by the Liberal-National Party coalition.

[11] Data available at: https://www.worldometers.info/co2-emissions/australia-co2-emissions/ (Worldometer, n.d.-a).

[12] Data available at https://www.ga.gov.au/digital-publication/aecr2023/coal (Australian Government 2023).

Conclusion

The carbon tax in Australia was formulated only because the Australian Greens, for the first time and only time, had an opportunity to influence policymaking in the Parliament in 2010. Their progressive ideas and values worked as pressure on the Prime Minister of that time to pass the carbon tax law and have a strong stand in the carbon reduction initiative. Had the Greens not been a part of the coalition government, the carbon tax would never have been there. The parliamentary and proportional system allowed the Greens to create pressure at the policymaking level despite the Greens having small numbers of seats in the legislature. The Labor Party, on the other hand, ideologically a social democratic party, was in favor of having an ETS and has been trying to formulate a carbon pricing mechanism since 2007. Their coalition with the Greens helped the Labor Party too to fulfill their election agenda of addressing the climate change problems. In addition, the Greens becoming a part of the government reduced the influence of the big corporation lobby and made them a weak challenger to their initiatives to adopt carbon taxes. Nevertheless, the Greens are not as strong as the Liberals and the Labors in the Parliament and when the Greens had to step down from their coalition in 2013 after the Labors lost the election, the carbon tax law was repealed by the coalition of the Liberal Party and the National Party. The case study reveals that the parliamentary and proportional systems allowed different political parties, including the ones with environmental concerns, to have more maneuverability at the policy level, making the adoption of climate policies and carbon reduction policies likely. Also, the system allows opposing forces to form a government that would work against the environmental and climate change policy goals, as happened in 2013 in the case of the Labor-National party coalition's winning of elections. In the Australia case study, we found that the adoption of carbon taxes was possible because Australia has a parliamentary and proportional

system that allowed the Australian Greens to form a coalition with the Australian Labor Party because the Labor Party did not have a majority in the Parliament in the 2010 election. The Australia case demonstrates that three conditions, therefore, need to be present there to have a successful adoption of carbon taxes: parliamentary type of government, proportional representation, and Green and/or Left party presence in the government. It shows that a parliamentary and proportional form of government ensures the presence of smaller and more diverse political parties like the Greens. However, a mere presence or increased seats in the legislature does not ultimately result in policy adoption. A carbon tax is adopted only when the progressive parties form the government within the parliamentary and proportional systems.

Australia is a case where we are observing how a group of top-level coal mining and gas industries is dominating the decision-making process through donations and job offerings to political leaders, and they, along with the political leaders in favor of them, are forming negative opinions about the carbon tax and other carbon reduction policies at the grassroots level. Many leaders and political parties in Australia worked as the pawns of the coal mining and gas industries. They just participated in how the coal and gas companies wanted them to do.

It was the opposition from the public and the maneuvering of the coal mining and gas industries that caused the abolishment of the carbon tax policy. The coal mining industries and others made huge sums of financial donations to the Liberal Party before the 2013 elections and the coalition of the Liberal Party worked exactly as the corporations wanted them to work by abolishing the carbon taxes and the coal mining taxes.

Chapter 5: Determinants of the adoption of a carbon tax in Mexico

Introduction

What were the determinants of a carbon tax in Mexico in 2014? This chapter aims to unravel the changes in Mexico leading to its decision to adopt a carbon tax in 2013. I am focusing not only on understanding the causes behind Mexico's carbon tax but also on understanding its timing. I am curious to know why Mexico undertook the policy in 2014, not before or after. The case study allows me to measure the influence of the political-institutional factors, such as the level of democracy, the type of government, and the electoral system, on adopting Mexico's carbon taxes and find out the changes in the conditions that made Mexico turn from a non-carbon tax country to a carbon tax one. The case study will help me know more about why a developing country like Mexico would want to have carbon taxes to address climate change at a time when other developing countries did not do so.

This dissertation has two goals: to understand the factors that cause nations to adopt carbon taxes and the specific timing of this policy's adoption. I have conducted a cross-country quantitative analysis of what determines the adoption of carbon taxes among all countries in search of a general pattern. I found that highly liberal democracies are more likely to adopt carbon taxes, and highly liberal democracies with proportional representative systems are also more likely to adopt carbon taxes. The quantitative analysis did not show any correlations between the parliamentary type of government and the adoption of carbon taxes. I conducted a case study on Australia to understand when nations adopt carbon taxes. The case study allowed me to control the political-institutional and economic variables because Australia has been a highly liberal democracy with a parliamentary and proportional representation system for a long time with no change in those conditions. I investigated changes in other factors that may have

influenced the decision to implement carbon taxes. The Australian case study also allowed me to know when and why a country would revoke a carbon tax because it did so within two years of the inception of the carbon tax. The research revealed that the parliamentary and proportional representative system allowed the Australian Greens - with their agenda for carbon mitigation policies, especially to have carbon taxes - to gain access to the coalition government led by the Australian Labor Party in 2010. The Greens had a few seats in the legislature but enough to form the coalition and pressure the Labor prime minister to adopt carbon taxes and prevent the industry lobby from blocking the policy. Ideologically, the Greens and the Labors (left-leaning party) hold homogeneous policy preferences about carbon pricing policies, environmental and climate change protections, wealth redistribution, and government interventions. Carbon taxes, therefore, were in place because of the collaboration between the Greens and the Labors. Carbon taxes were revoked in two years when the Labors lost the election of 2013 while getting replaced by the Liberal-National Party coalition, and the Greens no longer had leverage in the government. The case study helped me conclude that the combination of parliamentary-proportional representation allows smaller political parties with environmental and climate change policy agendas, like the Australian Greens, to access the government, not just to gain a position in the legislature and help the adoption of carbon taxes. In addition, when they do not have access to the decision-making or are no longer a part of a coalition government, adopting a carbon tax is impossible, as happened in Australia when the carbon taxes were revoked when the Greens were ousted from power.

The case study on Mexico confirms some of the findings of the quantitative study and the Australian case study by setting the arguments that the components of liberal democracy changed in 2000 in Mexico with the abolishment of a 71-year rule by a single party and

increased the participation of different political parties in the electoral politics while increasing the debates on climate change policy-making that later resulted in the adoption of carbon taxes. Though Mexico has a presidential system instead of a parliamentary one, it has a mixed majoritarian-proportional electoral representation that allows multiple parties to have their voices heard in the legislature and policymaking, and this confirms the findings of my quantitative chapter and the Australian case study chapter, that when this happens, there is more likelihood of the adoption of carbon taxes. The changes in democratization and electoral politics brought an environmentalist from a conservative political party, the National Action Party (PAN), to become President of Mexico in 2006, and a myriad of environmental and climate change laws and institutions were set up by that regime. The electoral incentives brought changes in the outlook of the Institutional Revolutionary Party, known as PRI (the party that ruled Mexico for 71 years), and other political parties, and they brought extensive reform agendas in energy, economy, taxation, and politics in 2012. PRI won the election of 2012 and created a pact (Pact for Mexico) to collaborate with all the political parties in the legislature to pass the reform bills that needed two-thirds majority support in the legislature. A carbon tax was included in the reform bills to address the carbon reduction goals, revenue collection, and energy policy reform. The PRI collaborated with the Partido Verde Ecologista de México (known as PVEM, the ecological green party of Mexico) and the Party of the Democratic Revolution (PRD, a left-leaning party) in passing the tax reform bill that introduced carbon taxes in Mexico in 2014. The adoption of the carbon tax brought a win-win situation for Mexico because Mexico's oil industry, Pemex, was incurring financial losses and burdened with large amounts of taxes to fund the government budget, and because Mexico's tax collection from sources other than the oil industry was very low. These twin economic challenges also made adopting carbon taxes a good

revenue-generation option. And internationally, Mexico retained its climate leadership role by joining the carbon pricing country club in COP21 in 2015.

In essence, the findings here align with the findings of the Australian case study because in Mexico, too, we are observing a coalition between the PRI, PVEM, and PRD in bringing the carbon taxes in, which is essentially a collaboration between a center-right party, a left party, and an ecological green party – all having a homogeneous policy preference about government intervention for more environmental and climate change protection within a democratic proportional representation structure (here Mexico has a mixed system with some form of proportional representation though not entirely). The case study of Mexico also shows the importance of having liberal political institutions in place for robust carbon reduction policies like carbon taxes, as the theory chapter and the quantitative study of this dissertation suggest.

Mexico's adoption of a carbon tax is a puzzling question because Mexico was the eighteenth country to adopt a carbon tax policy but the first developing country to do so. Developing countries lack economic, institutional, and technological capacities to address climate change. Their economy is too weak to invest in climate change research, formulation of mitigation and adaptation strategies, and technological innovations (Reddy and Assenza 2009). Since Mexico is a medium-income country, it faces financial and technical challenges in addressing climate change problems. In addition, Mexico is a non-Annex I country under the Kyoto Protocol and does not have any binding obligation to adopt carbon reduction targets (Balderas Torres, Lazaro Vargas, and Paavola 2020). Therefore, it is puzzling why Mexico unilaterally adopted a carbon tax in 2014 before the Paris Agreement of 2015, which created commitments and obligations for member countries. In addition, Mexico is an oil-producing and exporting country. It is one of the world's top-ranked oil producers. According to Worlometer, it

is ranked 17th globally in oil reserves. Despite this feature, it is puzzling why Mexico would be willing to adopt a carbon tax that would increase its fossil fuel price and might adversely affect its oil export. The literature on the determinants of Mexico's carbon tax and climate change policy is small. Scholars have looked at the membership of Mexico in international organizations, international pressure to adopt a climate policy, the ambition of Mexico for the leadership role as a developing country in the area of climate change policy-making, and economic plus environmental incentive to adopt carbon taxes (Balderas Torres, Lazaro Vargas, and Paavola 2020; Meirovich 2014; Skovgaard and Ferrari 2023; Yamin 2014). In this chapter, I aim to look at the influence of political factors, such as political structural change, leadership ambition, electoral politics, and domestic economic factors, on adopting carbon taxes in Mexico.

Methods

This is a single case study on Mexico to understand its policy decision for adopting carbon taxes and therefore, the most suitable and appropriate method is process tracing of events and causal mechanisms. Process tracing is widely applied in qualitative research to get a thick and detailed description of events and have a very "good snapshot" to understand the causal mechanisms (Collier 2011, 824). In this chapter, the literature on the determinants of carbon taxes and climate change policy, as well as the literature on the adoption of carbon taxes by Mexico and the democratization of Mexico, have been used to test theories, formulate hypotheses, and observe whether they are applicable to understand the events leading up to carbon taxes in Mexico. The relevant literature is also used as the data source for the study. Here, a comparison is made between the time when Mexico had a one-party illiberal democratic regime from 1929 and the time after multiparty liberal democracy was established in 2000. Then, the factors that led to the adoption of carbon taxes in 2013 are examined. I am also looking at a

country with some proportional representation that brings all political parties into the legislature and ensures everyone's voice is heard and addressed. Here, more emphasis is placed on the timeframe from 2000 to 2014 to understand the adoption of carbon taxes in Mexico.

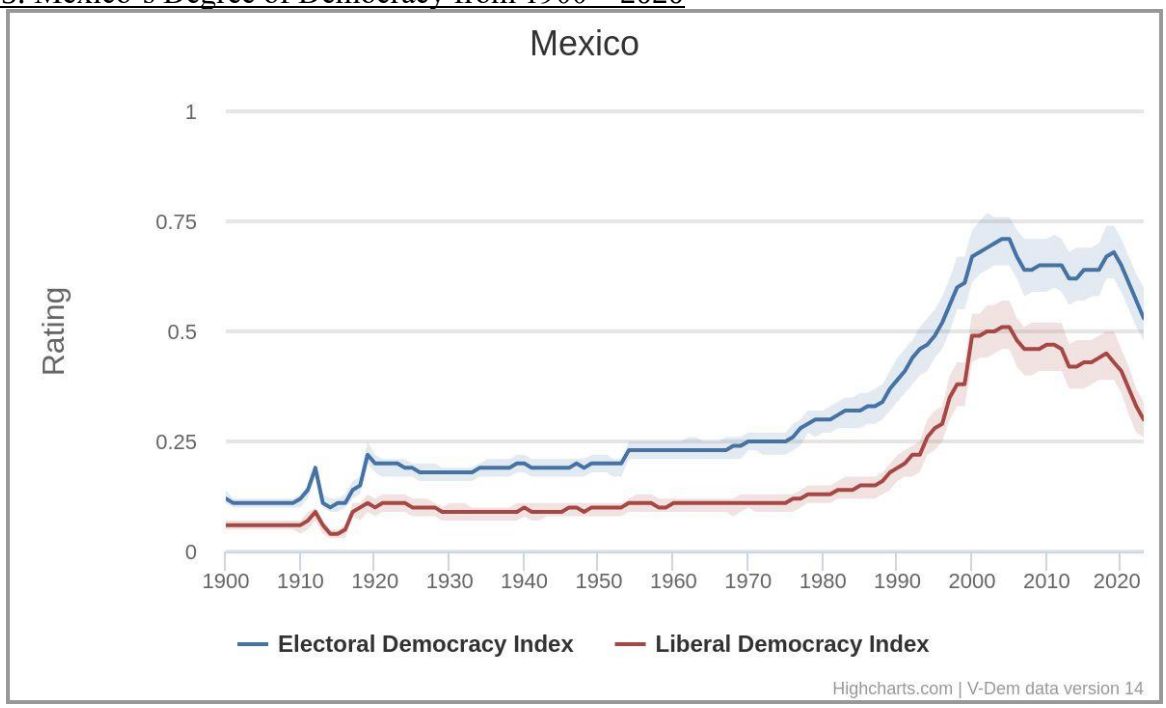
Structural changes that contributed to the adoption of carbon taxes

Many scholars have researched how the democratic institutional structures of a country influence its environmental and climate change commitments, policy-making, and performance, as discussed in the theory chapter (see chapter 2) (Bernauer and Koubi 2009; Lachapelle and Paterson 2013; Neumayer 2002; Payne 1995). This study expects Mexico to show evidence of addressing climate change problems and making climate change commitments and policies as it democratized over time. Since democracy allows people to think and discuss environmental and climate change problems and debate policy options, the public gets sensitized and informed about the seriousness of the issues, and it is expected that environmental and climate change issues are incorporated into the political agenda and the policymaking level in democracies (Neumayer 2002; Payne 1995). In addition, when there is a multi-party electoral system with an extensive range of civil liberties, political leaders are compelled to consider public perspectives on environmental and climate change problems to attract voters who support environmental and climate change actions because political leaders want to avert any possibility of losing in the political competition. Democracies facilitate a competitive environment amongst the different political parties where all would like to address compelling challenges of environmental and climate change impacts on the population and offer them preventive policies to appeal for the vote (Neumayer 2002; Payne 1995). This study expects that Mexico will show evidence of this process too, along with more civil liberties, freedom of speech, freedom of association, right to vote, and a multi-party electoral system to emerge in Mexico.

Researchers argued that democracies sign and ratify international environmental agreements and treaties more, get more memberships in international organizations, establish national reporting and assessment bodies about the environment and sustainable development, and make more commitments to protecting the environment (Neumayer 2002). In addition, another worth mentioning research by Lachapelle and Paterson (2013) found that democracies are more likely to implement a variety of climate change policies (Lachapelle and Paterson 2013). This study predicts that Mexico would have done the same and would show some pieces of evidence.

In contrast to democracies, scholars argued that in autocratic regimes (discussed in Chapter 2 as well), leaders do not address environmental and climate change challenges because there is no electoral competition to make political leaders prioritize such policy agendas and or address the pressing problems of the population or things that matter in public opinion (Neumayer 2002). There is no civil liberty to discuss or criticize the policymakers, nor is there any accountability to the citizens. Autocrats spend their national income only on the ruling regime and their supportive bureaucrats and elites as they do not have any reason to do public spending for public benefit, especially in environmental degradation and climate change (Neumayer 2002). We see a similar process of events happening in Mexico - though not entirely autocratic because it was having elections - it remained under a single-party rule for 71 years with shrinking civil liberties and often fake elections. The PRI, took over power in 1929 and remained in power until 2000 (Edmonds-Poli and Shirk 2020). However, scholars argue that Mexico started to democratize incrementally by taking various reform policies to come out of the autocratic political structure from the 1980s (Edmonds-Poli and Shirk 2020). The quality of its democracy remained low until the year 2000.

Figure 5: Mexico's Degree of Democracy from 1900 – 2020



Source: (V-Dem Institute 2022)

In addition, Mexico has a presidential system with a mixed majoritarian and proportional representation in the legislature. The literature review in the theory chapter (chapter 2) shows that there is an argument that parliamentary forms of government are more conducive to climate change and environmental policy adoptions, even taxes, because of less separation of power in the parliamentary system and more legislative cohesion (Persson, Roland, and Tabellini 2000). However, scholars found conflicting outcomes in their research and have disagreement about the effect of the type of government on the adoption of climate change policies and performances (Bernauer and Koubi 2009; Bueno de Mesquita, et al. 2005; Skovgaard, Ferrari, and Knaggård 2019). Mexico's case study shows us that within a presidential form of government, when PRI came to power in 2012, it needed legislative cohesion and coalition building as it tried to pass various reform bills in the legislature that required two-thirds of a majority. PRI signed an agreement with other political parties and formed alliances with them to pass the laws, and a

carbon tax was passed during that time. This finding shows that the presidential form of government also can have coalition formation in the legislature that may lead to the adoption of carbon taxes. This reinforces the argument of Skovgaard et al. (2019) that both parliamentary and presidential forms of government adopt carbon pricing policies. In this dissertation, my quantitative study also reveals that the parliamentary form of government is not correlated with the adoption of carbon taxes.

However, a mixed majority and proportional representation ensured the participation of many political parties in Mexico, and everyone had their perspective and votes on the reform agendas. Confirming my findings in the quantitative chapter and the Australia case study, Mexico also shows that proportional representation worked as a predictor that could explain the adoption of carbon taxes because smaller parties like PVEM (the ecological green party) were able to form a coalition with the PRI before the election. After the election, they formed a coalition with the PRD in the legislature to pass the fiscal and tax reform bill, which incorporated carbon taxes with the goal of carbon reduction.

Mexico under the PRI as an obstacle to a strong climate change policy

Since 1929, the PRI was able to maintain its rule until 2000 by applying the following three main methods (Edmonds-Poli and Shirk 2020):

a. Repression and elimination of any political opposition.

b. Centralizing presidential power and creating a system of no checks and balances between the executive, the legislature, and the judiciary.

c. Control of the media and restrictions on civil liberties.

Opposition parties could not operate in the Mexican political environment under the PRI until the late 1980s (Bruhn 2010; Edmonds-Poli and Shirk 2020). It is argued that there was

systemic repression, harassment, disappearance, and even killing of whoever tried to oppose the PRI rule (Edmonds-Poli and Shirk 2020). An author called it a single-party hegemony (Bruhn 2010)In addition, widespread election fraud occurred during these decades, and support for the PRI was bought by giving money and benefits to some people.

The centralization of power by the executive was very severe too. The PRI changed the electoral rules in 1946 and established a new electoral body where the chief of that federal electoral commission would be the Secretary of Interior, a close appointee of the President, and a PRI member (Edmonds-Poli and Shirk 2020). This commission was set to oversee elections, campaigns, candidacy, political party registration, and all legislative and presidential elections (Edmonds-Poli and Shirk 2020). The entire election process came under the control of the President of Mexico, and anyone who opposed the PRI did not get candidacy by the election commission (Edmonds-Poli and Shirk 2020). Unfortunately, the PRI had landslide victories in all elections happening afterward until 2000 in the absence of any healthy electoral competition and activities of other political parties. Mexican President could hold office for one term and then select the next presidential candidate from the same political party, the PRI (Edmonds-Poli and Shirk 2020). That also created more consolidation of power within the hands of the President because the potential candidates from the President's party would do whatever the President wished to please the President. The legislature, the judiciary, and the local and subnational bodies were not separated from the control of the PRI (Edmonds-Poli and Shirk 2020).

Several protests happened from time to time in 1945, 1958, 1959, 1967, and 1968, but all were cracked down with arrests and imprisonment (Edmonds-Poli and Shirk 2020). Frequent repression was also used to intimidate people and prevent any protest or demand for democracy and civil liberties.

Changes in the political and economic sphere started to emerge in the 1970s in Mexico (Edmonds-Poli and Shirk 2020). The legitimacy question of the PRI and its internal conflicts became acute (Edmonds-Poli and Shirk 2020). Smaller political parties wanted to enter into electoral politics and larger population was unhappy with the autocratic regime because of violation of their civil rights and widespread repression. To address these problems, the PRI brought a very significant reform in Mexican politics in 1977 with the Federal Law of Political Organizations and Electoral Processes that allowed other political parties to enter the electoral politics (Edmonds-Poli and Shirk 2020). The law increased seats in the legislature and created a threshold of 1.5% national vote or 65000 nationally distribute membership in the party for any political party to have official registration (Edmonds-Poli and Shirk 2020). However, the Secretary of Interior still remained the Chief of the Federal electoral Commission and electoral process remained under the PRI control. There were subsequent reforms in the electoral rules and the constitution that the PRI brought to address its legitimacy crisis and allow more political parties to get into the electoral politics. The most significant reform came in 1996 when the executive branch was completely separated from the electoral body (Edmonds-Poli and Shirk 2020). The Federal Electoral Initiative (IFE) replaced the older commission, and the composition of the body was changed, too. IFE had its independent Presidency and Executive secretariat to run the election process by replacing the Secretary of Interior's position as the Chief (Edmonds-Poli and Shirk 2020). It is widely believed that Mexico was able to create an independent electoral body for the first time to hold a free and fair election. The result of the reforms was reflected in the election of 2000 when the PRI lost to the National Action Party (PAN) (Edmonds-Poli and Shirk 2020).

Economic decline from the early 1980s contributed to the political and economic reforms as well in Mexico. Mexico became the fourth largest oil producer country in the 1970s and was experiencing a huge economic boom (Edmonds-Poli and Shirk 2020). In 1980 its GDP growth rate was 8% (Edmonds-Poli and Shirk 2020). However, the dictatorship in Mexico was extracting huge foreign debts to run the government spending for the bureaucracy, the supporters, the elites, and the beneficiaries of the ruling party. In 1981, Mexico went bankrupt as the price of oil decreased, and Mexico's growth rate went down to 0% in 1982 (Edmonds-Poli and Shirk 2020). Mexico had to declare that it was unable to return foreign debt. In this grim situation, the dictatorship had no other option but to turn to the developed democratic and capitalist free market bloc of countries and increase Mexico's trade to revive the economy. Mexico joined GATT in 1986 and signed the North Atlantic Free Trade Agreement (NAFTA) in January 1994 with the USA and Canada (Edmonds-Poli and Shirk 2020). The aim was to increase foreign trade and decrease foreign debt. NAFTA also allowed American investors to enter Mexico for investment and utilize their cheap labor. There is an argument that the opening up of the border because of NAFTA brought modernization ideas with it (Martínez 2018), and Mexico delved into the internationalization process by getting more memberships in various international treaties and organizations. Some scholars, though, differ and argue that NAFTA did not include any conditions for democratization (Cameron and Wise 2004). Soon after signing the NAFTA, in May 1994, Mexico joined the Organization for Economic Cooperation and Development (OECD), which is mostly composed of advanced, wealthy industrialized economies. OECD has membership conditions that include free market economies, high GDP per capita income, democratic structures, and respect for human rights. The entry of Mexico into the free market bloc by NAFTA and the stabilization of its GDP per capita enabled it to enter the

OECD group. Also, they created pressure upon it to democratize more by allowing multi-party electoral politics and free and fair elections because it had a one-party regime.

The events under the PRI indicate that it never prioritized any climate change agenda to address climate change problems until the opportunities for joining the developed world for trading purposes emerged and the opportunity to enter the Kyoto Protocol came. The PRI was more invested in domestic economic and political problems than in climate change.

Increasing opportunities for climate change policies under Felipe Calderon

Climate change initiatives dramatically increased between 2006 and 2012 when Felipe Calderon became the president of Mexico. It was not PAN as such that changed Mexico's outlook on climate change because, after the 2000 election, when Vincent Fox formed the government, he took some minor initiatives on climate change but did not take as many initiatives as Felipe Calderon did subsequently. The Vincent Fox administration ratified the Kyoto Protocol in September 2000, and then started national and international commitments and created new institutional set-ups to evaluate Mexico's climate change problems (Balderas Torres, Lazaro Vargas, and Paavola 2020). The most significant initiative was the establishment of the Inter-ministerial Commission on Climate Change in 2005 to evaluate Mexico's climate change problems, create and implement national strategies climate change, and oversee the Clean Development Mechanism (CDM) projects in Mexico under the Kyoto Protocol to promote sustainable development in Mexico (Balderas Torres, Lazaro Vargas, and Paavola 2020). It is noted that one-third of the total number of 192 CDM projects in Mexico started during the Vincent Fox era (Balderas Torres, Lazaro Vargas, and Paavola 2020).

However, it was President Felipe Calderon who started signing and ratifying international environmental treaties and agreements, making international environmental commitments, and

formulating national policies and actions regarding environmental and climate change in large numbers from 2006 to 2012. The following initiatives were taken during his regime:

- Started developing and publishing the National Strategy on Climate Change (NSCC) regularly in 2006 (Balderas Torres, Lazaro Vargas, and Paavola 2020).
- The law for Bio-energy Promotion and Development was passed in 2007 to promote the production and commercialization of bioenergy from different sectors (Climate change laws of the world, n.d.)
- Law for Sustainable Energy Use in 2008 (IEA 2014).
- It established a Special Program on Climate Change (PEGG) in 2009 (Averchenkova and Guzman Luna 2018; Miguel 2021).
- It introduced National Development Plans, a national climate change information system, Climate Change Funds, a high-level climate change commission, and the National Institute of Ecology and Climate Change (INECC) with the goal of enhancing the environmental protection regime domestically (McCain 2012).
- Passed the General Law on Climate Change (GLCC) in 2012. The law had provisions of Mexico's pledge to reduce GHG emissions from the level of 200 by 30% by 2020 and 50% by 2050. It also established a National System on Climate Change (SINACC) that incorporated all climate change-related government agencies to formulate and implement policies in a coordinated manner (Averchenkova and Guzman Luna 2018; Miguel 2021).

During this time, Mexico made a very important international move towards taking climate change actions and becoming a climate leader:

- In 2010, Mexico hosted the Cancun Conference of the UNFCC (COP16) and emerged as a leading country in addressing climate change problems (Balderas Torres, Lazaro Vargas, and Paavola 2020).

In the 2006 elections, Felipe Calderon as a presidential candidate from PAN emphasized the continuity of economic progress and stability of the country that the voters experienced during the administration of Vincent Fox (Moreno 2007). There were low inflation rates, high economic growth rates, and high oil prices that gave an advantage to PAN in the election compared to PRI (Moreno 2007). Historically, the PRI was not very efficient in handling the economic problems of Mexico and was criticized for its authoritarian behavior, crime, corruption, violence, and public suffering (Moreno 2007). The election of 2006 was won by the PAN candidate Calderon, and after the elections, he started emphasizing the importance of addressing the climate change problems more (Ramírez 2014).

The climate change initiatives of the Calderon era (2006-2012) show a dramatic change from the PRI era (1929-2000) in terms of adopting policies and the PAN era under Vincent Fox (2000-2006) in establishing institutions that would work only for environmental problems and climate change issues. It can be argued, therefore, that it was not the PAN as a political party that brought the change in the outlook of Mexico's climate initiatives, but rather the individual leadership goals of President Calderon were responsible.

In an interview with the International Bar Association, Global Insight in September 2014,[13] President Calderon (he was no longer in office during that time) was asked about why he

[13] Interview: "Former Mexican President Felipe Calderon discusses climate change and the law" by IBA Global Insight, September 2014. Available at: https://www.youtube.com/watch?v=Vj-VQwMAjkA .

chose to take many initiatives to address climate change problems. President Calderon emphasized three reasons in his interview. The first one was his personal inclination, which was inspired by his father during his childhood, to work towards addressing the inequality between the rich and the poor, as well as working for the betterment of nature and the environment (IBA Global Insight 2014). He said that his father's teachings inspired him to create and enforce laws and policies directed towards sustainable development and sustainable use of energy, and he concentrated on providing more social equality and a competitive economy for individuals to flourish (IBA Global Insight 2014). The second reason for his climate initiatives is the increasing severity and intensity of climate and natural disasters (IBA Global Insight 2014). He mentioned the severe droughts, hurricanes, and typhoons that Mexico was experiencing and how they have created a dangerous situation for the inter-tropical country (IBA Global Insight 2014). He wanted to act on climate change because climate change was posing severe threats to Mexico (IBA Global Insight 2014). The third reason was his belief that individual actions are as necessary as international treaties and actions (IBA Global Insight 2014). He thinks individual actions are more effective because international treaty commitments are non-binding (IBA Global Insight 2014). He mentioned that Mexico became the first developing country to unilaterally set targets for reducing carbon emissions and when someone makes public commitments to address a problem like climate change, it becomes binding for the individual, and it is more binding than any international agreement (IBA Global Insight 2014). He said that this is why he went for unilateral action by formulating a policy on climate change with the target of reducing carbon emissions (IBA Global Insight 2014).

From his interview, it is evident that President Calderon looked for both individual climate leadership and the nation's leadership position among the developing countries. As

discussed in chapter 2 of this dissertation, climate policies can be driven by exemplary leadership goals of an individual, and with national goals, targets, and policies, a nation can try to set good examples for others under a certain leadership and try to establish the nation as a climate leader. Mexico indeed hosted and presided over the 2010 Cancun Conference of UNFCC (Macey 2016). There was a standing ovation for Mexican President Felipe Calderon because of his outstanding contribution to making the conference successful and attaining completion of the Cancun Accord (Macey 2016). The event hosted by the UNFCC heightened Mexico's image and reputation in international forums. The climate consequences were not driven by rhetoric during the conference because Mexico changed its national law to realize its international pledges. It made strong and ambitious commitments in the Copenhagen Agreement of 2009 (Climate Action Tracker 2013). Mexico's adoption of the General Law on Climate Change in 2012, which had specific carbon reduction targets, indicates its ambition to lead developing countries in terms of carbon reduction and climate change policy formulation. The Paris Agreement of 2015 made it obligatory for member countries to have nationally determined contributions to reduce CO2 emissions. Mexico undertook the law three years before the Paris Agreement of 2015.

Moreover, all the climate change initiatives took place after 2000, and it gives evidence that climate change policymaking happened after democratization in Mexico. The political structural change from the 1990s to the 2000s in Mexico allowed alternative political parties to come to office, and a political space was created for debates on policy issues and allowed an environmentalist like Calderon to come to power. The change in leadership brought different ideologies and policy ideas to the legislative and executive branches. Mexico turned to environmental and climate change initiatives because of those structural changes as well. If PRI continued to rule Mexico in an authoritarian manner, climate change would not have received the

same importance as it did in the 2000s when other developing countries did not even start thinking about climate change and carbon reductions.

Electoral politics of 2012

PRI returned to power after 12 years by winning the 2012 general elections. The PAN government headed by President Calderon (2006-2012) was facing criticism for not attaining any success in the economic and security areas of Mexico, disappointing the population's expectations (Flores-Macías 2013). The criticism of the PAN regime was surrounded by its failure to revive the economic performance of Mexico as well as the tackling of the intense drug trafficking problem by using violent means (Flores-Macías 2013). Economic recession and decreasing economic growth rate of Mexico reduced the popularity of President Calderon and his party PAN significantly before the 2012 general elections (Flores-Macías 2013). Voters showed their dissatisfaction with the election because of the increased rate of unemployment, economic inequality, and economic challenges during that time (Camp 2013). In addition, PAN failed to address the discontents of the voters in its election agenda losing the competition with PRI (Camp 2013). Many voters found PRI to be an alternative to PAN and believed that it would be able to bring economic prosperity again. Besides, there was an internal strife within the left political party PRD that gave PRI a more advantageous position in the 2012 elections (Camp 2013).

Two important aspects of the electoral politics of 2012 contributed to the adoption of carbon taxes in 2013. One is that the PRI had to come up with an election agenda that would assure the voters that the PRI would make policies to address the failure of the PAN regime if they won the election. PRI offered promises to reform the economic, fiscal, energy, taxation, employment, education, and financial sectors, etc., to present an alternative prospect to the voters

(Serra 2014). Carbon taxes became part of the taxation reform that PRI undertook a year after the election. Another aspect of the electoral politics to contribute to the adoption of carbon taxes is that PRI made a coalition with the PVEM (the Ecological Green Party) of Mexico before the elections to ensure its winning (Camp 2013; Spoon and Gómez 2017). The PRI made an agreement called Commitment for Mexico with the PVEM before the election to increase its voter support (Camp 2013). Despite having ideological differences, since PRI is a center-right party whereas PVEM is a green party, they have been forming electoral alliances since 2003 (Spoon and Gómez 2017). It is argued that the alliance was made only with the target of securing winning office in the executive and legislative branches, and they did not have any specific policy goals together (Spoon and Gómez 2017).

One way for PRI to realize its reform agendas after the election was to seek support from the two other large parties, the PAN and the PRD, because it did not have a two-thirds majority in the two chambers of Congress needed to pass the reforms. PRI started to discuss with the opposition parties in July 2012 about the reform proposals, and was able to sign a Pact for Mexico on December 2, 2013, with PRD and PAN (Herrara and Urrutia 2012). They decided to cooperate and discuss reform bills on three sectors in the Pact: telecommunications, education, and fiscal reform to address the debt and other economic burdens of Mexico (Herrara and Urrutia 2012). The Pact for Mexico paved the way forward for PRI to address a myriad of reforms in the political and economic sectors by 2013, and within those reforms, carbon tax became one component amongst others that could address the government's revenue generation problems.

PRI had to offer all possible changes in the policy arenas in Mexico in 2012 to win elections and prove to the people that they really would carry those plans. PRI had the image of creating a single-party regime in Mexico and curtailing civil liberties, as it ruled Mexico for 71

years before PAN formed the government in 2000. PAN won elections twice in a row, and to replace PAN, PRI needed to offer better policies and better management in all aspects of governance. This is one very compelling reason for PRI to work for carbon emission reduction and climate change policymaking too. Despite the opposition from PAN, the party that created the climate change leadership role of Mexico in the international forums and passed national laws to reduce carbon emissions, PRI went ahead with the carbon tax policy to address carbon emissions, too. The PAN, as a conservative right-wing party, did not support the tax reform bill and did not support carbon taxes either. On the other hand, the PRD, as a left-wing party, did not support the energy reform bill that asked for privatizing the energy sector. For this reason, the PRI sought two sorts of coalition within the legislature: on one front, PRI made a coalition with the PRD and PVEM to pass the tax reform bill, and on another front, PRI made a coalition with the PRD to pass the energy reform bill.

PRI wanted to maintain the same climate change leadership image of Mexico at the international forums. This is evident from President Pena Nieto's participation and address at COP 21 in 2015, where he joined other carbon pricing nations to talk about carbon pricing and emphasized the role that Mexico played in setting an example for developing countries by initiating and implementing carbon pricing and carbon reduction goals. He said: "The economic rationale is clear: setting a real price on carbon will reduce consumption and encourage economic agents to invest in more efficient processes and a cleaner, more sustainable energy mix" (Gobierno de Mexico 2015). He also pledged Mexico's commitment to work for the global cause and responsibility to fight climate change and reduce carbon consumption. He added, "… we are therefore taking concrete measures and promoting public policies in favor of the environment and sustainable development." (Gobierno de Mexico 2015).

PRD supported the carbon tax scheme and the entire tax reform bill of 2013 prepared by the PRI because, from the ideological standpoint, it is characterized as a left-wing political party (Bruhn 2021) and it supports government intervention and redistribution of wealth. PRD emphasizes an economic policy where the government would spend more on social welfare policies, work for poverty alleviation, provide rights to have an abortion, same-sex marriage, and uphold democratic values (Helfgott 2023b). Their ideological foundation determined their favorable position on tax reform and carbon taxes. The PRD was a part of the Pact for Mexico too, with the PRI in its reform initiatives, and it provided the support to pass the bill with 11 votes in favor and 9 votes against in the Senate and 73 votes in favor and 23 votes against in the House of Deputies (Barrientos Del Monte and Añorve Añorve 2014).

Table 9: Voting on the tax reform bill in the Senate in Mexico, 2013

Party Name	Yes	No	Abstention
PRI	54	0	0
PAN	0	36	0
PRD	11	9	0
PVEM	7	0	0
Others	1	5	0
Total	73	50	0

Source: (Barrientos Del Monte and Añorve Añorve 2014).

Table 10: Voting on the tax reform bill in the Chamber of Deputies, 2013

Party Name	Yes	No	Abstention
PRI	207	0	0
PAN	0	113	0
PRD	73	23	0
PVEM	25	0	0
Others	12	28	0
Total	317	164	0

Source: (Barrientos Del Monte and Añorve Añorve 2014)

PAN, on the other hand, is a conservative right-wing political party in Mexico (Bruhn 2021) and it emphasizes a free market, less government power, and less government intervention in the economic sphere while supporting some social redistribution (Helfgott 2023a; Shirk 2000).

The PAN has another characteristic of upholding spiritual and religious values (Shirk 2000). It encourages individual economic and spiritual development with less government role in that process (Shirk 2000). Because of its ideological basis, the PAN opposed PRI's fiscal and tax reform proposals and took a position against tax increases. A legislator from the Chamber of Deputies, Jorge Villalobos, expressed frustration in the media about the tax proposal being very harmful and unreasonable to the people (Alper and Gutierrez 2013). Voting in the tax reform in Congress in 2013 showed their opposition to the newly increased taxes. All Pan Senators (36 in total) and all PAN Deputies in the lower Chamber of Congress (113 in total) gave a negative vote to the tax reform bill at that time (Barrientos Del Monte and Añorve Añorve 2014).

While PVEM was in the coalition government of 2012 with PRI, it wanted to benefit from the alliance more than other things by covering its campaign expenditure, increasing its seats in the legislature, and influencing policy (Spoon and Gómez 2017). It is difficult to infer that PVEM was the reason that PRI decided to implement the carbon tax policy. It ideologically supported carbon reduction measures and climate change policies. It is considered as ideologically positioned in the center like PRI and, therefore, was comfortable with making an alliance with PRI (Bruhn 2010). However, it is evident that PVEM supported carbon taxes, and all members of PVEM voted in favor of the tax reform bill in the Senate (7 votes in favor, no negative votes, and no abstentions) and in the Chamber of Deputies (25 votes in favor, no negative votes, and no abstentions) (Barrientos Del Monte and Añorve Añorve 2014).

Domestic economic reasons for the adoption of carbon taxes in 2013

Mexico has faced a myriad of economic problems since the 2000s that can be considered as deterministic factors for adopting a carbon tax because it provided a new revenue collection

source. It needed to focus on revenue collection, reducing the loss of Pemex, allowing privatization, and increasing economic growth.

Historically, Mexico has been collecting small amounts of revenue compared to other countries. In 2012, its revenue collection was only 9.5% of the GDP (Cárdenas Sánchez 2018). If oil revenue is deducted from the revenue collection data, the revenue collection amount is small. For the past 30 years, most of the Mexican government's revenue has been generated from oil revenue. About 30-40% of the government spending of Mexico came from Pemex, its nationalized oil company (Malkin 2013). Mexico's revenue collection has remained very low since the 1950s (Gutiérrez 2021). There were several attempts to reform the tax system, but the political leaders failed to pass any reform bills because of opposition and lobbying from the higher-income groups (Gutiérrez 2021). The tax reform included 4 new excise tax sources that included carbon taxes, and it was estimated that the government would collect 2 billion dollars as carbon taxes after the reform (Garcia and Barrera 2013). The entire tax reform bill was designed to remove the special treatments and privileges that the business and high-income groups had (Mexican government press note). However, it was projected that the reform would increase the revenue collection from the 2013 level of 9.6% to 13.2% in 2019 (Gutiérrez 2021).

Another reason for having the carbon taxes implemented was the economic loss that Pemex was experiencing. The carbon tax would not only generate revenues that would relieve some of the dependency on the revenues from Pemex but also would encourage renewable energy production. The Mexican government was extracting its federal government budget from the government-owned Pemex. According to a 2013 report by Wood, the Mexican government received 30% of its budget revenue from Pemex at that time. In addition to bearing the burden of giving revenue to the government, Pemex was prevented by constitutional barriers from having

any joint ventures with foreign companies and did not have any access to technologies to explore its deep-sea oil reserves (Wood and Martin 2018). Despite having the world's eighth-largest oil-producing capacity, Pemex faced loss, and its production decreased alarmingly (Wood 2018). From 2006 onwards, Pemex could not generate any profit at all, and on top of that, it had to pay $57 billion in taxes to the government in 2008 (Wood and Martin 2018). There were several attempts to reform the energy sector to allow privatization as well as foreign companies to collaborate with Pemex in its oil exploration, including one reform attempt in 2008 by President Calderon of PAN. However, they all were unsuccessful because of opposition from various political parties, especially PRD and partially from PRI, because they attached nationalistic feelings to Pemex and did not want to allow foreign companies to intrude into Mexico's oil sector (Wood and Martin 2018). The failure of President Calderon to revive Pemex gave an opportunity for PRI or President Pena Nieto to come forward with a dramatic energy reform proposal, including the tax reform proposal and a multitude of other reforms, win the election, and return to office. The PRI was successful in passing the energy reform bill in Congress with the support of the PAN because the PAN originally had one energy reform proposal in 2008. Moreover, as the PAN was part of the Pact for Mexico, it supported the energy reform bill, even if it was against the carbon taxes and the tax reform bill. From the perspective of PRI, the justification for having a carbon tax was very strong despite the fact that the tax would increase the price of fuel and there would be a risk of endangering the market competitiveness because of the problems of Pemex's profit loss and technological backwardness and the low rates of revenue collection from other sectors other than PEMEX were very large and the tax reform bill with its new sources of revenue generation would reduce these problems a lot. Therefore, the PRI sought

to form a coalition with the PAN to pass the energy reform bill because it could not secure the support of the PRD on that.

Alternative theories to explain Mexico's carbon tax

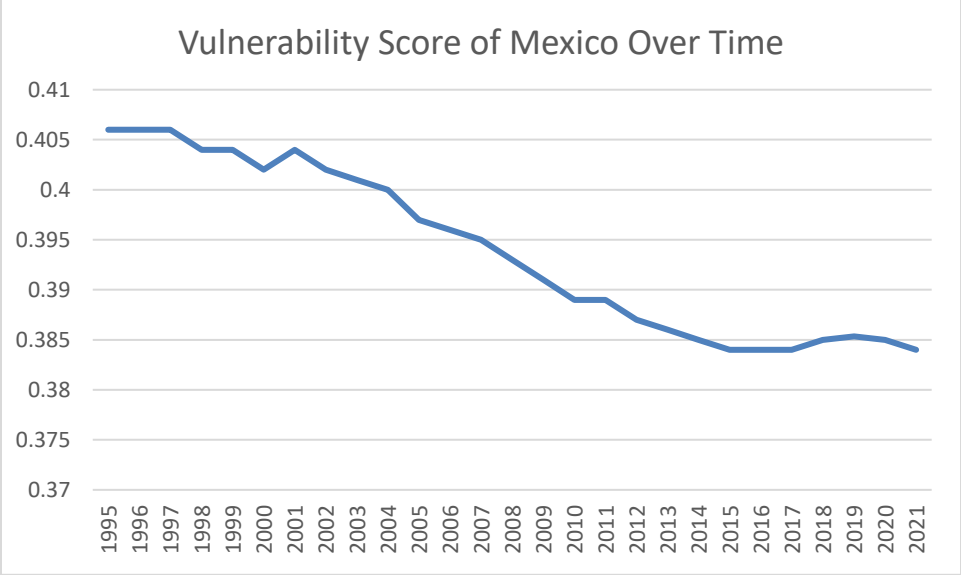
There are alternative theories that explain why a country would adopt strong climate change policies and why a country would adopt a carbon tax. They apply to Mexico somewhat but do not entirely capture the conditions that made Mexico decide on the carbon tax. One such alternative explanation is that a country's economic development determines its ability to adopt a carbon tax policy (Geoffroy Dolphin, Pollitt, and Newbery 2019; Levi, Flachsland, and Jakob 2020; Skovgaard, Ferrari, and Knaggård 2019; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). The Logic is that economic development enables countries to invest more in climate change mitigation. However, developing countries face many challenges regarding basic needs and industrialization. Developing economies also lack advanced technology like nuclear, solar, or wind power production, and the cost of setting those up is very high for developing countries. Mexico is still considered a developing country and cannot be considered as having an advanced economy to invest entirely on its own in carrying out climate mitigation strategies. This is evident from its pledges for international aid and support in climate mitigation. Since Mexico's status as a medium-income developing country did not change before the adoption of carbon taxes, it is predicted that it did not influence its decision on carbon taxes.

Another alternative explanation is that Mexico's climate change vulnerability may have contributed to the decision to adopt carbon taxes. Theoretically, it is argued that democratic countries with high climate change vulnerability will have strong climate actions (Peterson 2021). Mexico suffers from the global temperature increase, heatwaves, and less precipitation during the hot days (Earth Observatory 2021) like the rest of the world, endangering its

biodiversity, forests, and agriculture. One study projects that 2 degrees temperature increase and a 10% precipitation decrease will devastate the forests, scrubs, and steppes of Mexico and significantly reduce them (Villers-Ruiz and Trejo-Vázquez 1997). The number of affected people because of droughts, temperature increase, and less precipitation in Mexico is 9 million because they are dependent on irrigation and agriculture and are losing jobs (Jessoe 2018). From the 1990s, Mexico started to have very severe and frequent surges of droughts, making most of its farming land too dry to produce any crop or vegetation. The intensity of the droughts increased extremely in 2003 when 64.8% of its land was experiencing drought (Monitor de Sequía en México 2022). In 2006, farmers were unable to produce maize and corn, their traditional crops, as 83% of Mexico's land was experiencing drought (Monitor de Sequía en México 2022). The situation kept on reaching the point where everyone started to panic. In 2008, 88.7% of land was covered in drought, and in 2011, it was even more massive as 95% of its land was experiencing drought and was too dry to produce crops (Monitor de Sequía en México 2022). Its reservoirs were drying up, and about 61 reservoirs are in critical condition now (Miguel 2021).

That being said, the vulnerability score from the ND-GAIN Database of the University of Notre Dame shows that Mexico has a consistently declining trend regarding climate change vulnerability. The theory, therefore, does not explain the adoption of carbon taxes.

Figure 6: Vulnerability to environmental problems in Mexico, 1995 - 2021



Source: ND-GAIN Data (University of Notre Dame 2021)

Conclusion

My objective in this chapter was to understand the determinants of a carbon tax in Mexico in 2013. I have analyzed the influence of the level of democracy and structural changes in the political sphere of Mexico since 2000, its ambition to have a climate leadership position, electoral politics, and domestic political and economic factors on the decision to adopt carbon taxes in Mexico.

I found that the democratization process replaced PRI from its position in 2000 after many decades as PAN was elected for the first time. The change in government and initiation of multi-party electoral politics created more space for exercising civil liberties. Mexico also has a mixed majority-proportional electoral system in the legislature. The proportional component ensures the participation and representation of all political parties in Mexico in the legislature. Different political parties and leaders could participate and contribute to the debate on different policy issues. The 2006 general election brought an environmentalist in power who worked towards establishing Mexico as a climate leader by formulating new climate laws, hosting

international conferences, and establishing institutions on the environment and climate change. With the alternation of power in 2012, the PRI returned to office with reform proposals to bring further changes in the nation's political and economic structures. Electoral politics made the PRI change itself and take up the role that the PAN was doing. PRI maintained Mexico's climate leadership role by adopting carbon taxes while also addressing the economic challenges that Mexico was facing in the energy sector and the poor tax collection system. The PRI was able to form a coalition with the PVEM (the Ecological Green Party) before the election of 2012 to win more votes. After the election, the PRI was able to form a coalition in the legislature with the PRD (the left party) to pass the tax reform bill in 2013, which required a two-thirds majority vote in the legislature. The three, the PRI, the PVEM, and the PRD, had homogeneous policy preferences regarding the taxation bill and the carbon taxes, and they passed the bill that adopted carbon taxes in Mexico. Here, the proportional representation component of the electoral system of Mexico played a role in having a coalition in the legislature and passing the carbon taxes.

Chapter 6: Conclusion

This dissertation intends to answer the following questions: Why do states adopt carbon taxes, and why do they adopt them at a specific time? The concept of carbon taxes emerged as the need for carbon reduction policies became more urgent with rapid climate change and temperature increase (Ritchie and Roser 2024). Carbon taxes serve the goal of addressing environmental externalities through a market mechanism of setting a price on carbon emissions instead of creating laws (Dole 2013). Currently, 28 states have carbon taxes out of 195 states worldwide. I am curious to know what conditions led these 28 states to become carbon tax states from non-carbon tax states when 166 did not.

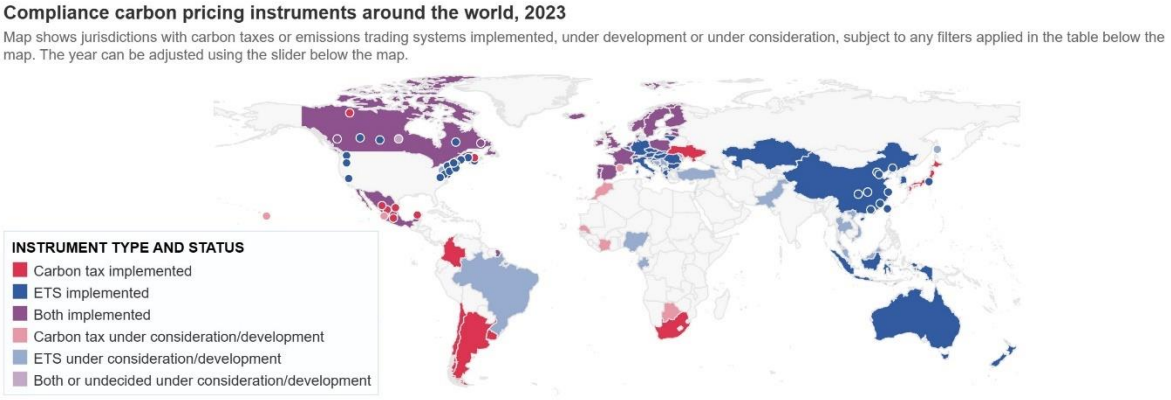
What is a carbon tax?

A carbon tax is a tax for each ton of carbon emission produced from the energy consumption of oil, coal, and natural gas (Dole 2013; Elkins and Baker 2001). It aims to reduce carbon emissions by increasing the price of energy consumption (Dole 2013; Elkins and Baker 2001). This is usually imposed on all individuals and industries. The main purpose of having a carbon tax is to reduce carbon emissions by making energy consumption costly and changing the perspectives and practices of people regarding fossil fuel and coal burning by switching to renewable energy resources (Dole 2013; Elkins and Baker 2001). It aims to reduce the supply and demand for fossil fuel and coal by increasing prices. Carbon taxes have three major advantages- they are very cost-effective and efficient; they create scope for the redistribution of taxes by allowing the government to reduce income or housing taxes to reduce the burden of carbon taxes on low-income people and target the high emitters with the carbon taxes; and they help initiate revenue recycling (Elkins and Baker 2001). States can recycle the revenue generated from carbon taxes by investing them in producing clean energies or other environmental projects

(Elkins and Baker 2001). However, there are criticisms against the adoption of carbon taxes. A fear is there that carbon taxes can create profit loss and job loss because energy consumption would be costly (Elkins and Baker 2001). It can harshly affect low-income people because they must pay more for energy. People do not like to pay any taxes. People are willing to pay more when energy prices rise, but they are not willing to pay taxes on energy consumption and when energy prices rise for taxes (Andersson 2019). Moreover, big corporations lobby against any carbon taxes because they will incur profit loss for them.

On the other hand, cap and trade or carbon trading is a system where governments sell carbon permits to industries, limiting the total amount of the country's carbon emissions (Dole 2013; Elkins and Baker 2001). The goal is to incrementally reduce the country's total carbon emissions every year and ultimately phase out carbon emissions entirely (Dole 2013; Elkins and Baker 2001). Governments do not set a fixed price for the permits, but let the price be decided by the supply and demand of the permits (Dole 2013; Elkins and Baker 2001). Industries can trade the unused permits amongst themselves (Dole 2013; Elkins and Baker 2001). This system targets the big emitter industries and encourages switching to renewables. The main disadvantage of this system is that it applies only to industries, and it does not apply to individuals or other sectors and, therefore, is limited in scope compared to carbon taxes.

Figure 7: Carbon taxes and ETS



Source: (World Bank 2023)

Why do states adopt carbon taxes?

Climate change problems and the global temperature increase started to show severe impacts on the earth in the 1980s when biodiversity loss, melting of arctic ice, reducing snow, extreme rain and extreme drought events, loss of plants and forests, and extreme weather conditions were frequently happening (Lindsey and Dahlman 2024). The major reason identified by scientists is carbon emissions by burning fossil fuels, coal, and natural gas (Ritchie and Roser 2024). Economists identified market mechanisms as the most effective way to reduce carbon emissions. A few European states were the first to introduce carbon taxes in 1990 and experimented with its application to reduce fossil fuel and coal-generated energy consumption (Dole 2013).

There is a vast literature on the determinants of international and national climate policies. One part of the literature on the national climate policy is the carbon pricing policy, which includes carbon taxes and carbon trading systems, but this part is limited. The literature focuses mainly on the effectiveness of the carbon pricing policy. Only a handful of them focus on the determinants of carbon pricing policies relevant to this study. The literature also does not focus on carbon taxes separately. In this dissertation, I aim to understand the determinants of

carbon taxes alone but draw theories and hypotheses from the determinants of the carbon pricing literature.

The literature on carbon pricing mechanisms discusses the purpose of having carbon taxes, other policies that are necessary for its successful implementation, a comparative analysis between the carbon taxes and the carbon trading system, why countries need to adopt carbon pricing mechanisms, and the effectiveness of the carbon pricing policies, etc. In the determinants of the carbon pricing literature, researchers have discussed the influence of several political factors on carbon pricing and the challenges that carbon pricing faces (Geoffroy Dolphin, Pollitt, and Newbery 2019; Driscoll 2021; Levi, Flachsland, and Jakob 2020; Skovgaard, Ferrari, and Knaggård 2019; Steinebach, Fernández-i-Marín, and Aschenbrenner 2021). The most notable research on the determinants of carbon pricing mechanisms was done by Dolphin et al. (2019), Driscoll (2021), Levi (2020), Skovgaard et al. (2019), Steinbach et al. (2021) where they conducted a quantitative analysis to find general patterns of the adoption of carbon pricing mechanisms. They have borrowed theories from the broader environmental and climate policy literature as carbon pricing is part of that broader policy to examine whether those theories could explain the adoption of the carbon pricing mechanisms.

By reviewing the carbon pricing literature (See chapter 2), I have identified the following four strands of factors that influence the adoption of carbon prices, meaning carbon taxes and carbon trading systems:

- Political-institutional factors: include the level of democracy, the type of government (parliamentary, presidential, etc.), the type of electoral representation (proportional, majoritarian, or mixed), green/left party strength, ambition for climate leadership, etc.

- Economic factors: economic development, GDP, GDP per capita income, oil exports, financial crises, etc.
- Challenges to the adoption of carbon prices: carbon intensity, CO2 emissions per GDP, CO2 emissions per capita, and opposition from corporations and industries.
- Diffusion of carbon pricing mechanisms through learning and emulation: The effect of membership in international organizations, memberships in international climate agreements, trading partnerships, etc. (Thisted and Thisted 2020).

The literature on carbon pricing policies is very small and contains conflicting findings regarding the influence of the above-mentioned factors on the adoption of carbon prices. Skovgaard et al. (2019) did not find any significant correlations between the political institutional factors and the adoption of carbon prices, whereas Dolphin et al. (2019) and Steinebach et al. (2021) did. In addition, Dolphin et al. (2019) and Steinebach et al. (2021) found correlations between economic development and the adoption of carbon prices. Skovgaard et al. (2019) did not find a correlation between carbon prices and carbon intensity, and Dolphin et al. (2019) and Steinebach et al. (2021) found positive correlations. Driscoll (2021) argued about the strong negative influence of big corporations on the adoption of carbon prices. Moreover, Levi et al. (2020) found a strong connection between the public perception of vulnerability to climate change and the adoption of carbon prices. Thisted and Thisted (2020) showed two distinct waves of adoption of carbon taxes among countries and argued that a diffusion kind of behavior is observable among them where learning and emulation about adopting carbon taxes happened through membership in various international forums and through success stories about carbon taxes. This small number of literature, because of its conflicting and fragmented findings,

indicates that there is more need for research on this topic to find consensus on what determines the adoption of carbon taxes and carbon trading mechanisms.

My objective in this dissertation was to understand how much of these theories and findings can explain the adoption of carbon taxes and the timing of their adoption. I have separated carbon trading and carbon taxes in this study to have a deeper look at the adoption of carbon taxes because there are differences between them, and many nations have applied both. These two policies have different advantages and drawbacks too. A few EU countries started implementing carbon taxes individually in 1990. In contrast, according to the EU's decision for all its member countries, the carbon trading or Emissions Trading Scheme (ETS) was introduced in 2005.

Major findings: quantitative and qualitative insights

In this dissertation, I have conducted a cross-sectional quantitative analysis of all nations in search of a general pattern for adopting a carbon tax. My aim has been to measure the influence of the political-institutional factors, such as the level of democracy, the type of government, and the type of electoral representation, on the adoption of carbon taxes. I have used a logistic regression analysis to find a correlation between the independent variables and the adoption of carbon taxes. I have found that highly liberal democracies have very strong correlations with the adoption of carbon taxes, and they are more likely to adopt carbon taxes. This indicates that when nations have a high level of democracy, they have the assurance of civil liberties, free and fair elections, competitive electoral politics, free media, opportunities to have public debates about climate change policies and action, more participation of environmental activists and experts on the policy debates, etc. These conditions are reflected at the policy level and increase the chances of the adoption of carbon taxes. I have also found in my study that

within the highly liberal democracies (with scores above 0.5 on a 0-1 scale provided by the V-Dem Institute), nations with a proportional form of representation are more likely to adopt carbon taxes. This finding indicates that the proportional system, which ensures the participation and representation of all political parties in the legislature by allocation of seats according to the percentage of voting in an election, brings diverse perspectives and opinions of policies in the legislature. Often, small political parties get their policy preference reflected in the decisions of the legislation because of coalition formation within the government or because the proportional structure gives strength to all political parties to get involved in the decision-making. In terms of the type of government, I could not find any significant correlations between the parliamentary form of government and the adoption of carbon taxes. I also did not find any significant impact of the economic factors, such as the GDO per capita and the CO2 emissions per GDP, on the adoption of carbon taxes.

I have conducted a case study on Australia to have a deeper look at the causes of its decision to adopt carbon taxes in 2012 and its rapid decision to revoke it in 2014. The case study confirmed my findings of the quantitative study. Australia is a highly liberal democratic country and highly economically developed with a parliamentary and a mixed preferential-proportional system. These conditions allowed the Australian Greens, despite having only a few seats in the legislature, to become a part of the coalition government formed by the Australian Labor Party after the 2010 elections. The Greens wanted to implement a carbon tax to reduce Australia's carbon emissions, and the Labor wanted to have an Emissions Trading Scheme or ETS (Twomey 2014b). They had similar policy preferences, and the Greens pressured the Labors to adopt the carbon taxes in 2012 (Hudson 2019; MacNeil 2021). The Labors had to agree on this because otherwise, the break-up with the Greens would make them dismantle the coalition government.

The Greens have also managed to keep the oil and mining industry's lobby away from decision-making (Crowley 2013b). However, when the Labor Party lost the election of 2013, the Greens had to step down from power. The new government of that time was formed by a coalition of the Liberal and the National Party, right-leaning, and they were opposed to the carbon taxes from its introduction with the perception that it was harmful to their coal and oil-dependent economy. Their policy preference aligned with the oil and mining industry and increased the strength of the opposers to the carbon taxes. The Liberal-National coalition abolished the carbon taxes in 2014. The case study showed that if the Australian Greens did not get any chance to form a coalition government with the Labors and did not have homogeneous policy preferences for carbon reduction amongst themselves, the carbon tax would not be there. As the Greens stepped down from power, the carbon tax was abolished, indicating that it was necessary. The case study also revealed that the progressive ideology that supports environmental protection and sustainability of the Greens and the Labors played an important role in their decision to adopt carbon taxes.

In the second case study on Mexico, I aimed to understand the determinant factors behind Mexico's adoption of carbon taxes. The study revealed findings similar to those of the quantitative and the Australian case study. Mexico, a medium-income developing country, shows that carbon tax adoption is not limited to only industrialized, highly developed economies. Mexico's level of democracy showed dramatic change in 2000 when Mexico experienced a change in the government as PAN won the election of 2000, ending the 71-year rule by PRI. The change in power brought changes in electoral politics, too, allowing smaller political parties to participate in the competition. Mexico has a presidential system with a mixed majority-proportional legislative representation. This indicates that the presidential system also allows to have carbon taxes. In addition, this reveals that the proportional component of the legislature

again made diverse representation possible in the legislature, paving the way for environmental and climate change actions to be taken into consideration. PAN as a political party did not bring changes, but the leadership change in 2006 created an opportunity for Mexico to come out as a climate leader nationally and internationally from the developing country bloc. The democratization of Mexico allowed an environmentalist, Felipe Calderon, to become the President of Mexico in 2006 and he then hosted the Cancun conference in Mexico in 2010 and initiated a myriad of climate change mitigation policies in Mexico. He also established government institutions to assess climate change problems and policies (Balderas Torres, Lazaro Vargas, and Paavola 2020). In 2012, he adopted a General Law on Climate Change that set nationally determined carbon reduction targets for Mexico before any other developing country did that (Balderas Torres, Lazaro Vargas, and Paavola 2020). The other major parties took up the agenda that President Calderon showed. The PRI became more competitive in electoral politics in 2013 by offering a number of major reforms in areas of energy, taxation, economy, and politics (Serra 2014). The PRI formed a coalition with the PVEM (the Ecological Green Party) before the election of 2013 and was able to win the elections (Camp 2013; Spoon and Gómez 2017). To carry out its reform agenda, the PRI made an alliance with the other major parties of Mexico, the PAN (conservative) and the PRD (the left), after the elections because it required two-thirds majority support in the legislature for the reform bills to pass. A coalition was formed between the PRI, the PVEM, and the PRD, who had similar policy preferences regarding the carbon taxes and other tax reforms in the taxation bill (Barrientos Del Monte and Añorve Añorve 2014). PAN, being a conservative party, opposed the tax reform bill but formed a coalition with the PRI to pass the energy reform bill (Barrientos Del Monte and Añorve Añorve 2014). The PRI could maintain Mexico's climate leadership role both nationally and internationally while also

addressing the need to create new revenue sources for Mexico and decrease the financial losses of Mexico's energy company, PEMEX, by adopting carbon taxes. My conclusion for the Mexico case study is that the democratic structure, the electoral competition, and the proportional component of the legislature gave all the political parties some strength to influence the decision-making process, and this allowed the adoption of carbon taxes.

Future research

The influence of the Green parties or the Left parties on the adoption of carbon taxes requires deeper investigation and research. A study on this topic can give us an idea about how the green/left party strength or access to the government influences the decision of carbon taxes over time. Future research would help us understand when institutions allow greens to form coalitions and when they have voter support, the green parties can influence the decision of adopting carbon taxes. Also, future researchers can focus on the ideological preferences of the political parties and their influence on the adoption of carbon taxes.

Conclusion

The findings of this dissertation are important in several ways. First, it confirms some of the findings of previous research on the determinants of carbon pricing and rejects some of the findings of the literature. Skovgaard et al. (2019) did not find any significant correlation between the political and institutional factors and the adoption of carbon pricing policies, whereas my research found a strong correlation between two political and institutional factors, the level of liberal democracies and proportional representation, on the adoption of carbon taxes. My findings support the findings of Steinebach et al. (2021) in this regard. My findings also support Andersen's (2019) argument that if small political parties, such as Green or Left parties, are able to form governments, then the adoption of carbon taxes becomes highly likely.

Secondly, my dissertation provides a new revelation to the existing literature: within liberal democracies with scores above 0.5 (according to V-Dem Institute's Democracy Index), proportional representation makes the adoption of carbon taxes highly likely. Finally, the case studies in my dissertation revealed that not only the Greens or the Left or a coalition between the Greens and the Left need decision-making power, but they also need a policy preference for adopting carbon taxes.

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