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From Barrels to Ballots: The Effect of Changes in Oil Prices on Incumbents and Populists

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Abstract: The rise of populist parties across Europe has coincided with recurring commodity and energy price crises, with economic shocks shown to punish incumbent governments and benefit populist parties. However, electoral consequences of economic shocks on incumbent vote share remain understudied in multiparty systems, while the oil price channel remains understudied for populist parties. This paper aims to investigate whether municipalities with higher car dependence experience greater incumbent punishment and greater support for the populist Sweden Democrats in response to oil price increases. Using Swedish parliamentary election data at the municipality level from 2002 to 2022, we employ a two-way fixed effects model interacting the change in international Brent crude oil price with municipality-level car ownership share as a measure of differential exposure to fuel costs. Our results suggest that municipalities with higher car ownership exhibit a greater decrease in the incumbent government's vote share in response to an oil price increase, while the Sweden Democrats experience a higher vote share. The findings contribute to existing literature by examining the effect on the incumbent in a multiparty setting and by using oil prices and car ownership as a new channel through which populist parties benefit. Further, the results speak to the broader discussion on political accountability, suggesting that voters hold incumbents responsible for exogenous shocks, whilst populist parties appear to benefit from the same economic conditions.

Keywords: Energy Prices, Electoral Accountability, Pocketbook Voting, Populism, Retrospective Voting

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Contents

1. Introduction

In recent years crises have unfolded in quick succession – COVID-19, the Russian invasion of Ukraine in 2022, and, as this is being written, the bilateral attack on Iran by Israel and the United States. The consequences for global commodity and energy supplies have been dramatic, which has had a direct effect on the lives of citizens around the world. *Cost-of-living crisis* and *energy crisis* have become recurring expressions and topics for debate on a global, national, and local stage, characterising political discussions and elections. In the 2024 US election, economy was a priority among voters and presidential candidates, as were the energy prices ahead of the Swedish election in 2022 (Gallup Inc., 2024; Novus, 2022).

In Sweden, parties on the right accused the incumbent government, the Social Democrats, of causing and failing to contain high energy prices which affected consumers through electricity, gasoline and diesel channels. The leader of the right-wing populist party, the Sweden Democrats, Jimmie Åkesson, asked: "Are you tired of soaring fuel prices? Are you tired of soaring electricity prices? Are you tired of the food becoming more expensive? Then you should vote for the Sweden Democrats." (Sverigedemokraterna, 2022c). The election was a success for the party who experienced a surge in popularity, becoming Sweden's second largest party as a coalition of the right ascended to government.

A similar trend has emerged across Europe – Rassemblement National in France, Alternative für Deutschland in Germany, and Reform UK in the United Kingdom are just a few names among those who have seen advances in popularity.

As a result, this rise of populism has been subject to research in recent years. The literature review conducted in this paper highlights the importance of a variety of economic shocks in strengthening populist parties' position, and how incumbents often are punished for events outside their control, such as increasing energy prices. The intersection between these two areas provides the foundation for our research, and also the contribution to the two. In the former, the paper contributes by examining how an everyday cost-of-living shock through the oil price channel, and exposure to this shock in terms of car dependence, may affect voter behaviour, while in the latter shifting focus from how energy prices affect the incumbent to how it affects voting behaviour for populist parties in particular. Doing so in a multiparty system, with a different political structure to two-party systems as in the United States for example, also provides contributory value since effects potentially differ across systems when accountability is split among multiple parties. Furthermore, it contributes to the discussion on political accountability, the electoral effect of energy policy, and understanding the rise of populism.

The contribution is on the one hand made by first answering the question whether incumbents are *punished* by increases in oil prices in municipalities where car dependence is higher, and on the other hand, by answering the question whether Sweden's right-wing populist party, the Sweden Democrats, *benefit* from increases in oil prices in municipalities where car dependence is higher.

Methodologically, the paper employs a two-way fixed effects model with two different outcome variables – the change in incumbent government vote share and the Sweden Democrat vote share – using election data at the municipality level for Swedish parliamentary elections between 2002-2022, changes in the international Brent crude oil price, as well as a local exposure variable of car

share at the municipality level. The oil price is interacted with car share on the basis that higher car ownership should mean higher exposure to oil price fluctuations through fuel expenditure, and thereby decreased tendency of voting for the incumbent and increased tendency of voting for the Sweden Democrats. Our results confirm this effect, indicating that a municipality with 10 more cars than another will experience a roughly 1.5 percentage point greater decline in vote share for the incumbent between election years, and an approximately 2.2 percentage point higher vote share for the Sweden Democrats, in response to a realistic oil price hike of $15.

The paper is organised as follows. Section 2 gives an overview of the Swedish political system and the Sweden Democrats, as well as the link between oil and gasoline prices. Section 3 reviews existing literature on economic crises' effect on incumbent and populist voting, and synthesises the two fields to provide a basis for our contribution to thereafter formulate our two hypotheses. This is followed by a description of our data and variable construction in Section 4, whereafter Section 5 defines our two-way fixed effects models and discusses its assumptions and limitations. Section 6 demonstrates the results for the change in incumbent vote share and for the vote share of the Sweden Democrats, as well as the other parties in Parliament. In the same section, we perform multiple sensitivity analyses to ensure the robustness of our results and mitigate limitation concerns. Results and limitations are then discussed more broadly in Section 7, linking our findings to our hypotheses and previous literature, before finally providing our conclusions in Section 8.

2. Background

One of our central contributions lies in our study of voting behaviours in a multiparty system, and thus it is vital to understand this system as well as the parties that operate within it. A description of this, a classification of where each party is on the political spectrum, and an explanation of the role of gasoline and oil prices in Swedish politics, follows below.

2.1. The Swedish Political System

2.1.1. The Institutional and Political Framework

The Swedish Parliament (*Sv. riksdagen*) consists of 349 members, with elections held every fourth year. Elections are proportional, meaning that the number of seats each party receives in Parliament depends on the proportion of votes received in the election. To enter Parliament, the principal rule is that a party must receive a minimum of four percent of the total national vote (Sveriges Riksdag, 2026).

There are currently eight parties in Parliament, written in descending order of number of seats: the Social Democrats (Socialdemokraterna, S), the Sweden Democrats (Sverigedemokraterna, SD), the Moderates (Moderaterna, M), the Centre Party (Centerpartiet, C), the Left Party (Vänsterpartiet, V), the Christian Democrats (Kristdemokraterna, KD), the Green Party (Miljöpartiet de gröna, MP), and the Liberals (Liberalerna, L) (Sveriges Riksdag, 2023b). This combination of parties has been in Parliament since 2010, when SD passed the four percent threshold (Statistiska Centralbyrån, 2011).

Classifying the respective parties on a scale from left to right is subject to definitions and perceptions. Using voter perception, the Left Party is considered to be the most left, followed by the Green Party and the Social Democrats, with the latter two remaining relatively close on the

spectrum. Moving right, the Centre Party positions itself around the centre just before the Liberals. Further right on the spectrum is the Christian Democrats, the Moderates, and lastly, furthest right on the spectrum, the Sweden Democrats. It is only in recent years that SD is viewed to be more right-wing than M (Valforskningsprogrammet, 2023). However, according to scholars, SD is classified as far-right, and notably the only populist party in Sweden (Rooduijn et al., 2023, 2024).

The incumbent government consists of M, KD, and L, with support from SD who have remained outside of government but with influence through the Tidö Agreement (*Sv. Tidöavtalet*), a formal cooperation agreement between the four parties (Moderaterna, 2022b). The majority of governments since the 1990s have been coalition governments, and in the case of one-party governments, they have held only a minority of the mandates, requiring support from other parties (Sveriges Riksdag, 2023a).

The emergence and rapid growth of SD in Parliament, in a political structure where multiparty and minority governments are frequent, has sparked a more divided Parliament with new political alliances forming in the past decade (Sveriges Riksdag, 2023a). This includes the January Agreement between S, C, L, and MP, where C and L were to retain influence and support the S-MP government without being part of it, as well as the current, aforementioned Tidö Agreement where SD holds a similar supporting position (Moderaterna, 2022b; Socialdemokraterna et al., 2019).

2.1.2. The Sweden Democrats and Key Policy Issues

Within this fragmented parliament, a key component was SD entering parliament in 2010. This far-right populist party has experienced substantial and continual electoral growth, moving from a marginal political actor to being the second largest party in Sweden. SD was founded in 1988, with roots in extreme-right milieus, but has since developed into a right-wing populist party, with Jimmie Åkesson as the long-standing party leader since 2005. They are classified in literature as the main populist party in Swedish Parliament, with the Left Party being classified solely as far-left, and not as populist (Rooduijn et al., 2023, 2024).

A populist party is commonly defined as a party that frames politics and society as separated into two contesting groups – "the pure people" and "the corrupt elite" – where politics is "an expression of the volonté générale (general will) of the people" (Mudde, 2004). The Sweden Democrats combine this populist view with social conservatism as well as nationalism (Sverigedemokraterna, 2022a). The party emphasises that their key policy issues are migration and welfare, as well as fuel and energy policy (Sverigedemokraterna, n.d.).

While immigration has been a fundamental policy focus for the Sweden Democrats, the previous election following the Russian invasion of Ukraine marked a new significant focus on energy prices. They suggested lowering the fuel tax and the reduction obligation (*Sv. Reduktionsplikten*, explained in Section 2.2) to lower the prices on gasoline and diesel by as much as 10 Swedish krona (approximately $1), arguing that "Swedish citizens, Swedish countryside and Swedish business life" should not be "sacrificed" for policies on fuel that are "detached from reality" and "harmful" (Åkesson & Sjöstedt, 2022). The social media communication on the topic further attributed responsibility for high fuel prices on the governing party (S) and the prime minister Magdalena Andersson, comparing the current gasoline and diesel prices with fuel prices if SDs' proposals

were implemented – calling the high prices "Sossepriser" ('Social Democrat prices') (see Appendix Figure A1). Overall, this communication strategy appears to frame these policies implemented by the incumbent government as imposing disproportionate costs on households and businesses.

The emphasis on fuel and energy prices makes the present study particularly relevant, as it suggests that fluctuations in oil prices may influence voters' economic conditions, political narratives, and issue salience, and thereby also electoral outcomes.

2.2. Oil and Gasoline Prices

Given the recent emphasis on fuel and energy prices as important political issues in recent Swedish elections, an overview of the crises that have driven these price surges becomes important. Additionally, it becomes fundamental to understand what factors affect these costs and how.

Crude oil prices are set in a global market, meaning Swedish consumers are subject to international price fluctuations, outside domestic control. These prices are influenced by a range of factors, including production decisions made by the Organization of the Petroleum Exporting Countries (OPEC) who control a significant share of oil reserves and oil production. Furthermore, changes in global economic activity, geopolitical events, and supply disruptions, might affect prices (U.S. Energy Information Administration, 2023).

These global oil prices feed into retail gasoline and diesel prices. In addition to the cost of crude oil, however, fuel prices also depend on exchange rates and domestic taxes, with the former constituting around 60% of the price for petrol and 45% of the price for diesel in Sweden in 2022. Fuel prices are, in Sweden, further increased through the reduction obligation, which requires renewable fuel to be mixed into gasoline and diesel (Statistiska Centralbyrån, 2022). Furthermore, the global oil price could have an effect on domestic inflation, indicating that energy prices might play a role in shaping overall price levels and thereby cost of living (Choi et al., 2018). It has also been suggested that oil price shocks affect consumers both through its direct effect on fuel prices and through its indirect effect on production costs, with the latter potentially being passed on to consumers (Kilian & Zhou, 2023).

Oil price shocks have occurred on several occasions since the turn of the millennium, recurringly affecting the global economy and thereby the lives of voters. An example of such a shock took place in 2011, in the context of both geopolitical disruptions from the Arab Spring and continued strong global demand (Myers Jaffe & Miller, 2012). As changes in global economic activity influences oil prices, the increasing demand from emerging markets at the time augmented the climb in prices (U.S. Energy Information Administration, 2012).

In recent years, the COVID-19 pandemic initially caused a fall in oil prices through decreased demand and increased oil inventories as measures were adopted to counteract the disease (Wheeler et al., 2020). However, in 2021, the demand once again rose as restrictions were progressively lifted, doing so quicker than the supply, as the latter remained limited after a decision from OPEC, Russia, and other oil-producing countries (U.S. Energy Information Administration, 2022). The increase continued in 2022, with Russia's supply of oil and gas being severely restricted as countries planned to phase out importing Russian oil as economic punishment for their invasion of Ukraine (World Bank Group, 2022).

3. Literature Review

This paper relates to two main strands of literature, with the first being how incumbents are punished for a variety of economic factors, and the second being how economic insecurity benefits populist parties.

3.1. Turning Against the Incumbent

Relating to the first strand of literature, a large body of research demonstrates that personal finances and economic conditions are central determinants of incumbent support.

The notion of retrospective and pocketbook voting revolves around exactly this: how voters reward or punish incumbents depending on the incumbent's past performance and depending on the voters' own financial situations respectively. It has been shown that worsening personal economic situations exert influence on voter outcomes, tending to reduce electoral support for the incumbent (Afzal, 2024). This appears to be especially true if individual financial situations can be directly blamed on the government, and may even induce voters to defect from their typical party affiliation (Tilley et al., 2018). Furthermore, an improvement to an individual's personal finances caused by a factor exogenous to the government – for example, winning the lottery – benefits the incumbent's vote share, but does not improve the perception of government competence (Bagues & Esteve-Volart, 2016).

One's personal economic situation is not the only factor influencing the re-election probabilities of incumbents – the national and world economy also have an effect. If the world economy performs poorly, incumbents are punished; if it performs well, they benefit (Leigh, 2009).

A specific, recurring, and current source of financial pressure on the pocketbook is energy and fuel costs. A growing body of research is thereby considering the political consequences of oil and gasoline prices specifically.

Fuel prices, and gasoline in particular, have been shown to affect voter behaviour through the pocketbook mechanism, varying with exposure. Voters who spend more time commuting, in turn bearing higher fuel costs, are significantly more likely to vote against the incumbent in response to gasoline price increases (Kim & Yang, 2022). In line with this, presidential approval ratings appear to be negatively impacted by higher gasoline prices (Gupta et al., 2025).

Crucially, the effect of oil prices impact the incumbent despite being outside of their control. This suggests that voters are "quasi-rational" as they partially attribute "luck" – exogenous positives – to the competence of elected officials (Wolfers, 2002). On a national level, a country with higher dependence on oil has been shown to experience a decrease in the re-election probability of an incumbent as oil prices increase, highlighting the importance of exposure to prices in voting patterns (Arezki et al., 2022).

Overall, these studies suggest that fluctuations in oil and gasoline prices can influence voter behaviour, often through perceived personal economic losses, "quasi-rational" attribution of exogenous shocks to incumbents, and exposure to fuel prices. The findings thereby provide a clear basis for examining how oil price changes might affect electoral outcomes in Sweden through a local exposure variable, linking economic conditions to political accountability in a multiparty context.

3.2. Economic Factors and Populism

If economic hardship and crises can reduce an incumbent's chances of getting re-elected, then who benefits? The second strand of literature this paper is based on shows that one alternative that voters can turn to is populist parties.

Economic crises, such as the Great Recession, create economic insecurity and rising unemployment. Increased economic insecurity, and in particular unemployment, as a result of external crises appears to increase the populist vote share. However, it does so heterogeneously depending on regional context and how exposed a nation is to a crisis (Algan et al., 2017). Similarly, exposure to economic changes, for instance more intense import competition, drives support for nationalist, isolationist, and radical-right parties, suggesting that globalisation affects voting patterns through uneven welfare gains (Colantone & Stanig, 2018).

It has also been argued that economic insecurity shapes populist voting both directly and indirectly. Directly, higher insecurity increases the likelihood of voting for populist parties as a demand for protection, while, indirectly, the propensity to vote populist is affected through reduced trust in institutions and lower electoral participation. Highlighting the turnout channel, 40% of the increase in populist voting following economic insecurity shocks is driven by reduced turnout (Guiso et al., 2024).

In the Swedish context specifically, differential exposure to electricity price increases through varying manufacturing shares in communities has been shown to affect voting patterns. Notably, focusing on the compensation hypothesis – that workers in affected districts seek welfare compensation from left-wing parties – electricity price increases seem to benefit the Social Democrats, rather than populists (Brännlund et al., 2024). However, when shifting focus from a manufacturing-sided shock to a consumer-sided electricity cost exposure, radical right parties seem to benefit instead. Voters shift their preference towards the Sweden Democrats, as they oppose the "perceived costly climate mitigation measures"; exposure to price changes benefits radical right parties (Brännlund & Peterson, 2024). This distinction is relevant for our paper, as it similarly focuses on a consumer-sided exposure channel – oil prices and car dependence – to explore its effect on populist parties.

Together, this literature demonstrates how economic insecurity can reshape voter preferences and strengthen support for populist and right-wing movements. Similar to research on the effect of electricity prices on Swedish voting patterns, our study explores a related but less studied economic channel in the populist subject: whether fluctuations in oil price influence electoral outcomes, and especially right-wing populist voting in Sweden.

3.3. Contribution and Hypothesis

Combining the two strands of literature, the review demonstrates how a variety of economic shocks punish incumbents, even for events outside their control, while strengthening populist parties. To address the former field, we begin by asserting whether it holds that incumbents are punished for oil price increases also in a multiparty context, as previous literature has been focused on two-party elections. Thereby, the first hypothesis we test is:

H1: Municipalities with higher baseline car dependence experience a greater decrease in voter support for the incumbent government in response to an increase in oil prices prior to an election.

Turning to the second strand of literature, we aim to investigate which party actually benefits from economic shocks and oil prices in particular. As mentioned, previous literature suggests that populists will benefit from economic insecurity, hence with a focus on the oil price channel our second hypothesis becomes:

H2: Municipalities with higher baseline car dependence experience greater voter support for the Sweden Democrats in response to an increase in oil prices prior to an election.

Generally, through these two hypotheses, we contribute to the broader literature on economic shocks and political behaviour by investigating how everyday cost-of-living shocks tied to oil prices may affect voter behaviour in a multiparty context.

Specifically, while previous literature on incumbents has examined the effect of oil prices on voting outcomes, the same channel has not yet been examined in literature on populist voting. Part of our contribution thereby lies in shifting the channel applied in incumbent literature to populist literature, establishing a contemporary important factor potentially driving recent populist strides. Furthermore, in relation to the incumbent literature, we attempt to establish that previous findings of the impact of oil prices and economic shocks on voting outcomes can be applied to a multiparty context. It also contributes to the discussion on political accountability, the electoral effect of energy policy, and understanding the rise of populism.

Drawing on previous studies, we apply the two-way fixed effects logic from Kim and Yang (2022), using their method as the basis for our approach given its focus on exploiting local exposure to gasoline price fluctuations. We contribute to the findings of Brännlund and Peterson (2024) by investigating the effect of oil prices rather than electricity prices, a similar but distinct energy price channel for consumers, simultaneously offering a contrasting perspective to Brännlund et al. (2024) by utilising a consumer-sided interaction variable more closely associated with traditional pocketbook voting. In relation to the latter, we also comment on the compensation and populist hypotheses.

4. Data and Variable Construction

This section will detail the data we use for our analysis, as well as variable construction. We first introduce our outcome variables, before discussing our usage of an interaction term as the explanatory variable, then outlining controls used for an additional regression, and finally commenting on descriptive statistics.

4.1. Outcome Variables

Data on vote share for all parties was collected from the Swedish Election Authority and covers the six Swedish parliamentary elections between 2002 and 2022, held every four years (Valmyndigheten, 2026b, 2026a). The data reports the number and share of votes for each party in each municipality for Swedish national elections. We have chosen to focus on the share of votes denoted from 0-100, as this allows us to measure how support for a given party has changed over time and how this differs between municipalities. For each municipality and election year, the data

thus contains the vote share received by each party, which includes the eight parties currently represented in Swedish Parliament, as listed in Section 2.1.1.

Using municipality-level election results allows us to capture geographical variation in political preferences across Sweden. This variation becomes particularly relevant for the empirical strategy of the paper, which examines whether municipalities with greater exposure to oil price fluctuations, through higher baseline car ownership, exhibit different voting patterns to less car dependent municipalities. The resulting municipality-election panel dataset thus forms the basis for the analysis used in the empirical strategy.

4.1.1. Change In Incumbent Government Vote Share Outcome Variable

The complex nature of the Swedish multiparty system, as discussed in Section 2.1.1, with collaborations such as the 'January Agreement', complicates the definition of the incumbent, as some parties remain outside government but still retain influence as supporting parties. The main focus of this thesis, however, remains the impact on the incumbent government, and as the role of supporting parties in shaping and being accountable for the implemented policies are often not *a priori* clear, we choose to define the incumbent as the parties in government.

The following composition of parties have made up the government since 2002: the Social Democrats in 2002-2006, a coalition of the Moderates, the Liberals, the Centre Party and the Christian Democrats between 2006-2014, the Social Democrats and the Green Party between 2014-2021, and only the Social Democrats between 2021-2022 after the Green Party left government (Sveriges Riksdag, 2023a). The Green Party are still included in the definition for incumbent government as they were in government for the majority of the 2018-2022 election cycle, having substantial influence on policies during the period.

We construct a simple dataset indicating which parties were incumbent leading up to each election year, enabling us to cross-reference this year with our election vote share panel data, thereby determining which party or parties vote shares should be used in the calculation for change in incumbent support. The support for the incumbent parties in the election year in which they ascended to government is summed, as is the support for the incumbent parties in the following election, and the change is then computed with the former subtracted from the latter. Because we focus on change in incumbent vote share, this model has only five election year observations, since a change into 2002 cannot be calculated due to the absence of municipality level data in preceding elections.

The dependent variable for this specification is therefore defined as the change in incumbent government vote share between the election in year t and the election in year $t-4$, for municipality i.

$$\Delta\, Incumbent\ Vote\ Share_{i,t} = Incumbent\ Vote\ Share_{i,t} - Incumbent\ Vote\ Share_{i,t-4} \qquad (1)$$

This follows from the logic that punishment of incumbents inherently is in relation to a previous election based on inter-election performance, as reflected in the concept of retrospective voting. Thereby the change in, rather than the level of, incumbent vote share becomes appropriate to answer our hypothesis.

4.1.2. Sweden Democrat Vote Share Outcome Variable

Of particular interest, in line with our second hypothesis, is how the Sweden Democrats experience heterogeneous support between municipalities in response to an oil price increase. Our hypothesis is as previously stated that they will benefit from higher oil prices in municipalities with greater car dependence.

While vote share was directly available in the datasets provided by the Swedish Election Authority from 2006 and onwards, the dataset only contained the number of votes for SD in 2002. The vote shares for this year have thereby been calculated by dividing the number of votes SD received in a given municipality by the total number of votes cast in that municipality.

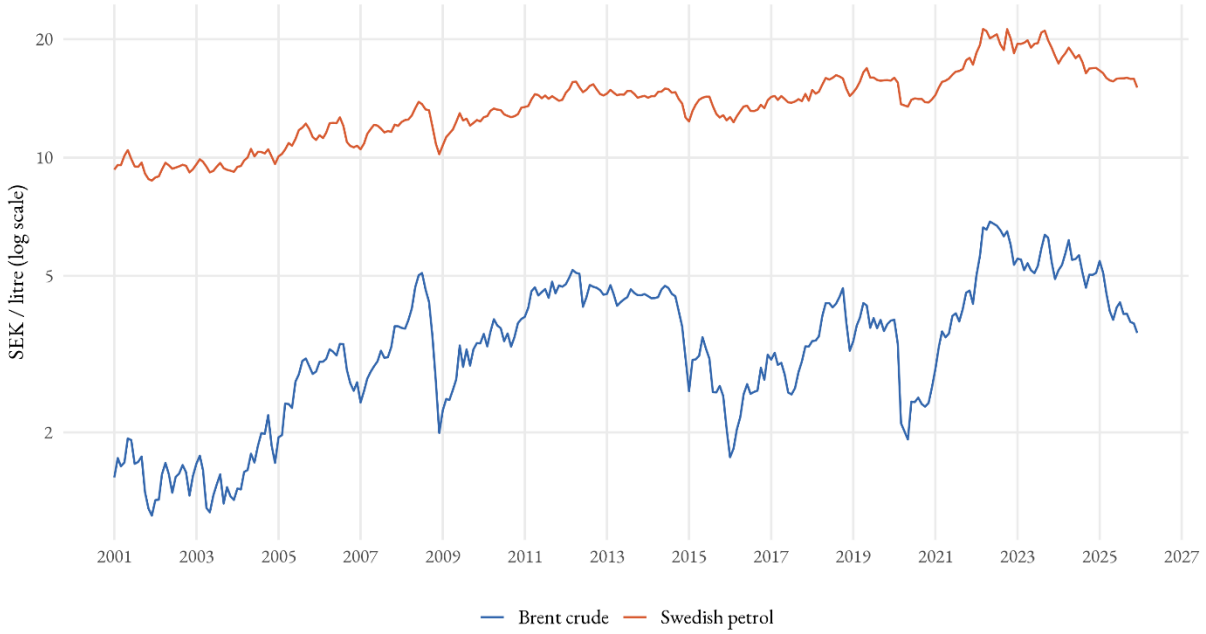
Our key dependent variable is the vote share for the Sweden Democrats, denoted by *Sweden Democrat Vote Share*$_{i,t}$, in municipality *i* for election year *t*. We define the Sweden Democrats' vote share in levels, rather than in the change of as for the incumbent, as voters are not evaluating whether SD deserves to retain previous support in the same way as for the incumbent. Rather, they shift toward the party in response to oil price increases, a relationship captured by the absolute level of support.

4.2. Explanatory Variable

4.2.1. Oil Price Data

Oil price data is retrieved from the Federal Reserve Bank of St Louis, from the Federal Reserve Economic Data (FRED), quoting monthly figures of Brent crude in USD per barrel based on data from the International Monetary Fund (International Monetary Fund, 2026). The dataset provides monthly prices, which are aligned with election years. However, we also extend the period to allow for lagged windows of oil price changes in years prior to an election year, meaning that we use data from 1997-2022.

Figure 1 below depicts a graph of Brent crude oil prices and Swedish petrol prices from 2001 into 2026. Since fuel costs are not incurred by Swedish voters through purchasing barrels of oil, but rather at the pump, it is important that oil prices reflect petrol prices such that the genuine cost burden felt by the public is captured. In the figure, oil prices have been converted to SEK/litre from USD/barrel using historical exchange rate data (Investing.com, 2026) and information on how many litres are in a barrel of oil (approximately 158.987 litres), to make prices more comparable. A logged scale allows for the comparison of relative changes.



Note: Brent crude oil prices (blue line) and Swedish petrol prices (red line) from 2001-2026. Oil prices are converted into SEK/litre to match the unit of petrol prices. Sources: IMF and Bensinstation.nu

Figure 1: Brent Crude Price Plotted Against Swedish Petrol Prices (Log Scale)

The graph indicates a close relationship – petrol prices often spike with oil prices, as can be observed in 2008 and 2022 – but petrol prices seem to be stickier and less volatile. As mentioned in the background, 60% of Swedish petrol prices are composed of taxes, which make final prices more sensitive to changes in these than to changes in the input cost. Despite this, we observe that Brent crude prices are a good proxy for petrol prices, with the plot in Figure 1 indicating a correlation of 0.895. Additionally, Figure B1 in the Appendix indicates the relationship between the monthly percentage changes of the two prices and shows a similarly high positive correlation of 0.754 (correlations are shown in Table B1). Petrol and oil prices therefore seem to move together, with higher oil prices indicating a higher cost burden with municipalities more dependent on cars.

As will be discussed later, we interact the oil price variable with municipality-level car ownership in the empirical models to account for differential exposure to oil price fluctuations across municipalities.

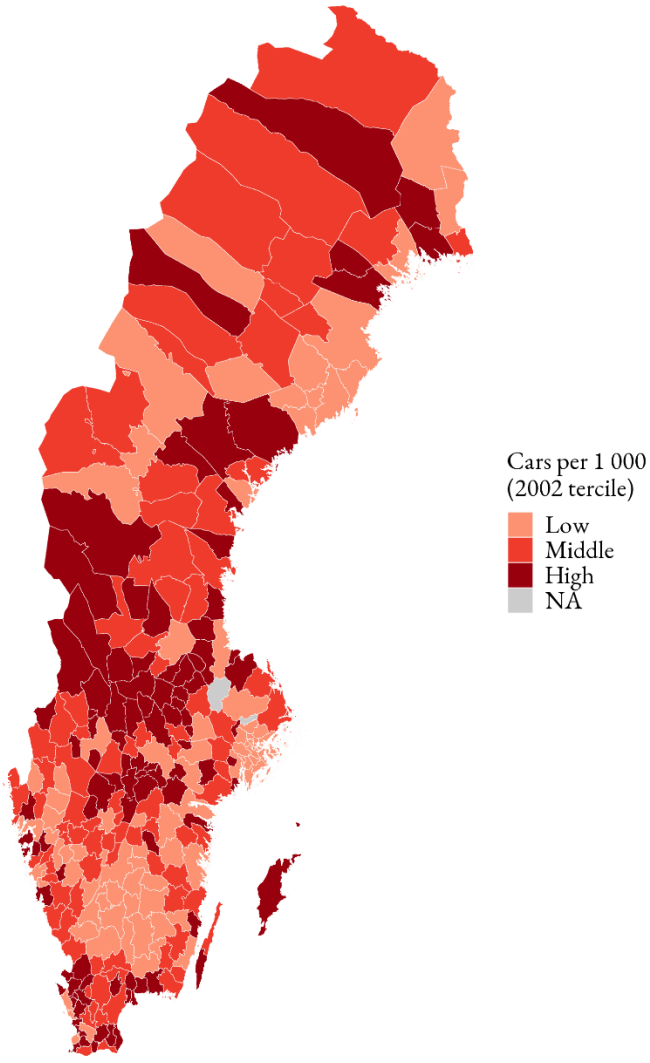
4.2.2. Car Ownership Data

As previously mentioned, to account for differential exposure to oil price fluctuations across municipalities, we use data on car ownership per 1 000 natural persons at the municipality level, as a higher proportion of car ownership implies a relatively greater dependence on petrol and diesel. The measure includes only cars owned by individual residents, excluding company vehicles or similar, to better capture the everyday reliance on petrol for personal transportation, and thus also the personal cost of higher oil prices. Normalising by population allows for comparability across municipalities of different sizes.

The data is retrieved from Statistics Sweden and we only use the baseline level found in 2002 as discussed in the following section (Statistiska Centralbyrån, n.d.-e). In the interest of improved

interpretability, we inflate the magnitude by a factor of 10 by using the variable cars per 100 natural persons instead, simply by dividing the above-mentioned figure by 10. This creates a car ownership share variable for each municipality *i*. For an additional regression, we split car ownership into terciles to provide a more categorical interpretation, instead comparing municipalities with low, medium and high car shares.

Sweden has 290 municipalities, but we have chosen to exclude two of them – Heby and Knivsta – throughout all datasets as there was no available data on the number of cars in 2002. We thus have 288 municipalities over six elections, giving us 1,728 observations.



Note: Heat map of car ownership per 1000 people in Swedish municipalities in 2002 split into terciles. Source: SCB

Figure 2: Heat Map of Car Ownership Per 1 000 People in 2002

Figure 2 plots the number of cars per 1 000 people in 2002 in each municipality. The darkest shade of red represents municipalities in the upper tercile of car ownership, and the lighter shades progressively indicate the middle and low terciles of car ownership accordingly. Larger cities, such as Gothenburg, Malmö, and Stockholm, all have lower car ownership shares, which is intuitively

reasonable as alternative means of transport are readily available, and distances to services and work are likely shorter. Car ownership is higher, however, in central and northern Sweden, as well as in the southmost municipalities. Here, public transport could, on the contrary to earlier, be less developed with greater distances to services, increasing reliance on cars. It is the variation in car ownership across municipalities that form the basis for differential exposure to oil prices in our model in this paper.

4.2.3. Variable Construction

Our research question aims to explore how oil prices have impacted Swedish politics. To capture this effect at the local level at which our investigation occurs we interact the crude oil price, which is constant across Sweden nationally, with car share in each municipality in 2002, following a similar approach to Kim and Yang (2022).

As seen in Section 4.2.1, 60% of Swedish gasoline prices consist of various taxes, making them endogenous to Swedish political outcomes. Brent crude prices do not contain the same tax component, nor does Sweden play a meaningful role in the global crude oil market, hence they are plausibly exogenous. Combined with the high correlation with Swedish gasoline prices, as observed in Table B1 in the Appendix, they conceivably constitute a good proxy for the purpose of our study.

In order to capture the effect of higher oil prices leading up to an election therefore, we follow the approach of Kim & Yang (2022), measuring the change in crude oil price from election *t* to year *t*-1. We calculate the average for the former with monthly prices from September (of year *t*-1) to August (of election year *t*) given Swedish elections are held on the second Sunday of September (Sveriges Riksdag, 2026), and for the latter as September (of year *t*-2) to August (of year *t*-1). More specifically:

$$\Delta Oil\ Price_t = \overline{Oil\ Price}_t - \overline{Oil\ Price}_{t-1} \quad (2)$$

The economic relevance of this approach is further supported by findings indicating that voters place a 75% weight on real disposable income growth in the year of the election when making voting decisions, and a 25% weight in the year prior (Healy & Lenz, 2014). The change in the oil price leading up to an election should therefore effectively capture the cost voters take into account when casting their ballots. We use the US dollar change in oil prices, consistent with the Kim & Yang (2022) approach, as voters are impacted by higher dollar prices rather than percentage increases. Furthermore, this is reflected in the Sweden Democrats' communication highlighting price comparisons in absolute numbers, as demonstrated in Section 2.1.2 and in Figure A1 in the Appendix, making this approach applicable to how voters engage with prices (Åkesson & Sjöstedt, 2022).

For our exposure variable, we choose to use a baseline year for car ownership rather than varying this over time, specifically the car share in 2002, the same year as the first election year. This is because car ownership over time is likely endogenous with politics, where, for example, individuals across municipalities may buy more cars in response to, say, a Sweden Democrat electoral success in the previous election year in anticipation of policy changes favouring car ownership. In this case, oil prices for municipalities with a higher share of car ownership may not cause a swing to SD, but be partly driven by it, introducing reverse causality.

Our interaction creates the explanatory variable:

$$\Delta Oil\ Price_t \times Car\ Share_i^{2002} \quad (3)$$

The interaction variable therefore measures the differences in sensitivity across municipalities – the higher the car share in a municipality, the more affected that municipality should be by more drastic changes in oil prices.

4.3. Control Variables

In a secondary regression (Section 6.3.1) we control for various factors to capture socioeconomic and demographic variation across municipalities and over time that may independently affect the Sweden Democrat vote share, and general election results, to isolate the effect of oil prices. They are consistent with what has been used in past literature, and hence are peer supported in their usefulness (Brännlund et al., 2024; Kim & Yang, 2022; Rickardsson, 2025). However, there exists endogeneity concerns regarding oil prices plausibly having a direct effect on these controls, and they are therefore applied solely in the secondary regression as to see whether our main results are robust to these confounding variables.

4.3.1. Net Salary

Using data from Statistics Sweden, we control for average net income on the municipality level (Statistiska Centralbyrån, n.d.-f). The data is aligned with the election years and are log-transformed. The data thus includes the logged average net income for each municipality from 2002 to 2022. This variable is supported by Kim & Yang (2022), who also use it in their US based study.

4.3.2. Unemployment

Unemployment data is obtained from Statistics Sweden and refers to the share of registered unemployed people aged 20-64 at the municipality level (Statistiska Centralbyrån, n.d.-a, n.d.-g). It stems from two different datasets, one covering unemployment between 1997-2021, and the other 2022-2024. The two sets are merged and aligned with the election years, including the unemployment rate for each municipality between 2002-2022. Unemployment is also controlled for by Kim & Yang (2022), through their inclusion of an employment rate.

4.3.3. Population and Proportion of Asylum Seekers

Population data is retrieved from a dataset supplied by Statistics Sweden (Statistiska Centralbyrån, n.d.-c). The data demonstrates the number of inhabitants in a municipality in a given year and is log-transformed. We use the period 2002-2022 and align the controls with the election years. Kim & Yang (2022) also control for the population of each US state.

Furthermore, we attempt to control for the proportion of asylum seekers in a given municipality in each of the election years, which is also provided by Statistics Sweden (Statistiska Centralbyrån, n.d.-d). The asylum seekers control was approximated using data for the number of people who were born abroad in the 5 countries which the Swedish Migration Agency states were the primary nationalities seeking protection in Sweden in the years 2013-2022, namely Syria, Afghanistan, Eritrea, Somalia and Iraq (Migrationsverket, 2023). The number of people born in each of these

countries for each municipality was summed and then divided by each municipality's population, resulting in a share variable. This was a key control as it has become an increasingly controversial and central topic in Swedish politics throughout the duration of our sampled time period, and it has been shown that higher exposure to newly settled asylum seekers increases voting for the Sweden Democrats (Rickardsson, 2025).

4.3.4. Education

To control for the level educational attainment in municipalities, which Brännlund et al. (2024) also control for, data from Statistics Sweden is used (Statistiska Centralbyrån, n.d.-b). The population in each municipality is split into two shares – those who have achieved a high school education or below and those who have at least started a higher education. It is these two shares for each municipality in each of the election years that is used as controls. The data thus stretches from 2002-2022 and is constructed to measure the proportion of the people in a municipality who pursued (even if they did not complete it) a form of higher education, such as an undergraduate degree. This was divided by the total population of the municipality, expressing the variable from 0-100.

4.4. Descriptive Statistics

Table 1 presents descriptive statistics for the variables of focus in our thesis, specifically for the Sweden Democrats vote share in each election year, the oil price change in the year leading up to each election, and finally the ownership of cars across municipalities as a percentage of the number of people.

Table 1: Descriptive Statistics

Variable	Mean	StDev	Min	Max	N
Key Dependent Variable / Year					
SD Vote Share 2002 (%)	1.358	1.195	0.000	6.500	288
SD Vote Share 2006 (%)	3.194	1.766	0.300	10.300	288
SD Vote Share 2010 (%)	6.308	2.540	1.700	15.800	288
SD Vote Share 2014 (%)	15.349	4.475	5.300	30.000	288
SD Vote Share 2018 (%)	20.935	5.441	8.600	39.200	288
SD Vote Share 2022 (%)	25.330	5.863	10.700	42.600	288
Independent Variables					
Δ Oil Price (USD)	13.125	14.528	-4.779	35.968	6
Car Share 2002	40.485	3.874	22.200	47.300	288
Low Car Share Tercile 2002 (%)	36.314	3.510	22.200	39.700	96
Mid Car Share Tercile 2002 (%)	41.028	0.741	39.800	42.300	93
High Car Share Tercile 2002 (%)	44.018	1.250	42.400	47.300	99

Notes: Descriptive statistics for all dependent and independent variables used in the main regression models. Panel of 288 Swedish municipalities observed over 6 election years (2002, 2006, 2010, 2014, 2018, and 2022). N = 1 728 observations. Sweden Democrat vote shares are reported as levels for each election year at the municipality level.
Sources: Swedish Election Authority, SCB, IMF

Most noticeably, the summary statistics for the Sweden Democrat vote share in each of our sampled election years illustrate a rapid rise for the party over the 20-year period and wide

differences in municipal support. This is reflected in them receiving no votes in certain municipalities in 2002 to then experiencing a minimum of 10% in 2022, accompanied by an increase in the mean vote share from 1.4% to 25.3%, and maximum vote share increasing from 6.5% to 42.6%.

Oil price changes in the year prior to the sampled election years have varied significantly, with a standard deviation of $14.5, a maximum increase of almost $36 and a largest decrease of $4, indicating the highly volatile macroenvironment throughout the observed 20 years. Car shares in the year 2002, our baseline, varied less although still with pronounced differences between municipalities, with about 25.1 percentage points, or 25 cars per 100 people, differing between the minimum and maximum observed values. In the car share terciles, the difference in mean between the high and low terciles is approximately 8 percentage points (8 cars per 100 people), varying from 36 to 44 cars per 100 people.

5. Empirical Strategy

In this section, we present our empirical strategy and methodology, including the two models that answer our hypotheses. The first examines whether municipalities with higher car dependence, as measured through car ownership, punish the incumbent government in response to an increase in oil prices between election years. The second specification assesses whether municipalities with higher car dependence, and thus more exposure to oil price fluctuations, experience larger increases in vote share for the Sweden Democrats in response to an increase in oil prices.

We first introduce a two-way fixed effects model, expanded from the specification used by Kim & Yang (2022), to test the former, before discussing the effect on Sweden Democrat vote share. Finally, we discuss the limitations of our models, which are similar across specifications given the same underlying method and explanatory variables, with the dependent variable being the only difference between them.

5.1. Two-Way Fixed Effects Model for Change in Incumbent Government Vote Share

The regression in Equation 4 tests whether municipalities with higher car dependence punish the incumbent government to a greater degree in response to an increase in oil prices.

Consistent with the Kim & Yang (2022) approach, and as reasoned by Brännlund et al (2024), we choose to include both municipality and election year fixed effects in our regression model. This accounts for the pronounced time-invariant differences that exist between Swedish municipalities, such as urban or rural classification and their geographical location, and the homogenous effect of time varying and municipality invariant factors, like macroeconomic shocks and national political trends.

$$\Delta\, Incumbent\ Vote\ Share_{i,t} = \beta_1 \Delta Oil\ Price_t \times Car\ Share_i^{2002} + \mu_i + \gamma_t + \varepsilon_{i,t} \qquad (4)$$

μ represents the municipality fixed effects for municipality i and γ the fixed effects for election year t. The individual effects of the change in oil price and car ownership variables are omitted since they are absorbed by election year and municipality fixed effects respectively. β_1 therefore

represents the differential change in incumbent vote share between elections in a municipality with one more car per 100 people than another, in response to a $1 increase in oil prices. Standard errors are clustered at the municipality level.

5.2. Two-Way Fixed Effects Model for Sweden Democrat Vote Share

We employ the regression in Equation 5 to test whether municipalities with higher car dependence experience larger increases in vote share for the Sweden Democrats in response to an increase in oil prices.

As is consistent with our approach in the incumbent model, we employ two-way fixed effects at both the municipality and election year level to account for time invariant and municipality invariant effects respectively.

$$Sweden\ Democrat\ Vote\ Share_{i,t} = \beta_1 \Delta Oil\ Price_t \times Car\ Share_i^{2002} + \mu_i + \gamma_t + \varepsilon_{i,t} \qquad (5)$$

As is constant across both equation (4) and (5), μ represents the municipality level fixed effects and γ the election year fixed effects. Individual variables of oil price changes and car ownership baselines are once again omitted. β_1 therefore represents the differential level in Sweden Democrat vote share in a municipality with one more car per 100 people than another, in response to a $1 increase in oil prices. As with the Sweden Democrat model, standard errors are clustered at the municipality level.

This regression is repeated for each of the eight parties in Swedish Parliament, allowing us to investigate how other parties are affected, including whether left-wing parties experience similar support, as stated by the compensation hypothesis in Brännlund et al. (2024).

5.3. Assumptions and Limitations of the Two-Way Fixed Effects model

One central assumption to both two-way fixed effects models is that the international Brent crude oil price changes should be exogenous to Swedish election outcomes. This assumption likely holds as the prices are determined in a global market, on which Swedish politics have negligible influence, given that the nation is neither a large producer nor a large consumer on the global stage, as discussed in Section 4.2.3. This same assumption is also required to hold for our local exposure variable, car share. A violation of this assumption would arise due to reverse causality, that is, if political outcomes affect car ownership. As mentioned in Section 4.2.3, we therefore use car ownership in 2002 as a time-invariant baseline.

A further assumption underlying our model is that municipalities with higher and lower car ownership would have followed common trends to one another in their voting outcomes. This means that any differential voting response between the two should reflect the oil price mechanism rather than other time-varying or municipality varying factors. The municipality fixed effects mitigate the issue to a certain extent by controlling for differences that are stable within these units over time, such as their urban or rural status. Meanwhile, the election year fixed effects contribute by controlling for shocks that are common to all municipalities, such as global economic crises like that experienced in 2008. The remaining variation should thereby constitute what identifies that high-car ownership municipalities increasingly vote for the Sweden Democrats when oil prices increase, while punishing the incumbent.

There is, however, a central threat to this assumption. While our model does control for what is constant over time within these municipalities and what varies over time but affects each municipality similarly, it does not control for the fact that certain factors might have a differential effect on municipalities with high versus low car ownership. That is, it does not control for time-varying factors with heterogeneous effects that happen to be correlated with higher oil prices. As these factors remain uncontrolled for, they could bias our estimates by operating through the oil price channel. In the Swedish context, one such factor could be a rural economic decline, where rural municipalities, which tend to have a higher proportion of car ownership, have experienced a worsening in local economic conditions which could potentially drive support for the Sweden Democrats as a protest vote against established parties, and could punish the incumbent. If such an economic decline in rural municipalities is driving SD support, while decreasing incumbent support, in election years where oil prices are increasing, the interaction term no longer captures the effect of oil prices on vote share through car ownership. Rather, it captures the effect of other economic conditions in municipalities with high car ownership.

Furthermore, the Russian invasion of Ukraine caused not only a spike in oil prices, but also raised security concerns concerning defence spending, NATO membership, and overall vulnerability to foreign threats. This could have affected municipalities with high versus low car ownership differently, for example through perception of exposure to threats, a differential view on the need for alliances, or varying beliefs regarding nationalism. Potentially, this could drive support for the Sweden Democrats in said municipalities in the same election year where oil prices rose dramatically. Both these examples make it difficult to attribute our estimated effect directly to the oil prices in themselves, as heterogeneous confounding time trends and their correlation with both oil prices and car ownership allow for a potential bias.

A related but distinct limitation concerns the interaction term. While we do argue that car ownership is motivated as a measure of exposure to oil price fluctuation, it simultaneously risks correlating with factors such as income levels and educational attainment, variables which also affect political outcomes, causing omitted variable bias. The interaction term conceivably captures the effect of some of these municipality specific characteristics, as shown by the significant non-zero correlations in Table C1, rather than oil price sensitivity itself, meaning that the estimated effects may reflect voter responses to other socioeconomic and demographic conditions rather than the oil price mechanism alone. Adding controls for these factors could mitigate the issue to isolate the effect of oil prices and car ownership. As mentioned in Section 4.3, however, oil prices might have a direct effect on the control variables themselves, in particular income and unemployment, which in turn have an effect on the electoral outcomes. This would render them bad controls as they absorb part of the channel through which oil prices affect electoral outcomes, biasing the coefficient downwards. For the latter reason, controls are excluded from the main specification but included in a secondary regression, aiming at examining the stability of our estimates.

Furthermore, as discussed in Section 4.2.3, our empirical strategy assumes that oil price changes in the period immediately preceding an election are the most salient to voters and therefore drives the effect on incumbents, as supported by previous literature (Healy & Lenz, 2014; Kim & Yang, 2022). Drawing on this, we further assume that the same should hold in relation to populist parties in our context.

Finally, a major structural limitation underlying the empirical strategy is the dataset itself, specifically that it contains only six election years and thus only few instances of oil price changes and election outcomes. This limits the time-variation used to identify the effect of oil prices on vote shares, and could mean that the estimated coefficients are sensitive to the inclusion or exclusion of an individual election year, with a particular year driving the results substantially in comparison to other years.

6. Results

This section presents our results for the two different two-way fixed effects specifications in an order consistent with the previous sections. First, we display the estimated effects on the change in vote share for the incumbent government, whereafter we follow the same procedure for the effects on the vote share for the Sweden Democrats. Lastly, we perform several sensitivity analyses in order to test our assumptions and potential limitations as highlighted in Section 5.3.

6.1. Change in Incumbent Government Vote Share

Table 2 below displays the main results of the two-way fixed effects model for the incumbent government, demonstrating the relationship between the change in incumbent vote share and oil price increases for differential municipality car ownership shares.

Table 2: Effect of Oil Price Change by Car Share on Change in Incumbent Vote Share

	Δ Incumbent Vote Share
Δ Oil Price × Car Share 2002	-0.0104***
	(0.0016)
Controls	No
Municipality FE	Yes
Year FE	Yes
Clustered SE (municipality)	Yes
Observations	1440
R^2	0.777
Within R^2	0.036

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: Two-way fixed effects (TWFE) regression output, with Δ *Incumbent Vote Share* as the dependent variable and Δ *Oil Price* × *Car Share 2002* as the independent variable. Table reports the coefficient for the explanatory variable. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and election year level.

Our results indicate that a municipality with 1 more car per 100 people than another municipality will experience a 0.0104 percentage point larger decline in the incumbent vote share between elections in response to a $1 increase in the average price of oil in the year leading up to an election. A more intuitive interpretation of the estimated coefficient is provided by using a change in oil prices that is close to the mean, and a difference in car share roughly corresponding to the difference in high tercile and low tercile car share means, as seen in Table 1. That is, an increase

of $15 in the year prior to an election, the incumbent vote share is expected to fall by approximately 1.56 percentage points more in a municipality that had 10 more cars per 100 people than another.

We also conduct a supplementary regression (Table D1 in the Appendix), where car ownership share is split into terciles, garnering a less arbitrary interpretation. We find that municipalities in the upper tercile of car ownership share experience an approximately 1.03 percentage point greater decline in incumbent support for a $15 increase in oil prices compared to low tercile municipalities.

The significance of our results to the 1% level suggests that there is a heterogeneous effect of oil price increases on the incumbent vote share between elections in municipalities with varying levels of oil price exposure through car ownership. Specifically, those municipalities more exposed to the oil price fluctuation appear to swing away from the incumbent to a larger extent than municipalities that are less exposed. We therefore find initial evidence in support of our first hypothesis.

6.2. The Sweden Democrats' and Other Parliamentary Parties' Vote Share

The results of the two-way fixed effects model for the Sweden Democrats are presented in Table 3 below. Here, the relationship between the level of the Sweden Democrats' vote share and oil price increases for varying shares of municipality car ownership is estimated. The core difference between the models, as mentioned in Section 4.1, is that the outcome variable instead reflects level of vote share. Lastly, we estimate the effect on other parliamentary parties' vote shares.

Table 3: Effect of Oil Price Change by Car Share on Sweden Democrat Vote Share

	Sweden Democrat Vote Share
Δ Oil Price × Car Share 2002	0.0149***
	(0.0011)
Controls	No
Municipality FE	Yes
Year FE	Yes
Clustered SE (municipality)	Yes
Observations	1728
R^2	0.956
Within R^2	0.119

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output, with *Sweden Democrat Vote Share* as the dependent variable and Δ *Oil Price × Car Share 2002* as the independent variable. Table reports the coefficient for the explanatory variable. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and election year level.

The estimate indicates that a municipality with 1 more car per 100 people than another municipality will have a 0.0149 percentage point greater increase in vote share for the Sweden Democrats as oil prices increase with $1. Using the same example as in Section 6.1, a realistic interpretation would be that a $15 increase in the oil price in the year prior to an election would imply a 2.24 percentage

point greater vote share for the Sweden Democrats in a municipality with 10 more cars per 100 people than another.

We repeat the supplementary tercile regression for Sweden Democrat vote share (Table D1 in the Appendix), finding that municipalities in the upper tercile of car ownership share experience an approximately 1.62 percentage point greater SD vote share for a $15 increase in oil prices compared to low tercile municipalities.

Our results are significant at the 1% level, once again indicating that there is a heterogeneous effect of oil price increases, here on the Sweden Democrats, in municipalities with varying levels of oil price exposure through car ownership. That is, municipalities that are more exposed to oil price variation will to a larger extent vote for the Sweden Democrats than municipalities that are less exposed. The results suggest that our second hypothesis is also supported: municipalities with a higher baseline car dependence do experience a greater propensity to vote for the Sweden Democrats.

In comparison to the rest of the parties in Parliament (see Table E1 in Appendix), we observe the largest estimated coefficient for the Sweden Democrats. The other parties with a positive effect, in falling order of magnitude, are the Liberals, the Christian Democrats, and the Moderates, with 0.0063, 0.004, and 0.0037 percentage point increase in vote share respectively, in response to a $1 increase in oil prices in a municipality with 1 more car per 100 people than another. The parties with a negative effect are then the Social Democrats, the Centre Party, the Left Party, and lastly the Green Party, with 0.0133, 0.0096, 0.0054, and 0.001 percentage point decreases in vote share respectively, again in response to a $1 dollar increase in oil prices in a municipality with 1 more car than another.

6.3. Sensitivity Analyses

Finally, we construct four sensitivity analyses testing the robustness of our models, with regards to concerns regarding the applicability of assumptions, as discussed in Section 5.3, which include endogeneity concerns, omitted variable bias, time-varying confounders and reverse causality. We first introduce control variables for various economic factors local to specific municipalities, then using fixed effects to account for region specific time trends. Our penultimate test observes the models with each election year removed in isolation, before varying the time period in which average oil price is computed.

6.3.1. Sensitivity Analysis I: Controlling for Local Economic Indicators

To address the issue of omitted variable bias in both of our regressions potentially causing municipality car ownership in 2002 or oil price shock responses to reflect time-varying, municipality-specific characteristics, such as socioeconomic factors and demographics, we model the same main specifications but control for a select set of local economic indicators, as described in Section 4.3.

Table 4: Local Economic Controls

	Δ Incumbent Gov. Vote Share	Sweden Democrat Vote Share
Δ Oil Price × Car Share 2002	-0.0058***	0.0124***
	(0.0014)	(0.0012)
Controls	Yes	Yes
Municipality FE	Yes	Yes
Year FE	Yes	Yes
Clustered SE (municipality)	Yes	Yes
Observations	1440	1728
R^2	0.824	0.965
Within R^2	0.239	0.290

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output for two regressions, with Δ *Incumbent Gov. Vote Share* and *Sweden Democrat Vote Share* as the dependent variables respectively, both with Δ *Oil Price × Car Share 2002* as the independent variable, and control variables included. Table reports the coefficient for the explanatory variable and the control variables. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and county-year level.

In our change in incumbent vote share model, the magnitude of the estimated coefficient decreases from -0.0104 to -0.0058, but remains significant at the conventional level. In the Sweden Democrat vote share model, we find no substantive change to our result that would suggest oil prices and car ownership are just a reflection of the aforementioned economic conditions, with our result remaining significant at the 1% level and only a marginal decrease in magnitude (0.0124 versus 0.0149).

The rather large magnitude decrease in the change in incumbent vote share model can be the result of two potential issues. First, it may suggest that the coefficient of our interaction term in Table 2 is inflated due to omitted variables, and second, that the introduction of local economic conditions are bad controls, as discussed in Section 5.3, biasing the estimate downwards. Under either interpretation, oil price sensitivity through car ownership remains a significant negative estimator of incumbent vote share change.

Overall, these estimates suggest that the results in Tables 2 and 3 remain relatively robust. The chosen set of local economic conditions seem to have a relatively minor role in the results for the Sweden Democrats, and for the incumbent change in vote share, although the inclusion of such factors reduced the observed coefficients, the effect remains significantly negative.

6.3.2. Sensitivity Analysis II: Controlling for Region-specific Time Trends

In an attempt to mitigate the concern of heterogeneous confounding time trends affecting municipalities with different car dependence heterogeneously, we introduce county-year fixed effects to allow for region specific time trends.

Table 5: County-Year Fixed Effects

	Δ Incumbent Gov. Vote Share	Sweden Democrat Vote Share
Δ Oil Price × Car Share 2002	-0.0050***	0.0160***
	(0.0017)	(0.0014)
Controls	No	No
Municipality FE	Yes	Yes
County × Year FE	Yes	Yes
Clustered SE (municipality)	Yes	Yes
Observations	1435	1722
R^2	0.893	0.969
Within R^2	0.010	0.110

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output for two regressions, with Δ *Incumbent Gov. Vote Share* and *Sweden Democrat Vote Share* as the dependent variables respectively, both with Δ *Oil Price × Car Share 2002* as the independent variable. Table reports the coefficient for the explanatory variable. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and county × year level.

For the change in incumbent vote share model, whilst we again see a dampened coefficient, it remains significantly negative at the 1% level, with an increase in oil prices by $1 leading to the incumbent being punished by 0.005 percentage points more between election years in a municipality with one more car per 100 people, as seen in Table 5. While regional time trends have a substantial impact on the incumbent's favourability therefore, it is not the sole driver of our observed variation.

In the Sweden Democrat vote share model, we observe a consistently positive significant estimate with a larger magnitude of 0.016, as seen in Table 5, compared to our main coefficient of 0.0149. This has two potential interpretations: either, unobserved regional time trends are negatively correlated with the outcome variable in our main model, biasing our estimate downwards such that when they are absorbed an effect of larger magnitude is revealed; or, that the counties with the greatest internal car share variation also happen to be the ones for which the oil price increase to Sweden Democrat vote share channel is the strongest. This possibility is amplified by skewed county sizes and by our limited sample size with only six years, making it difficult to interpret this coefficient as a representative national average.

Ultimately, since the estimated effect remains statistically significant with consistent signs, our observed effects in the main regression appear robust. However, including county-year fixed effects only addresses confounders operating at the county level, whereas those threatening our common trends assumption likely operate along municipality characteristics, such as rurality, which are also correlated with car ownership (as discussed in Section 5.3). This test does therefore not rule out the presence of such confounders.

6.3.3. Sensitivity Analysis III: Filtering Out Single Years

The two tables below display the estimates for the main regressions, but with each year filtered out in isolation, resulting in five regressions for the change in incumbent vote share (as we only have vote share change for five elections) and six regressions for the vote share of Sweden Democrats. The primary aim of this is to address whether the structural limitation – the scarcity of time variation with only five and six elections – and the concerns following it result in one of the elections driving the results on its own. In the case where one election year is the primary source of the identifying variation, driving the results presented in Tables 2 and 3, we would expect to find a substantial change in magnitude for the coefficient and potentially even a drop in significance.

Table 6: Filtering Out Single Election Years (Δ Incumbent Gov. Vote Share)

Excluded election years:	2006	2010	2014	2018	2022
Δ Oil Price × Car Share 2002	-0.0095***	-0.0104***	-0.0170***	-0.0105***	-0.0031
	(0.0015)	(0.0016)	(0.0019)	(0.0016)	(0.0022)
Controls	No	No	No	No	No
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Clustered SE (municipality)	Yes	Yes	Yes	Yes	Yes
Observations	1152	1152	1152	1152	1152
R^2	0.858	0.770	0.690	0.792	0.754
Within R^2	0.051	0.045	0.056	0.046	0.001

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output for five regressions, with Δ *Incumbent Vote Share* as the dependent variable and Δ *Oil Price* × *Car Share* 2002 as the independent variable. Each regression excludes observations from the year detailed in the heading, keeping observations from the remaining election years. Table reports the coefficient for the explanatory variable. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and election year level.

As displayed in Table 6, the estimate for the change in incumbent vote share remains both significant at the 1% level and relatively stable in magnitude when removing the election years of 2006, 2010 and 2018, with coefficients of -0.0095, -0.0104, and -0.0105 compared to the previous main results with a coefficient of -0.0104. However, when removing 2014, while remaining significant at the 1% level, the estimate increases substantially in magnitude to -0.017. In contrast, when removing 2022, the result becomes insignificant and closer to zero in magnitude (-0.0031), though still negative.

The time variation limitation is arguably even more prevalent in the regression on change in incumbent vote share as there are only five elections to begin with, so leaving one out means that only four elections remain. It should be noted however, that the negative effect remains throughout all exclusions, such that the coefficient still points in the expected direction in line with our hypothesis.

Table 7: Filtering Out Single Election Years (Sweden Democrat Vote Share)

Excluded election years:	2002	2006	2010	2014	2018	2022
Δ Oil Price × Car Share 2002	0.0109***	0.0156***	0.0160***	0.0218***	0.0141***	0.0051***
	(0.0009)	(0.0011)	(0.0011)	(0.0015)	(0.0010)	(0.0008)
Controls	No	No	No	No	No	No
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE (municipality)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1440	1440	1440	1440	1440	1440
R^2	0.966	0.966	0.966	0.968	0.965	0.955
Within R^2	0.251	0.317	0.321	0.337	0.307	0.192

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output for six regressions, with *Sweden Democrat Vote Share* as the dependent variable and Δ *Oil Price* × *Car Share 2002* as the independent variable. Each regression excludes observations from the year detailed in the heading, keeping observations from the remaining election years. Table reports the coefficient for the explanatory variable. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and election year level.

Shifting focus to the effect on the Sweden Democrats' vote share, all estimated coefficients remain positive as well as significant at the 1% level, indicating relatively robust results, as seen in Table 7. Our estimated coefficients do, however, differ in magnitude, with the smallest observed effect occurring when 2022 was removed from our sample, with a coefficient of 0.0051 – a third of that in the main results (0.0149). As opposed to the result on the incumbent, this estimate remains significant at the 1% level, providing reassurance for the precision of our results. The largest coefficient is obtained when removing 2014, with an estimate of 0.0218, which is almost twice the magnitude of the coefficient in the main results.

Our findings across both models are consistent in that when 2014 is removed, both interaction term coefficients increase substantially in magnitude, whereas when 2022 is removed the magnitude of the estimate decreases, with the coefficient in the incumbent model becoming insignificant.

The varying magnitudes thereby indicate that individual election years – in particular 2014 and 2022 – have an influence on the magnitude of our main results. For the Sweden Democrats, however, as estimates remain significant and positive throughout all regressions, this demonstrates that the estimated direction of our coefficient is robust. For the change in incumbent vote share, removing 2022 renders the estimate insignificant, which further shows that this result is driven by said election year, both in terms of magnitude and significance, but with the sign remaining negative throughout.

6.3.4. Sensitivity Analysis IV: Different Windows for Oil Price Changes

In a fourth and final sensitivity analysis, we examine whether our results are sensitive to our calculation of the change in oil prices and choice of oil price window. Following the approach of Kim and Yang (2022), we test how different oil price change windows impact our estimated

coefficient. Table 8 shows the results for such a regression for the incumbent vote share change model.

Table 8: Alternative Comparison Periods for 12-Month Oil-Price Windows (Δ Incumbent Vote Share)

	t – (t-2)	t – (t-3)	t – (t-4)
Δ Oil Price × Car Share 2002	-0.0031***	0.0056***	0.0044***
	(0.0005)	(0.0010)	(0.0006)
Controls	No	No	No
Municipality FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Clustered SE (municipality)	Yes	Yes	Yes
Observations	1440	1440	1440
R^2	0.773	0.772	0.778
Within R^2	0.017	0.014	0.042

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output with Δ *Incumbent Vote Share* as the dependent variable and Δ *Oil Price* × *Car Share 2002* as the independent variable, varying the comparison period used to compute the change in oil prices. Each column uses an alternative oil price change window based on election-year aligned 12-month averages. The average oil price in year *t* is defined as the average monthly crude oil price from September *t*-1 to August *t*, while *t*-2, t-3, and *t*-4 correspond to analogous 12-month averages ending 2, 3, and 4 years prior to the election, respectively. Table reports the coefficient for the explanatory variable. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and election year level.

Our results are robust when looking at how oil prices change two years prior to an election, with a significantly negative coefficient of 0.0031, albeit a third of the magnitude of the main estimate. It is not robust, however, at the three- or four-year window as the signs become reversed, with magnitudes of 0.0056 and 0.0044 in each window respectively. That is, we see a positive effect on the change in incumbent vote share in municipalities with higher car dependence when looking at oil price changes further away from the election. The significant sign reversal is what is of particular concern, as it implies our choice of oil price window influences not just the magnitude of the coefficient, but also its direction.

We observe a similar result for our Sweden Democrat vote share model as for the change in the incumbent regression, as shown in Table 9 below.

Table 9: Alternative Comparison Periods for 12-Month Oil-Price Windows (Sweden Democrat Vote Share)

	t – (*t*-2)	*t* – (*t*-3)	*t* – (*t*-4)
Δ Oil Price × Car Share 2002	0.0071***	-0.0017***	-0.0025***
	(0.0005)	(0.0005)	(0.0003)
Controls	No	No	No
Municipality FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Clustered SE (municipality)	Yes	Yes	Yes
Observations	1728	1728	1728
R^2	0.955	0.950	0.951
Within R^2	0.097	0.001	0.013

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output with *Sweden Democrat Vote Share* as the dependent variable and Δ *Oil Price* × *Car Share 2002* as the independent variable, varying the comparison period used to compute the change in oil prices. Each column uses an alternative oil price change window based on election-year aligned 12-month averages. The average oil price in year *t* is defined as the average monthly crude oil price from September *t*-1 to August *t*, while *t*-2, *t*-3, and *t*-4 correspond to analogous 12-month averages ending 2, 3, and 4 years prior to the election, respectively. Table reports the coefficient for the explanatory variable. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and election year level.

Again, the observed coefficient is robust in the two-year window at the 1% level with an estimate of 0.0071, a magnitude half of the main estimate, but not in the three- or four-year window. When using oil price change windows *t*-3 and *t*-4, the sign for the estimate reverses from positive to negative, with magnitudes of 0.0017 and 0.0025 respectively; there is a negative effect on SD vote share in municipalities with higher car dependence when looking at oil price changes further away from the election. Here too, the significance of the sign reversal is of particular concern, for the same reason as before.

Combining the two, we observe what appears to be a pattern: both see an attenuating but consistent effect using *t-2*, but experience significant sign reversals in the periods *t*-3 and *t*-4. As will be discussed in Section 7.2, this plausibly stems from a small election year sample. The sign reversal, therefore, remains an issue as it suggests that our results are sensitive to the temporal specification chosen for our regression.

7. Discussion

In the discussion section, we provide an in-depth analysis and qualitative evaluation of our study. First, we explore the indicated relationship between oil prices and political choices, why we think these results were observed, and what the consequences of this are for political parties and Swedish politics. We then discuss how our results fit into existing theory and literature, ultimately answering our research question.

7.1. Results

The results for the two main specifications suggest indicative support for our two hypotheses, with a negative and significant effect on the change in incumbent vote share in municipalities with a

higher car dependence in response to an increase in oil prices, and a positive and significant effect on the Sweden Democrat vote share through the same channel.

In previous literature, gasoline prices have been shown to have a negative effect on both presidential approval ratings and on incumbent president vote share, with the latter effect varying depending on exposure to price increases through time spent commuting (Gupta et al., 2025; Kim & Yang, 2022). Similarly, our findings suggest that exposure to oil prices as measured through car ownership also decreases the vote share of the incumbent governing parties when oil prices increase. This extends the findings to apply in a multiparty context through examining not just a singular leading party or leader, but the complex coalition governments which are commonplace in Sweden. As the oil prices used in our model are exogenous to Swedish politics, the findings are seemingly also in line with voters punishing incumbents for factors outside their control (Wolfers, 2002).

Voters in high car share municipalities then, seem to be disfavouring the incumbent in years where oil prices increase, compared to voters in low car municipalities. Our results indicate that these same oil price changes seem to benefit the Sweden Democrats. The estimated effects thereby appear to be in line with existing literature on populist voting, which has focused on economic insecurities, unemployment, electricity prices and their respective electoral effects, finding that they indeed benefit populist and antiestablishment parties (Algan et al., 2017; Brännlund et al., 2024; Brännlund & Peterson, 2024; Colantone & Stanig, 2018). By examining the effect of oil prices and car ownership, our findings suggest a new channel through which populist parties' benefit. In doing so, we also extend the findings of Brännlund et al. (2024) and Brännlund and Peterson (2024) by showing that a similar mechanism to electricity prices appears to operate through a different but related energy price channel. We thereby also contribute to the increasing political discussion around energy prices in Sweden and how exposure to these prices shapes electoral outcomes.

Our results can be viewed in light of a $36 increase in average oil price between 2021 and the 12 months preceding the 2022 election (as seen in Table F1 in the Appendix), which would indicate an approximate 3.7 percentage point greater decline in vote share for the incumbent and a 5.4 percentage point higher vote share for the Sweden Democrats, in a municipality with 10 more cars per 100 people than another municipality. The SD vote share coefficient appears large, especially in the context of the 2022 elections, where the party received 20.5% of the national vote share (Valmyndigheten, 2026b). However, the coefficient represents a differential effect between municipalities with varying levels of car ownership rather than a national shift. Viewed in the context of municipality level votes, the relative magnitude appears more reasonable as their vote share varies substantially between municipalities: in 2022 the lowest was 10.7%, and the highest was 42.6%, as seen in Table 1. The magnitude for the incumbents also appears large, especially when considering that the Tidö parties only secured a majority by 0.72 percentage points in 2022 (Valmyndigheten, 2026b), though, as with SD, our coefficient identifies a between-municipality differential rather than a national shift.

More broadly, our results in Table E1 indicate that other more moderate right-leaning parties also receive increased support, albeit to a lesser extent than the Sweden Democrats, in municipalities with higher car shares. A positive significant coefficient is observed for all parties who now form

the Tidö Agreement as described in Section 2.1.1, namely the Moderates, the Christian Democrats and the Liberals. The more left leaning parties, specifically the Social Democrats, the Centre Party, the Green Party, and the relatively far-left Left Party, are all seemingly disadvantaged by the same oil price increase. This finding stands in contrast to the findings of Brännlund et al. (2024) and their compensation hypothesis. If our results were to be in support of this mechanism, we would expect to see the left gain in response to an oil price increase in high car share municipalities, but instead parties on the left side of the spectrum seem to be punished. Rather, we find support for the populist hypothesis, in line with Brännlund and Peterson (2024), although our observed positive coefficients for other right leaning parties is unexplained by this concept.

The differential effects on the individual parties likely reflect the current left-right split in Swedish politics. The notion that the Moderates, Christian Democrats, and Liberals all benefit may sound contradictory, since they were all incumbents during our sampled period, and our results indicate that the incumbent government is punished by voters in high car share municipalities. However, the incumbent model captures the effect of whichever party or coalition is in government during oil price increases, while the party-level results reflect the effect on the individual parties. To attempt to explain the differential effect on the left and right sides of Swedish politics, therefore, one could examine the policies of the individual parties. The right-side parties have, especially in recent years, been vocal about reducing fuel taxes to mitigate high gasoline prices (Kristdemokraterna, 2022; Moderaterna, 2022a). Meanwhile, the left-side parties have in general had a less favourable view of such policies, potentially providing an indication as to why the left-parties have been disadvantaged. However, the Centre Party remains an outlier to this, as they are seeing a negative effect despite historically being a rural-friendly party. Such generalisations should therefore be done with care.

The two main findings of this thesis connect to the discussion in Section 2.1.2, where the politics and communication of the Sweden Democrats recently shifted more toward energy prices, blaming the incumbent government for high fuel prices and naming them "sossepriser". Furthermore, their communication explicitly appeals to rural municipalities with a higher car dependence, as seen in Figure A2 in the Appendix, where they blame the incumbent government for "punishing rural areas and the millions of Swedes who in different ways depend on cars to make everyday life work" and having "no understanding whatsoever of ordinary people's living conditions". The recent emphasis on said challenges in parallel with dramatically increasing oil prices following the Russian invasion of Ukraine, and the impact thereof in people's lives, could hint at why the effect attenuates when leaving out 2022. Although our study does not investigate any such effect and hence no concrete conclusion can be drawn, one can hypothesise that voters potentially respond more strongly to such campaigning surrounding cost of living, drawing car-dependent municipalities toward the Sweden Democrats.

7.2. Limitations

Our study contains two primary limitations that prevent a wholly causal interpretation of our results: the first is the very small sample of election years on which our regressions are based, providing time variation across at most six points, and the second is heterogeneous confounding time trends acting through the oil price channel.

Both of these become observably concerning in 2022, which we find in Section 6.3.3, when this year is filtered out. As a consequence of the small election year sample and the comparatively higher change in oil prices (the highest observed as seen in Table F1 in the Appendix), it contains the majority of the identifying variation driving our results. The reason for this high oil price change was Russia's invasion of Ukraine in February 2022, which compounds our second key limitation onto the issue of limited time variation. Along with the oil price shock, the invasion brought with it concerns of a potential influx of immigration, which is one of the Sweden Democrats' key policy issues. Without testing this directly, we cannot rule out that voters in rural municipalities, who may have more conservative views on immigration, and also a higher proportion of car ownership, are drawn to the right-wing populist party in response to their concerns surrounding an influx of asylum seekers. The incidence of this at the same time as the oil price shock makes it difficult to disentangle the two effects, thereby confounding our results. Wider concerns among similar voter groups regarding energy and national security concerns could have the same effect.

Other heterogeneous confounding time trends that may be present throughout the entire sample period, may also bias our results. An attempt to control for these was made in Section 6.3.2, through region-specific time fixed effects with seemingly robust results. We are, however, unable to establish their irrelevance to our models, given that they are less likely to act at the county level, but instead across municipalities with similar characteristics. The specific example used throughout the paper is rurality: a rural economic decline will be felt across rural municipalities, whilst those that are more urban will be less impacted. Municipalities within counties often do not share these same baseline characteristics; using the example of rurality, counties often have a variety of rural and urban municipalities. Therefore, the heterogeneous confounding trends discussed could persist in a specification using county-year fixed effects and remain a threat to the common trends assumption in both our models.

When examining whether our results are sensitive to the chosen oil price change window, we first see a dampened estimate, consistent with what Healy and Lenz (2014) suggest, as voters prioritise recent economic conditions when casting their ballots. However, moving further back in time, we would expect to see oil prices become progressively less relevant to voting decisions, and hence this concept fails to explain the observed sign reversal. Likely, this stems from our small election year sample resulting in limited time variation, where individual election years can represent the majority of the identifying variation for both the change in incumbent and Sweden Democrat vote share.

We can, however, draw the conclusion that time-varying municipality-specific variables are of reduced concern, given that our findings were robust when controlling for local economic conditions. Although the magnitude of the incumbent model was influenced by our controls, the effect of both our regressions remained in line with our hypotheses and with existing literature on these topics.

Although both the change in incumbent vote share model and the Sweden Democrat vote share model both remain relatively robust, the incumbent model is evidently more fragile. There is a loss of significance for the regression when 2022 is excluded, and it attenuates substantially when controlling for local economic indicators, whereas the Sweden Democrat model preserves

direction and significance, with little reduction in magnitude. The latter is therefore more strongly supported, whilst the former is more dependent on our specific design.

Due to the likely presence of heterogeneous confounders, the substantial impact of individual election years, as well as the sensitivity to the chosen oil-price change window, our estimates cannot be interpreted as causal. The direction of our results, however, remain relatively stable throughout and shall therefore be interpreted as indicative of a negative relationship between incumbent vote shares in municipalities with higher car dependence in response to oil prices, and a positive relationship for the Sweden Democrats.

Whilst our results do not establish a causal effect, they are indicative of the broader mechanism influencing voter behaviour in relation to exposure to oil price increases, that has been established through focus on the two-party system in the U.S., and are supported by existing literature. Our findings suggest the mechanism extends beyond the two-party context, although whether the relationship holds between different countries that experience different political environments, economic conditions, and other confounders, remains open to further research.

8. Concluding Remarks

This paper has aimed at answering whether incumbents are punished by increases in oil prices in municipalities where car dependence is higher, and whether the populist Sweden Democrats benefit from increases in oil prices in these same municipalities. Hypothesising that the questions will be answered in the affirmative, we generally aimed to contribute to literature on electoral responses to economic shocks and the discussion on political accountability in a changing political landscape.

To investigate the hypotheses, we employed a two-way fixed effects model where the international Brent crude oil price was interacted with car share at the municipality level, as a higher proportion of car ownership implies greater exposure to oil prices through fuel expenditure. The model was estimated using election data at the municipality level from Swedish parliamentary elections between 2002-2022 with municipality and election year fixed effects, and the outcome variables of change in incumbent vote share and the Sweden Democrat vote share.

For both specifications, we received significant results in the direction of the hypotheses; that is, a negative, punishing, effect on the incumbent and a positive, beneficial, effect on the Sweden Democrats in municipalities with higher car shares in response to an oil price increase. The findings of the paper thereby indicate support for our hypotheses and are in line with previous literature on incumbent and populist voting. Therethrough, the paper contributes to incumbent literature by examining the effect of economic insecurity, pocketbook voting, and oil and gasoline prices in a multiparty setting. In the populist literature, we contribute through examining the new channel of oil prices and exposure to this through car ownership. It also suggests that incumbent governments are held accountable for events outside of their control, and that populist parties seemingly take advantage of the blame being put on their opponent.

Concerns with the empirical strategy, however, remain. The limited time variation in our underlying data with only six elections, combined with heterogeneous confounding trends that potentially coincide with the oil price increases, as such factors cannot be ruled out to be affecting

our results, threaten the causal interpretation. As a consequence, our findings should be interpreted as indicative that the hypothesised relationship exists, but still supporting our hypotheses.

Given the contemporary volatility in oil prices around the world following the instability in Iran and the Strait of Hormuz, and their continued political relevance, there is reason for further research on the effect of oil prices on electoral outcomes. Access to a larger sample of election years would be beneficial, to allow observation of a greater variation in oil price changes, rendering more stable results. An alternative to using more election years could be to collect individual level survey data at an annual frequency on car ownership and usage, fuel expenditure and voting intention.

Furthermore, as the Sweden Democrats' communication shifted toward cost-of-living and fuel price, it would be interesting to see if the frequency at which political parties voice their political agenda and intentions is what affects vote shares, rather than the policy issue at hand. In the context of this paper, that would be whether Sweden Democrat communication regarding high oil and petrol prices is important alongside pocketbook considerations in driving voter responses.

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10. Appendix

Appendix A: Sweden Democrats' Social Media Posts

Figure A1: Sweden Democrat Instagram Post Comparing "Sossepriser" and "Jimmiepriser"

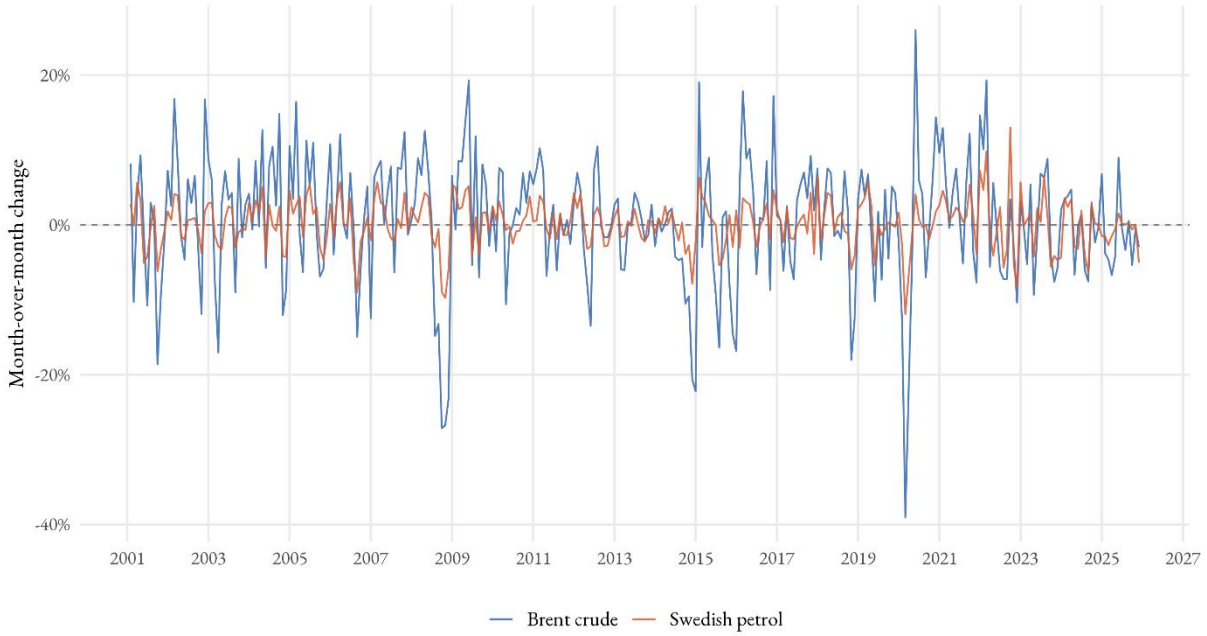
Notes: Instagram post from the Sweden Democrats' Instagram account, demonstrating "Sossepriser" ('Social Democratic prices') with a photo of their party leader and Swedish prime minister at the time Magdalena Andersson, and "Jimmiepriser" ('Jimmie prices') with a photo of the Sweden Democrat party leader Jimmie Åkesson. The caption is: "Fuel Prices if Jimmie was in charge. We lower the diesel prices by 10 SEK and gasoline by 6.50 SEK" (Sverigedemokraterna, 2022b).

Figure A2: Sweden Democrat Instagram Post Calling for Lowered Diesel prices

Notes: Instagram post from the Sweden Democrats' Instagram account, showing the Sweden Democrat party leader at a petrol station with the in-picture text "Lower the diesel price! Sweden is more than central Stockholm". The caption is: "Not all Swedes can, or want to, live in central Stockholm. Price increase after price increase, price record after price record. The government's policies are punishing rural areas and the millions of Swedes who in different ways depend on cars to make everyday life work. This is both irresponsible and serious. The government shows no understanding whatsoever of ordinary people's living conditions. Their policies seem entirely built upon their own access to convenient public transportation or the ability to take a taxi to Rosenbad [The office of the Swedish government]. But Sweden is so much more than our major cities' most central districts, and we Swedes must be able to live in the whole country. Not just in central Stockholm." (Sverigedemokraterna, 2022d)

Appendix B: Swedish Petrol Prices and Brent Crude Oil Prices

Figure B1: Swedish Petrol Prices versus Oil Price, Month-to-Month Changes



Notes: The percentual monthly changes in the Brent crude oil price (USD/barrel, blue line) and the percentual monthly changes in the Swedish petrol prices (SEK/l, red line). Sources: IMF and Bensinstation.nu

Table B1: Correlation Between Brent Crude and Swedish Petrol Prices

	Log Scale Levels	Monthly Percentage Change
Pearson correlation	0.895***	0.754***

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: Pearson correlations between the between Brent Crude Oil prices and Swedish Petrol Prices, in log scale levels and monthly percentage change. p-values test the null hypothesis of zero correlation. Sample size of 288 municipalities.

Appendix C: Correlations

Table C1: Cross-Sectional Correlations Between Car Share and Controls (2002)

	Log income	Unemployment rate	Log population	Asylum proxy share	High education share
Car Share 2002	-0.391***	0.265***	-0.517***	-0.577***	-0.577***

* p<0.1, ** p<0.05, *** p<0.01

Notes: Pearson correlations between the 2002 cross-sectional car share (per 100 inhabitants) and each control variable as measured in 2002. p-values test the null hypothesis of zero correlation. Sample size of 288 municipalities.

Appendix D: Tercile Regression

Table D1: Tercile Regression

	Δ Incumbent Gov. Vote Share	Sweden Democrat Vote Share
Δ Oil price × Mid Tercile 2002	-0.0405***	0.0779***
	(0.0141)	(0.0118)
Δ Oil price × High Tercile 2002	-0.0688***	0.1081***
	(0.0165)	(0.0124)
Controls	No	No
Municipality FE	Yes	Yes
County × Year FE	Yes	Yes
Clustered SE (municipality)	Yes	Yes
Observations	1440	1728
R^2	0.773	0.954
Within R^2	0.018	0.075

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output for the dependent variables of ⊿ *Incumbent Gov. Vote Share* and *Sweden Democrat Vote Share* with Δ *Oil Price × Mid Tercile 2002* and Δ *Oil Price × High Tercile 2002* as the independent dummy variables, taking the value of 1 if a municipality is in the mid tercile of car ownership, and taking the value of 1 if a municipality is in the high tercile of car ownership respectively. The omitted reference category is low tercile car ownership. Coefficients of the two explanatory variables are reported and interpreted as the differential effect of oil price changes relative to municipalities in the low tercile of car ownership. Standard errors clustered at the municipality level in parentheses. Fixed effects at both municipality and election year level.

Appendix E: Effect on Other Parliamentary Parties

Table E1: Other Parties (Left to Right), Effect of Oil Price Change by Car Share on Vote Share

	V	MP	S	C	L	KD	M
Δ Oil price (USD) × Car share 2002	-0.0054***	-0.0010***	-0.0133***	-0.0096***	0.0063***	0.0040***	0.0037***
	(0.0005)	(0.0004)	(0.0014)	(0.0010)	(0.0006)	(0.0007)	(0.0009)
Controls	No	No	No	No	No	No	No
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE (municipality)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1728	1728	1728	1728	1728	1728	1728
R^2	0.890	0.898	0.920	0.834	0.899	0.889	0.942
Within R^2	0.089	0.008	0.065	0.087	0.084	0.032	0.009

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: TWFE regression output, where each column reports estimates for each of the eight parties in Swedish parliament, presented from left to right in accordance with each party's position on the political spectrum, with the respective party's vote share as the dependent variable, and ⊿ *Oil Price* × *Car share 2002* as the independent variable. Fixed effects at both the municipality and election year level. Standard errors are clustered at the municipality level in parentheses. Abbreviations: V = the Left Party, MP = the Green Party, S = the Social Democrats, C = the Centre Party, L = the Liberals, KD = the Christian Democrats, M = the Moderates.

Appendix F: Changes in Oil Price

Table F1: Absolute and Percent Change in Oil Prices, Swedish National Election Years

Election Year	Δ Oil (USD)	Δ Oil (%)
2002	-4.7793	-17.1237
2006	15.0890	30.2691
2010	16.6788	28.1614
2014	-0.5230	-0.4785
2018	16.3182	31.6140
2022	35.9680	60.4711

Notes: Each row reports the change in the average Brent crude oil price (USD/barrel), calculated in the same manner as our Δ Oil Price variable is defined. The first column indicates the change in USD, whereas the second indicates the change in percent. Source: IMF

Appendix G: Use of Artificial Intelligence

In writing this thesis, we have used two artificial intelligence tools – ChatGPT by OpenAI and Claude by Anthropic. The main use of the two has been generating code in R, aiming at scraping data, structuring datasets, estimating the regressions, as well as creating figures and tables. In doing so, the process of data gathering and output generation has been substantially more efficient. Additionally, the AI-tools have been used to improve grammar to ensure readability. While the use of these tools has been helpful, we acknowledge the risks associated with their usage and have taken steps to mitigate this, for example cross-referencing our datasets with original sources.