It is not easy being a Green party: Green politics as a normal good ☆

Patrick Gourley [a], Melanie Khamis [b,*]

[a] *University of New Haven, United States of America*
[b] *Wesleyan University, United States of America, and IZA*

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ABSTRACT

An extensive body of literature shows that voters often credit or blame ruling political parties for economic successes and failures, respectively. This paper presents a related, but new possibility: whether local economic conditions impact Green party electoral outcomes. According to the environmental Kuznets curve, high-income countries will see decreased environmental degradation as they become wealthier, but it is yet to be seen whether this relationship is carried over to environmentally friendly political parties. Using a panel data set that includes over 250 elections from 26 European countries, we find that elections held during times of economic growth increase the vote share that Green parties win. This effect is especially robust for national elections, as opposed to elections for the European Parliament. The magnitudes are large enough to potentially alter the number of seats Green parties have in national legislatures. This provides evidence that Green parties are most likely to gain seats when the economy is growing, and support for the existence of an environmental Kuznets curve.

1. Introduction

For decades, social scientists have posited that current economic conditions affect elections (Kramer, 1971). This is known as the voter popularity, or VP-function (Nannestad and Paldam, 1994). The intuition is straightforward; the ruling party will be credited or blamed for an economy's successes or failures, respectively. That said, the direction of causality can be difficult to identify, because while the economy may have an impact on who wins an election, winners of an election may have an impact on the economy. The latter is referred to as the Political Business Cycle, or PBC (Nordhaus, 1975). Teasing out one effect from the other is not straightforward. In countries like the United Kingdom, only two parties have governed for the last hundred years, meaning almost all current economic policies can be attributed to either the Labor or Conservative party.[1] Even in more fractious democracies with many parties, such as the Netherlands, only several parties won elections and formed governments over the last few decades. This creates a tangled web of whether politics is affecting the economy, the economy is affecting politics, or both.

The purpose of this paper is to establish the existence of a VP-function in a specific case, that of European Green parties. Green parties are a relatively new phenomenon, with the United Tasmanian Group and Values Party of New Zealand the first to contest a regional election and national election, respectively, in 1972 (Rainbow, 1992). Despite their founding in Oceania, Green parties have had the most success in Europe, and most European Union (EU) countries have had multiple Green party candidates win seats in the national legislature. Many EU countries have also had Green cabinet members. Although the raison d'être of Green parties is environmentalism, most have also adopted other progressive causes such as social justice.

Green parties in Europe are unique in that although many countries have viable, reputable Green parties that have had seats in parliament for decades, to date a Green party has never won a plurality of votes in a national election, and has never had the most seats in parliament while participating in a ruling coalition. While Green parties have participated as junior members in government coalitions, and very rarely have occupied the prime minister post, they have not been able to craft economic policy to the extent that traditional governing parties have.[2] This fact allows us to plausibly isolate the effects of economic growth on Green party political popularity.

Using a data set that comprises 26 countries and over 250 elections for both national legislatures and the European Parliament and a fixed effects framework, we find that economic growth, measured as real quarterly GDP change, is a key component of a Green party's popularity. A one-percent increase in GDP during the quarter of an election compared to zero growth increases a European Green party's vote share by 0.64 percentage points, or 9.6 percent of the median Green party vote share. This effect is driven by national elections, indicating voters may be more responsive to economic conditions when electing leaders to their own governments as opposed to the European Parliament. Another interesting result is that being part of a ruling coalition has a strong negative effect on the success of Green parties, costing them over 1.5 percentage points of the vote share and three seats on average. This is a large effect, as it corresponds to almost a third of a standard deviation for both vote share and number of seats of Green parties.

These results also indicate the existence of a VP-function even for parties that are not responsible for current economic conditions, which are the focus of much of the existing literature. A wide variety of economic variables is thought to influence voter popularity, such as economic growth at both the national and international level (Leigh, 2009; Friedrichsen and Zahn, 2014; Hobolt and Tilley, 2016). Unemployment also appears to play a role (Elinder et al., 2015; Cameron and Crosby, 2000), as does voter income, exogenously determined by mechanisms such as lottery wins and government subsidies (Manacorda et al., 2011; Bagues and Esteve-Volart, 2016). Even the strength of local organized crime can have an impact (Buonanno et al., 2016). These results are found both in Europe and the United States, in elections for heads of state and national legislatures (Fair, 1978, 1996; Charles and Stephens, 2013; Berlemann and Enkelmann, 2014).

Along with the determinants of vote share listed above, economic conditions can also affect voter turnout (Ashenfelter and Kelley, 1975). When the economy is doing especially well or poor, voters are more likely to head to the polls (Martins and Veiga, 2013). Additionally, the same economic conditions will affect individuals based on their family structure, such as whether they have young children in their household (Elinder et al., 2015). Even exposure to international trade may change voter behavior (Autor et al., 2020).

Of course, there is some dissent over the exact relationship between economic conditions and elections (Stigler, 1973). While a robust literature supports the notion of VP-functions (Bellucci and Lewis-Beck, 2011; Lewis-Beck and Stegmaier, 2013), the PBC predicts the opposite; that is, elected officials will impact the economy (Grier, 2008). Research has found that increases in government spending increase the chances that a local government is reelected and that peak in the business cycle predict elections. (Balaguer-Coll et al., 2015; Voia and Ferris, 2013). Political leaders may also impact immigration and tax policy (Folke, 2014; Freier and Odendahl, 2015). Of course, in many countries politicians can call for early elections, meaning that the PBC may be endogenous (Heckelman and Berument, 1998).

Again, this web of causality is difficult to untangle, and makes the study of Green parties useful to address concerns of reverse causality. Green parties cannot unilaterally call for new elections based on economic conditions, as no Green party has ever had a plurality of seats in a national legislature and has rarely had the political power to dissolve a ruling coalition. Also, while Green parties influence economic platforms while serving as junior members of the ruling coalition and possibly while members of the opposition, they will play a substantially lesser role than that of the ruling party. Still, there may be some concern that a Green party is affecting the economy, rather than the other way around. To address the possibility of a junior partner influencing the economy, one of our specifications includes only elections where the Green party is in the opposition, and this does not significantly change the results. Finally, the existence and popularity of the European Greens, a federation of European Green parties, shows most Green parties have similar platforms across countries in non-environmental topics, known as the green agenda.[3] That said, the presence of Agrarian and Christian Democratic parties in various countries will influence the local Green party and result in potentially significant differences when comparing the Green party of one country to another (Debus and Tosun, 2021).

The link between economic health and Green party popularity also provides evidence of the existence of an environmental Kuznets curve (EKC). The EKC predicts that poor countries will have a low amount of environmental degradation, as there is not enough industry to cause large-scale destruction of the environment. Then, as a poor country becomes wealthier, the increase in industry will lead to an increase in environmental destruction. Eventually, however, a tipping point is reached, and as middle-income country becomes wealthier the amount of environmental destruction will decrease, and environmental quality will increase. The result is an inverted U-shape curve, which predicts that wealthy countries will see an increase in environmental quality as they become wealthier (Grossman and Krueger, 1995).

The newness of the EKC concept has led to a profusion of studies on the topic, with mixed results. Churchill et al. (2018) find some evidence of the existence of an EKC when using a long panel of countries from 1870–2014, but find less evidence when looking within country. Conversely, He and Richard (2010) find no evidence of an EKC using parametric modeling. Others have found similarly mixed results (Stern et al., 1996; Cole et al., 1997). These mixed results are also present in a closely related theory, the clean

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[2] The first Green party head of state was Indulis Emisis, who became the Latvian Prime Minister after the collapse of the ruling coalition.
[3] https://europeangreens.eu/.

democracy hypothesis, which predicts democracies will be more environmentally friendly than non-democracies (Kammerlander and Schulze, 2020). There is also some debate over the shape of the EKC, with some arguing that an "N-shaped" EKC is more accurate than the originally proposed "inverted U-shape" (Pfaff et al., 2004). Interestingly, Chen et al. (2019) found that the EKC reaches its peak earlier in countries that have more environmental awareness. The findings here provide a possible cause or effect of environmental awareness — the success of the local Green party.

Our contribution is twofold. First, we arguably identify a causal relationship between economic growth and Green party popularity. Our empirical design leverages country, year, and month fixed effects, as well as current government variables, to plausibly isolate the effects of a growing or contracting economy on Green Party vote share. These results are robust to numerous specifications and are remarkably stable. One percentage point growth in GDP consistently corresponds to around three-quarters of a percent increase in vote share, and these results are statistically significant. Additionally, this effect holds even when the Green party was not a junior partner in the ruling coalition, and could not influence the timing of elections or have a large influence on current government policy, making the potential reverse causality less likely.

Second, this relationship provides evidence of a political EKC. Although not a direct measure of environmental quality per se, Green party popularity will be correlated with public sentiment. For the typical voter, one of the most effective ways they can change their country's environmental approach is through the ballot box. The expectation is that the better the economy, the more voters will care about the environment, and thus the more they will vote for Green party candidates. We use economic growth rate during the quarter of the election, as it is likely that people will be concerned with the relative strength of the economy, not the size of the economy in levels. For example, consider a situation where the economy of Romania is growing and the economy of Denmark is contracting. We expect that to benefit the Romanian Green Party and hurt the Danish Green Party, even though Denmark is a significantly wealthier country, because as the economy of Romania grows the citizens are wealthier relative to their benchmark and will thus care more about the environment. This is in agreement prospect theory (Kahneman and Tversky, 1979). Therefore, the findings in this paper can be thought of as a political environmental Kuznets curve, much in the same way previous scholars have tested for the presence of an energy EKC (Acheampong, 2018; Shahbaz et al., 2020). Note that as all the countries in the sample are at least highly developed according to the Human Development Index (HDI), the results only provide evidence supporting the second half of the EKC, where wealthy countries see environmental quality increase as they become wealthier.

The rest of this paper is organized as follows. Section 2 provides a brief theoretical framework. Section 3 discusses the data used in this paper. Section 4 covers the empirical approach. Section 5 discusses the results. Section 6 concludes.

2. Theoretical framework

Following Greenstone and Jack (2015), the marginal willingness to pay for environmental quality (MWTP) can provide a useful tool to understand the voters' preferences on the environment and economic performance.[4] Their own individual income is in turn determined by general economic performance in a country.

The following simple model, that assumes perfectly competitive markets, a representative agent maximizes their utility U subject to a budget constraint with income I, and solving this constrained optimization problem, the MWTP for this problem is derived. The utility of the representative consumer who is also a voter is represented by a Cobb–Douglas utility function, where environmental quality e and consumption c are the two goods the consumer wants to maximize. While Greenstone and Jack (2015) address environmental change and also a measure of health that is also dependent on environment, here a more simplified version is modeled, which considers consumption and environmental quality as two goods in the voter–consumer choice problem.

Both goods e and c are normal goods to the consumer. The Cobb–Douglas utility function for simplicity assumes normalization, $\alpha + \beta = 1$. A representative voter–consumer maximizes the following the utility function:

$$U(e, c) = e^\alpha c^\beta$$

subject to a generic budget constraint $I = p_e e + p_c c$.

From this one can derive the marginal utility of consumption, marginal utility of environmental quality and the optimal bundle of e^* and c^*. As with Greenstone and Jack (2015), the main interest in the MWTP defined as ratio of the marginal utility of environmental quality λ_e and the marginal utility of consumption λ_c. Therefore, individual marginal willingness to pay is the marginal rate of substitution between environmental quality and income:

$$MWTP = \frac{\lambda_e}{\lambda_c}$$

Increases in I translate into increased demand for both environmental quality e and consumption c from the representative voter–consumer.

At the macroeconomic level, and consistent with this microeconomic model, aggregating this across n consumers in the economy, this in turn would translate into increases in economic performance that lead to increased demand for environmental quality, alongside increases in consumption.[5] Because the marginal utility of both increase, it is not clear that environmental quality will increase because income rises. However, support for Green parties is a proxy for the desire of higher environmental quality.

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[4] As stated in their paper their micro model is consistent with the underlying explanations proposed in the literature for the EKC.

[5] This is most consistent with the second part of the EKC of decreases in environmental degradation alongside increases in income, which could be most applicable to the subset of developed countries in our study.

Therefore, if the MWTP for environmental quality changes relative to the MWTP of consumption because of changes in GDP, it should be reflected in a change in the vote share green parties receive.[6]

3. Data

Data on real GDP growth comes from the OECD, and data on population from the UN. Election data is provided by the ParlGov,[7] a private organization that collects information on all elections from European Union countries as well as other OECD nations. This data set contains the results of all national and European Union elections, such as the vote share each party earned, the number of seats that party won, the total number of seats available, and a left–right political score of each political party on a one-to-ten scale. The left–right political score is time-invariant at the party-country level and is based on political science literature.[8] Left-leaning parties are given low scores, with the Communist Party of Austria, for instance, receiving a 0.5. On the other side of the spectrum, Belgium's far-right National Front has a score of 9.7. The data set has been trimmed down to include only Green parties in elections from 1992–2019. 1992 is an important demarcation year in Europe, as the collapse of the Soviet Union and Yugoslavia spurred competitive elections in much of Eastern Europe for the first time. The end of the Soviet Union also set into motion large political changes in Western Europe, as the military threats from the Warsaw Pact began to diminish in 1989 and the pact formally ceased to exist in 1991. The Soviet Union formerly dissolved in December of 1991. Additionally, as communist states fell it became apparent that many had mostly ignored environmental concerns during the industrialization of the second half of the 20th century (Midlarsky, 1998).

A few caveats to the election data. Although in the vast majority of elections there is one Green party, the fractious nature of some nations' politics would lead to splinter Green parties breaking away from their main group. For example, in Denmark, the Socialist People's Party is the traditional Danish Green Party. Formed in 1959, the party has held seats in the Danish Parliament since 1960 and is a full member of the European Green Party. In 1989, the Red–Green Alliance also formed, which along with Green politics advocates for socialism and has one of the furthest left scores of any party in the data. Both parties currently hold seats in the Danish parliament. When an election had multiple Green parties that received votes in the same election, those votes are combined to form one "aggregate Green party", in order to accurately capture the percentage of the electorate that is voting for Green politics. Additionally, in several elections, Green parties would join with other parties to form one electoral coalition that would appear on the ballot as a joint party. In these cases it is impossible to say what percentage of the electoral coalition's vote share would have gone to the Green party had they decided to run independently. These elections are not included in the sample.

Finally, any election in a country where a Green party has never received one percent of the vote share has been removed from the data set.[9] This is to ensure only countries that have, or at some point had, a viable Green party are examined. For example, Norway's Green party received between 0.1 and 0.4 percent of the vote in their national elections until 2013, when they received 2.8 percent of the vote. Therefore all Norwegian elections 2013 and later are included in the data set.

The data set for the main specification consists of 252 elections in 26 different countries, all from the European Economic Area.[10] Table 1 gives the number of elections by country. Countries in western Europe are generally more prevalent in the sample, as they often have more popular Green parties and have been in the EU longer. There is heterogeneity in the number of observations per country, with Spain and Austria tied for the most observations with 15 apiece, and Norway only having two. Again, the paucity of Norwegian observations is due to their lack of a viable Green party throughout the sample period.

Table 2 displays summary statistics of the data. Green parties received an average of 6.9 percent of the vote in all elections, with a maximum of 21.7 percent of the vote. Percent of seats won has a higher level of variance, with a mean of six percent, a median of five percent, a minimum of zero, and a maximum of 23 percent, which occurred in Germany. The ruling party during the election has a left–right score of 5.6, indicating that on average, European governments are centrist. Again, the minimum and maximum show that this is not always the case, with far-left and far-right parties occasionally winning elections. The coalition variable is an indicator variable that takes the value of one if the Green party is a member of the ruling coalition at the time of the election. Green parties were part of the ruling coalition during 20 percent of the elections. During the quarter that elections were held, the economy was growing at an average of 0.6 percent, although some elections did occur during steep recessions and others during large economic booms. Finally, population is given in the millions, with a median of 9.7.

Fig. 1 shows the histogram of vote shares than Green parties in the sample have received. Often, Green parties earn a small amount of the vote, but in some countries, such as Latvia, they are competitive in elections. Especially in countries with many political parties, ten percent of the vote share, while not enough to win an election, is enough to make a Green party relevant. Fig. 2 shows a scatter plot that relationship between Green party vote share and the percent change in GDP the quarter of an election. No strong trend-line emerges in the raw data, with some Green parties in rapidly expanding countries doing poorly, and others in contracting economies doing well.

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[6] However, increases in income and economic growth could also lead to increases in environment degradation and that in turn could lead to increased demand for environment protection. This could be another mechanism that would cause the vote share of Green parties to increase.

[7] parlgov.org.

[8] More detailed information is available on the ParlGov website.

[9] In the robustness checks, one of the specifications includes these elections as well, and the coefficient on the variable of interest is not meaningfully different. See Column 1, Table 5.

[10] Along with countries in the EU, this includes Iceland, Norway, and Switzerland.

Table 1
Elections by Country.

Country	Number of elections
Austria	15
Belgium	13
Czech Republic	9
Denmark	13
Estonia	5
Finland	13
France	12
Germany	13
Greece	12
Hungary	6
Iceland	6
Ireland	12
Italy	7
Latvia	11
Lithuania	3
Luxembourg	12
Netherlands	14
Norway	2
Portugal	4
Romania	7
Slovakia	6
Slovenia	10
Spain	15
Sweden	13
Switzerland	6
United Kingdom	13

Notes: This table shows the country breakdown from the main specification. The sample consists of all European Economic Association elections from 1992–2019, where the local Green party had earned at least one percent of the vote in an election in that country.

Table 2
Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max	Median
Vote share	252	6.9	5	.2	21.7	6.7
Seat share	252	.06	.06	0	.23	.05
GDP Pct. Change	252	.6	1.1	−5.7	4.4	.6
Euro	252	.5	.5	0	1	1
Coalition	252	.2	.4	0	1	0
Ruling party	252	5.6	1.7	1.8	8.5	6.2
Cabinet	252	.1	.3	0	1	0
Population	252	20.3	24.2	.3	83.5	9.7

Notes: Vote share is the percent of the popular vote a party received. Seat share is the percent of seats a party received. GDP Pct. Change refers to the change in GDP the quarter of the election compared to the previous quarter. Euro is an indicator variable that equals one if the country was part of the Eurozone when the election was held. Coalition is a indicator variable that equals one if the Green party is in the ruling coalition. Ruling party is a 1–10 score, with Communist parties having the lowest scores, and Nationalist parties having the highest scores. Cabinet is an indicator variable that equals one if the Green party had a member in the ruling cabinet, not including the environmental ministry, at the time of the election. Population is in millions.

4. Empirical approach

The following equation, or some variant, is used in all of the specifications that follow:

$$(ER)_{imy} = \alpha + (Econ)'_{imy}\beta + X'_{imy}\Gamma + \theta_i + \delta_m + \eta_y + \epsilon_{imy} \tag{1}$$

where ER_{imy} is the dependent variable, the electoral result achieved by a country's Green party for an election held in country i during month m and year y. The electoral result given is either the percent of the vote that a country's Green party received (vote share), or the percent of seats the party won. Every country has its own rules about how vote share correspond to the percent of seats (seat share).

The right-hand side main variable of interest $Econ_{imy}$ is the real GDP quarterly growth rate of the economy the quarter of the election. GDP growth rate is chosen as the measure of economic health under the EKC theory that as a middle-income or certainly high-income country becomes wealthier, the economy will become more environmentally friendly. We also include a measure of the GDP growth rate over a longer period of time in one of the specifications. This is similar to work by Doležalová (2015), who includes real GDP growth in the analysis of support for political parties of the left and right.
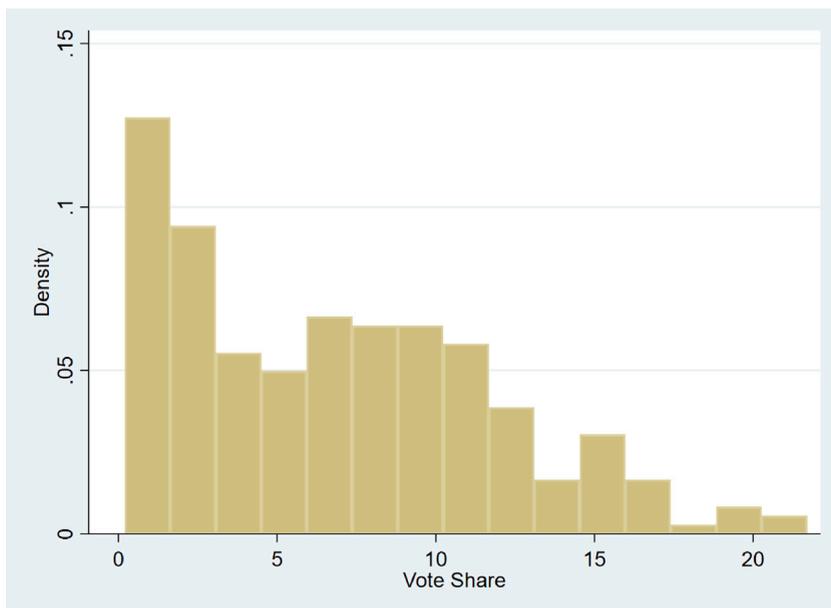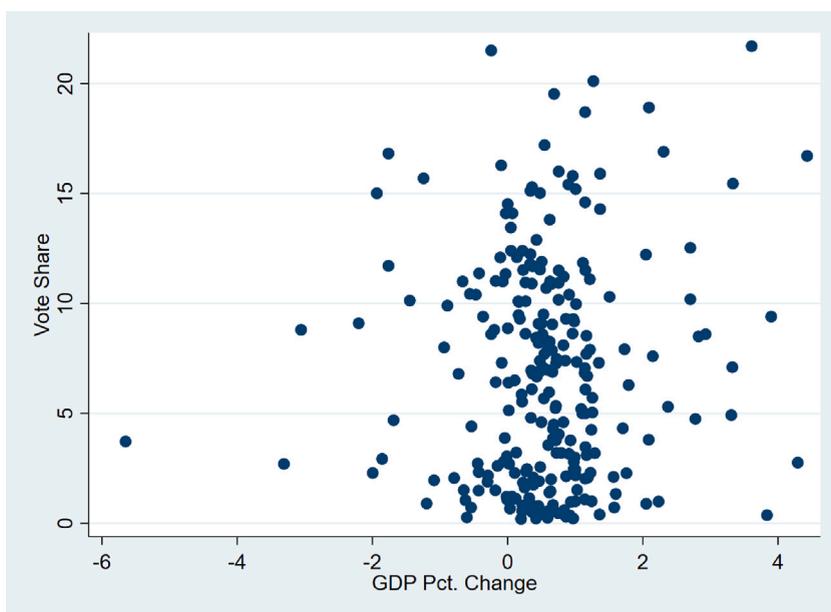
Fig. 1. Green party vote share.

Fig. 2. Green party vote share and GDP change.

The matrix X'_{imy} includes variables related to each election. We include a measure of whether the country was part of the Euro zone when the election was held ($Euro_{imy}$), which could account for the specific economic performance and election results that a country may have due to its membership in the Euro zone. Also included is a variable that indicates whether or not the Green party was part of the ruling coalition as a junior partner at the time of the election ($Coalition_{imy}$). This is important because a party in the ruling coalition would be expected to be viewed as at least partially responsible for the state of the economy, even if said party is not the head of the coalition. An additional control is the left–right score of the senior partner in government ($Ruling\,Party_{imy}$). The vast majority of Green parties are left of center, and given that voters generally blame or credit the ruling party for the failures

Table 3

Vote share.

Variables	(1) Vote share	(2) Vote share	(3) Vote share	(4) Vote share
GDP Pct. Change	0.358	0.519*	0.672***	0.719***
	(0.291)	(0.254)	(0.226)	(0.194)
GDP Pct. Change Sq.				−0.0809**
				(0.0374)
Euro	0.946	1.316**	−0.784	−1.008
	(0.610)	(0.473)	(0.698)	(0.775)
Coalition	1.125	−1.392**	−1.504**	−1.514**
	(0.786)	(0.574)	(0.665)	(0.664)
Ruling party	0.518***	0.0694	0.0614	0.0692
	(0.180)	(0.117)	(0.109)	(0.109)
Population	−0.0238*	0.260*	−0.136	−0.122
	(0.0135)	(0.129)	(0.146)	(0.146)
Observations	252	252	252	252
R-squared	0.060	0.097	0.332	0.337
Country FE	No	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Month FE	No	No	Yes	Yes
Countries	26	26	26	26

Notes: The dependent variable in each column is the percent of the votes cast that Green parties received in an election. GDP Pct. Change refers to the percent change in the nation's GDP in the quarter of the election compared to the previous quarter. This is not annualized. Euro is whether the country was part of the Eurozone when the election was held. Coalition is whether the green party was part of the ruling coalition when the election was held. Ruling party is a one-to-ten score of how left or right the ruling member of the ruling coalition is, with left-leaning parties given lower scores and right-leaning parties higher scores. Population is in millions. Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

and successes of the economy, it is important to account for whom voters are evaluating the Green party against. When the ruling party is left-leaning and the economy is doing poorly, the expectation is a Green party will perform poorly in an election, even if it is not part of the ruling coalition and is not responsible for economic conditions. In addition we also account for the size of the country and potentially more heterogeneous population composition, by adding control for population ($Population_{imy}$).[11]

The country fixed effects term, θ_i, accounts for any time invariant characteristics of each country. Our model is a fixed effects model, which follows some of the recent work by Doležalová (2015) and You et al. (2015). There are many of these characteristics that could affect political success of Green parties, such as whether the country has a substantial amount of natural beauty or was once a communist country. The month and year fixed effects, δ_m and η_y, respectively, account for any seasonality or year based effects on elections. There are several possibilities here. First, worldwide economic conditions will be at least partially addressed by the year fixed effects. In 2009, for example, the global financial crisis could have had a negative impact on all ruling parties, regardless of their ability to anticipate or prevent an economic recession. Another important time point, 2011, the large-scale environmental shock by the triple disasters of earthquake, Tsunami and the Fukushima Nuclear disaster in Japan, which political parties and voters potentially responded to. Second, there could be a seasonality effect, as there could be increased salience of environmental quality on the average citizen. For example, during the summer months wildfires may be increasing, or during the winter months there could be a lack of snow. Regardless, these differences need to be accounted for.

5. Results

Table 3 shows the results from Eq. (1). All columns have vote share, as a percentage, as the dependent variable. The independent variable of interest will change depending on the specification, but in column 1 is the percent change in GDP the quarter of the election relative to the previous quarter. Other independent variables include whether or not the country was using the Euro at the time of the election, whether the Green party was part of the ruling coalition when the election was held, the left–right score of the current ruling party, and the population of the country the year of the election.

Column 1 begins by only including the percentage change in GDP as the independent variable of interest, and does not include any fixed effects. This is mainly included for completeness, as not accounting for time invariant country characteristics or year of election or month of election characteristics is likely to cause severe omitted variable bias. Column 2 includes country fixed effects, which will account for all time invariant variables at the country level. Column 3 also includes year and month fixed effects, to address the aforementioned global economic conditions and seasonality concerns. Column 4 includes the square of the percent change in GDP, as it is possible the effect is nonlinear. Column 4 is the preferred specification.

The coefficient on GDP percent change in Column 4 is 0.72, and the coefficient on the square of GDP percent change is −0.08. These coefficients are statistically significant at the 99 percent and 95 percent level, respectively. This indicates that in a country

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[11] Our control variables differ to Doležalová (2015) as the focus of our paper are solely electoral results of the Green parties and not the whole range of the political spectrum.

Table 4
European Parliament and National Elections.

Variables	(1) EU Parl.	(2) Nat. Leg.
GDP Pct. Change	0.319	0.776**
	(0.268)	(0.320)
GDP Pct. Change Sq.	−0.0325	−0.144
	(0.0434)	(0.120)
Euro	−0.931	−1.460*
	(0.882)	(0.720)
Coalition	−1.656**	−1.005*
	(0.750)	(0.526)
Ruling party	0.0733	0.168
	(0.151)	(0.127)
Population	0.188	−0.118
	(0.263)	(0.248)
Observations	103	149
R-squared	0.417	0.467
Country FE	Yes	Yes
Year FE	Yes	Yes
Month FE	Yes	Yes
Countries	23	26

Notes: The dependent variable in each column is the percent of the votes cast that Green parties received in an election. Column 1 restricts the sample to only elections for the European Parliament. Column 2 restricts the sample to only elections for national legislatures GDP Pct. Change refers to the percent change in the nation's GDP in the quarter of the election compared to the previous quarter. This is not annualized. Euro is whether the country was part of the Eurozone when the election was held. Coalition is whether the green party was part of the ruling coalition when the election was held. Ruling party is a one-to-ten score of how left or right the ruling member of the ruling coalition is, with left-leaning parties given lower scores and right-leaning parties higher scores. Population is in millions. Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

with one percent quarterly GDP growth, compared to a country with zero percent GDP growth, the Green party would receive an additional 0.64 percentage points of the vote, on average. As the median Green party vote share is 6.7 percentage points, this is equivalent to a 9.6 percent increase. A country with two percent growth would see an increase in the Green party vote share of 1.11 percentage points relative to a country with no growth, on average. This provides evidence for both a VP-function and EKC. Voters appear to reward Green parties when the economy is growing, regardless of whether the ruling party is left or right of center.[12]

One interesting effect is the association between a Green party that is part of the ruling coalition and their subsequent electoral results. The coefficient of −1.51 is statistically significant at the 95 percent level, and indicates that Green parties receive on average 1.51 percentage points less of the vote share when they are part of the ruling coalition. This result is similar across future specifications. Indeed, it appears that one of the worst things a Green party can do is join a ruling coalition as a junior partner. This is in line with previous research that finds junior coalition members often have poor electoral results (Klüver and Spoon, 2020). The possible mechanisms for this are speculative, and are discussed in the final section of this paper.

Conversely, the left–right score of the ruling party does not have a statistically significant effect on the vote share of a Green party, and the coefficient of 0.07 is relatively small, indicating that although voters appear to punish Green parties for joining ruling coalitions, they do not seem to strongly turn towards or away from Green parties depending on whether the ruling party is left or right of center. Population also does not appear to have a strong association with Green party vote share. This is expected, as the country fixed effects will account for the time invariant size of a country.

Table 4 divides the sample into elections for the parliament of the European Union and elections for each country's national parliament. It is possible that voters place different values on a political party's environmental platform depending on the type of election. The results in Table 4 give some evidence that this is true. Column 1 limits the sample to only elections for the EU parliament, while column 2 only includes elections for national legislatures. The coefficient in column 1 is equal to 0.32 and is not statistically significant, while the coefficient in column 2 is equal to 0.78 and is statistically significant at the five percent level.

This provides some evidence that voters place a different preference on environmental outcomes when voting for national legislatures compared to the European Parliament. While absence of evidence does not constitute evidence of absence, and the lack of a statistically significant coefficient in Column 1 does not prove the lack of a causal relationship between economic growth and Green party vote share in EU parliamentary elections, it is possible that the relationship is larger and more stable for national elections. The upper limit of the 95 percent confidence interval in column 1 is 0.87, roughly equivalent to the coefficient in column 2.

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[12] In a robustness check to this fixed effect regression specification here, we also implemented fixed effect quantile regressions in nine deciles, following Machado and Santos Silva (2019). The coefficients are highly significant at the lower quantiles (20th, 30th, 40th, 50th) while not significant at the higher quantiles, indicating that the effect of GDP growth matters more on the lower end of the conditional distribution of vote shares. Results are available from authors upon request.

Table 5
Alternative specifications.

Variables	(1) All Elec.	(2) Cabinet	(3) Not Ruling	(4) Never Coal.	(5) Annual GDP Chg.	(6) Pre Tohoku	(7) Post Tohoku
GDP Pct. Change	0.708***	0.734***	0.801**	0.485*	0.134*	0.912***	0.881**
	(0.195)	(0.189)	(0.368)	(0.282)	(0.0662)	(0.165)	(0.384)
GDP Pct. Change Sq.	−0.0882**	−0.0819**	−0.260	0.0158	−0.00628	−0.119*	−0.277
	(0.0387)	(0.0378)	(0.162)	(0.137)	(0.00620)	(0.0650)	(0.302)
Cabinet		−0.820					
		(0.834)					
Euro	−1.145	−0.997	−0.951	−0.769	−0.974	0.266	−1.182
	(0.716)	(0.744)	(0.964)	(1.018)	(0.809)	(0.848)	(2.598)
Coalition	−1.539**	−1.142			−1.509**	−0.881	−4.181***
	(0.665)	(0.810)			(0.658)	(0.806)	(1.184)
Ruling Party	0.0526	0.0682	0.0973	−0.0285	0.0510	−0.135	0.133
	(0.0995)	(0.110)	(0.180)	(0.223)	(0.113)	(0.160)	(0.272)
Population	−0.139	−0.124	−0.111	−0.269	−0.142	−0.285	2.747***
	(0.135)	(0.150)	(0.177)	(0.177)	(0.147)	(0.232)	(0.758)
Observations	266	252	207	143	252	154	98
R-squared	0.340	0.339	0.387	0.452	0.298	0.363	0.566
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries	28	26	26	23	26	23	26

Notes: The dependent variable in each column is the percent of the votes that Green parties received in an election. Column 1 includes additional elections in countries where the Green party has never received one percent of the vote share. Column 2 includes an additional variable, cabinet, an indicator variable that takes the value of one if the Green party had a cabinet member outside of an environmental ministry when the election was held. Column 3 omits any election where the Green party was part of the ruling coalition. Column 4 limits the sample to countries where the local Green party has never been part of the ruling coalition. Column 5 uses GDP change from four quarters before the election instead of the quarter before the election. Column 6 and 7 split the sample to elections before 2011 and elections 2011 or later, which is the year of the Tohoku earthquake and resulting Fukushima nuclear plant nuclear disaster. GDP Pct. Change refers to the non-annualized percent change in the nation's GDP in the quarter of the election compared to the previous quarter, except in Column 5, where it refers to the change in GDP the quarter of the election compared to the quarter the previous year. Euro is whether the country was part of the Eurozone when the election was held. Coalition is whether the green party was part of the ruling coalition when the election was held. Ruling party is a one-to-ten score of how left or right the ruling member of the ruling coalition is, with left-leaning parties given lower scores and right-leaning parties higher scores. Population is in millions. Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Again, while this evidence is not definitive, it does make intuitive sense. The effects of the European Parliament are much more abstract then the those of a national parliament. When the economy performs well, it makes sense that voters reward the incumbent party in national elections, as the literature shows (Lewis-Beck and Stegmaier, 2000, 2007; Berlemann and Enkelmann, 2014). When the economy performs poorly, the incumbent party suffers. Elections for the European Parliament may not be as subject to voters looking to reward or punish parties that they formerly shunned or supported, respectively. Rather, it is possible that voters do not see a connection between the European Parliament and their own country's economic health, and thus vote for the same parties regardless of economic conditions.

5.1. Robustness

Table 5 provides a series of alternative specifications. Column 1 broadens the sample slightly by including all elections from 1992 until 2019, including those in countries where the local Green party has never received one percent of the vote share. This is done in case there are concerns that our one percent threshold is excluding elections or parties that are relevant when investigating the economic determinants of Green party electoral outcomes. These elections had previously been excluded as it is unlikely the Green party is a "viable" party if they have never received even one percent of the vote. Including these additional elections does not change the statistical significance or magnitude of the main coefficient.

There may be a concern about the ability of a Green party to endogenously affect election timing, or that a Green party that is part of a ruling coalition could still have a significant impact on the economy. In some European countries, the ruling political coalition can call for elections earlier than the end of the designated term. Parties will do this if they think it will improve their election outlook. While it is unlikely that the preferences of a junior partner like a Green party would be decisive, it is possible that voters then reward or punish the Green party when election dates are altered. To address this issue, several additional specifications are used.

Column 2 adds an additional variable, Cabinet, which is an indicator variable that takes the value of one if the Green party had a cabinet minister outside of the relevant environment portfolio that is usual for Green parties (Bäck et al., 2011). If, for example, the Green party was in charge of the ministry of finance or had a party member serving as deputy prime minister, they would have a greater ability to endogenously affect an election, or may receive more credit or blame for the economy. This is especially relevant because in recent years several countries have added ministries that combine economic and environmental policy (Tosun, 2018) The coefficient on GDP growth in the "Cabinet" specification maintains its statistical significance and magnitude.

Table 6

Seat share.

Variables	(1) All Elec.	(2) EU Parl.	(3) Nat. Leg.
GDP Pct. Change	0.00894***	−0.00109	0.00970**
	(0.00281)	(0.00693)	(0.00378)
GDP Pct. Change Sq.	−0.00183**	−0.00215*	−0.00201*
	(0.000802)	(0.00125)	(0.00106)
Euro	−0.00790	0.00223	−0.0124
	(0.00996)	(0.0186)	(0.00876)
Coalition	−0.0226**	−0.0306**	−0.0112*
	(0.00815)	(0.0121)	(0.00612)
Ruling Party	0.00219*	0.00330	0.00195
	(0.00113)	(0.00236)	(0.00125)
Population	8.25e−05	0.00430	−0.000700
	(0.00209)	(0.00356)	(0.00156)
Observations	252	103	149
R-squared	0.300	0.306	0.477
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Countries	26	23	26

Notes: The dependent variable in each column is the percentage of seats that Green parties received in an election. Column 1 includes all elections. Column 2 includes only European Parliament elections. Column 3 includes only elections for the national legislatures. GDP Pct. Change refers to the percent change in the nation's GDP in the quarter of the election compared to the previous quarter. This is not annualized. Euro is whether the country was part of the Eurozone when the election was held. Coalition is whether the green party was part of the ruling coalition when the election was held. Ruling party is a one-to-ten score of how left or right the ruling member of the ruling coalition is, with left-leaning parties given lower scores and right-leaning parties higher scores. Population is in millions. Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Columns 3 and 4 limit the sample based on previous successes of local Green parties. Column 3 omits any election in which the Green party was a member of the ruling coalition when the election was held. This is to further remove the possibility that voters may believe the local Green party is influencing the economy, even as junior partners of the coalition. As the VP literature shows, voters reward or punish the incumbent party for the status of the economy, so a Green party in opposition will not be credited or blamed for economic conditions during an election (Elinder, 2010; Bellucci and Lewis-Beck, 2011). The coefficient is statistically significant at the five percent level, and the magnitude is roughly similar to before. This provides strong evidence that economic conditions are exogenously affecting Green party vote share. Column 4 takes this a step further, and only includes elections in which the local Green party has never been part of a ruling coalition. While they would still have had seats in the national legislature, as this sample includes Green parties who have only been part of the opposition it removes almost all possibility that voters would associate their policies with current economic conditions, as those policies would not have been widely adopted. The coefficient in Column 3 is only statistically significant at the ten percent level and has a smaller magnitude than previous coefficients, but this loss of precision is not surprising as this reduces the sample to less than 150 elections.

Column 5 changes the main independent variable of interest. Column 5 compares GDP the quarter of the election compared to the four quarters ago (the year before), as opposed to previous specifications, which have compared the current GDP to that of the previous quarter. The coefficient is statistically significant at the ten percent level, and has a much smaller magnitude than previous specifications. This could indicate that voters place emphasis on immediate economic growth or contraction, not long-term growth. This would go along with the concept of an "October Surprise" in American politics, that is, events right before an election have the ability to sway a significant amount of the electorate.

Columns 6 and 7 split the sample by the year 2011. That was the year of the Tohoku Earthquake and the resulting Fukushima nuclear disaster in Japan. The events galvanized Green politics, prompting Germany to announce it would permanently shut down its entire nuclear power industry. The coefficients both before and after the disaster are similar.

Table 6 uses the percentage of seats a Green party won rather than the vote share. The percentage of seats, rather than the number of seats, is used because different countries have vastly different legislature sizes. Seat share is subject to a greater amount of measurement error than vote share, as most countries have a minimum vote share threshold that a party must meet in order to have a seat in parliament. Thus, a party that receives four percent of the vote may have the same electoral outcome as a party that receives one percent of the vote, zero seats. Even for parties that meet that threshold, there will always been rounding that can result in different vote shares being allocated the same number of seats, or the same vote share being allocated a different number of seats. On the other hand, ultimately political parties are interested in winning seats, not votes, so it is worthwhile to examine.

Column 1 uses the full sample of elections, while column 2 limits the sample to elections for the European Parliament and column 3 limits the sample to elections for the national legislatures. The coefficient on GDP growth and the square of GDP growth are both statistically significant, and are consistent with previous results; when the economy is expanding, Green parties perform better electorally. The coefficients indicate that if an election is held when the economy is expanding by one percent, then the Green party will win an additional 0.9 percent of the available seats. This corresponds to roughly 1.5 seats across all elections.

The coefficients on the economic growth variables in column 2, which only includes EU Parliament elections, are not statistically significant. Column 3, which limits the sample to elections for the national legislatures, does have a statistically significant coefficient with a meaningful magnitude. The coefficient on percent change of GDP is 0.0097, and the coefficient on the squared term is −0.0020. This indicates that a Green party gains one and half seats when the economy has grown by a percent over the previous quarter compared to zero growth. For Green parties that are struggling to gain a stable foothold in national politics, this is a non-trivial amount.

6. Discussion

While there are many different parties with a multitude of agendas across Europe, most European countries have at least one Green party, and those Green parties are, by and large, similar. The left–right right score for Green parties has a median of 2.5, and 90 percent of the parties are between a 1.7 and 4.8 (out of 10). Their primary concern is the environment, and with the notable exception of the Latvian Green Party, they are almost always left of center. Also, while the popularity of Green parties has increased over the last few decades, they have yet to win a plurality of votes in a parliamentary election, or be the senior partner in a ruling coalition.

These facts enable a cross country comparison on election determinants that remove many of the concerns that normally make such analysis difficult. There are many economic determinants of elections. From oil prices to trading policies, incumbent political parties can be helped or hurt when their economy is improving or declining, respectively. Most political parties, however, have at some point been in power and were able to influence those economic conditions themselves. Therefore, determining cause and effect can be difficult. With Green parties, economic policies could affect their popularity, but the reverse is at most marginally true.

In this paper we showed that there is an arguably causal relationship between economic growth and Green Party popularity. By using a fixed effects model that accounts for country, year, and month, as well as the current ruling party, we plausibly isolate economic growth before an election. The main specification shows that a one percentage point increase in GDP the quarter of the election, compared to zero growth, corresponds to a 0.64 percentage point increase in the vote share. This result is robust to several alternative specifications, and seems to be mainly driven by elections in the national legislatures, as opposed to elections for the European Parliament. This is equivalent to almost a full seat in an election for the national legislature.

The contribution to this paper is two-fold. In a traditional VP-function, the relationship between the economy and the ruling party is examined. As cited above, the literature generally finds that ruling parties are credited or blamed with the successes or failures of the economy, respectively. In this paper, we have examined the relationship between the economy and the local Green party, regardless of whether the Greens are part of the ruling coalition or in opposition. The results provide evidence that voters will increase their support for the Green party when the economy is growing regardless of whether allies or enemies of the Greens are in power, a unique outcome. The second contribution is to provide evidence that the already proposed Environmental Kuznets Curve, which postulates that economic growth will first cause an increase and eventually decrease in environmental degradation, is accurate. Our results can be thought of as a type of political EKC, where voter preferences shift towards higher environmental quality when the economy is doing well, and towards consumption when the economy is doing poorly. One limitation, however, is that our entire data set comes from European countries that are at least middle-income, so it can only support the latter half of the EKC prediction.

Our results also show that Green parties joining a ruling coalition as a junior partner generally has strong negative electoral effects during the subsequent election cycle. In our main vote share specification, being a member of the ruling coalition at the time of an election corresponds to a 1.6 percentage point decrease in a Green party's vote share. Given that the median and mean vote share for a Green party in our sample is 6.8 and 6.9 percent, respectively, this is a sizable effect. Exactly why this is happening is not clear; it could be that their goals are accomplished once they have a say in government, or that other parties co-opt their platform so voters move to other parties.

It is difficult to contrast the results found in this paper relating GDP growth to Green party electoral results because of the uniqueness of Green politics. Most of the papers in the literature look at ruling parties, as described above. These parties, by definition, win pluralities if not outright majorities of the vote, so it is possible for effects to be much larger than what one would expect for a Green party that normally polls in the single digits. Bellucci and Lewis-Beck (2011), for example, find that a when economic perceptions rise one standard deviation, government approval increases by 5.36 percentage points. Given that the average vote share of a Green party in our sample is 6.9 percent, it is difficult to compare one to the other. One exception to this is Klüver and Spoon (2020), which finds that a party that joins a coalition as a junior partner will see their vote share decrease by six percentage points.

There are several avenues for future research related to this article. First, it may be worthwhile to investigate why Green parties do relatively poorly after joining ruling coalitions. While this article provides evidence that there is a "junior partner penalty", one limitation is that no mechanism is definitely established. It would also be useful to see how economic growth affects Green party success at the sub-national level. As Green parties are more affected by national economic trends during national elections rather than elections for the European Union, it is possible that at the sub-national level the effects are even larger than those detailed here. This paper also restricts its analysis to Green parties, but a similar approach could be used for Communist parties, which are also present in many European countries but have generally not won elections. Finally, although Green parties have had the most success in Europe, Green politics plays an increasing role in many countries, and a future paper could examine other areas.

These results have two practical applications. First, all parties should consider the state of the economy when deciding how much emphasis to place on environmental issues. If the economy is growing, voters seem to care more about the environment than when

it is shrinking. All parties, regardless of their environmental stance, should take this into consideration. A European Green party should consider the economy when planning their strategy for an upcoming election. During times of economic expansion, this may be a good time for Green parties to try to capture additional seats, especially in elections that they had previously narrowly lost. On the other hand, during a time of economic contraction, it may behoove a Green party to "circle the wagons" and protect the seats they have, rather than trying to win additional ones. Second, Green parties need to think carefully about joining the ruling coalition as a junior partner, as doing so has an immediate negative effect on their election outcomes. While joining a ruling coalition may increase their visibility, it may not translate to policy success and may lead to a lack of differentiation between them and the ruling partner (Klüver and Spoon, 2020). Taken together, it is clear that there are significant economic determinants to Green party electoral success.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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