Humanities & Social Sciences Communications

ARTICLE

https://doi.org/10.1057/s41599-023-01584-3 OPEN

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Beliefs, economics, and spatial regimes in voting behavior: the Turkish case, 2007–2018

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The Justice and Development Party (Adalet ve Kalkınma Partisi, AKP) came to power in 2002, and since then has never received <34% of nationwide voter support in Turkish general elections. Recent research focuses on the Economic Voting Theorem (EVT), specifically the varieties of pocketbook or sociotropic voting, as the primary explanation for the AKP's successive electoral victories. However, this approach fails to adequately explain the ongoing electoral support for the AKP at both national and local levels, even under poor economic performance. It also fails to consider the impact of the spatial components of peripheral sociologies. This study employs the comparative method with EVT and Center–Periphery (C–P) phenomena in order to understand the dominant characteristics of voting behavior from a spatial perspective. Although EVT and C–P explanations take part in the literature, a limited number of studies measure and visualize the impact of those from a spatial perspective. In order to distinguish between the effects of EVT and C–P the study utilizes an original data set that measures different socio-economic factors such as per capita growth, unemployment, inflation, education, age, religious conservatism, ethnicity, and space both at the national and local levels. The results, contrary to expectations, show that the main drivers of voting behavior for the AKP consist of a mix of both C–P and EVT while C–P factors have a greater impact. In comparison to the EVT, C–P features such as religious conservatism and ethnicity perform better as predictors of the AKP's electoral performance than the national and local economic conditions. Also, spatial results imply that support for the AKP has different spatial regimes based on ethnic identity and there are no spatial spillovers between spatial regimes in terms of voting behavior.

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Introduction

Turkey has undergone a new phase in its political history in the past two decades. After the Justice and Development Party (Adalet ve Kalkinma Partisi, the AKP)'s came to power in 2002, there were new and hotly contended debates about the historic problems of Turkey. Since the AKP was representing a different tendency as a peripheral group than the powers traditionally embedded in the state, there were expectations for this new party to propose solid solutions for Turkey's old problems in terms of the democratization process. These expectations included not only reducing the tensions between secularists and conservatives but also resolving the conflicts surrounding the Kurdish question from a democratic perspective.

Moreover, the AKP's first term ruling (2002–2007) started right after the two crippling financial crises (November 2000, February 2001) that resulted in 133% currency rate devaluation and −6% negative economic growth in 2001 (Cizre and Yeldan, 2005; Kadri Ekinci and Alp Ertürk, 2007). Although the AKP has taken over bad economic conditions, then the economic growth rate was an average of 7.3% in the first term of its ruling (2002–2007), which was higher than the 4.9% average long run (1924–2001) national growth rate in Turkey. Hence, many researchers referred to the economic success of the AKP to explain the AKP's political dominance and mass support.

Since 2001, there have been five general elections and the AKP has won all of them as the first party (46% in 2007, 49% in 2011, 41% in 2015 June, 49% in 2015 November, and 42.6% in 2018). However, the AKP failed to maintain the same economic success during its following terms. The average national growth rates were 2.5%, 4.5%, and 4.4%, respectively, in its second (2007–2011), third (2011–2015), and fourth (2015–2018) terms. Although this economic backsliding has been used as a counter-argument quite often by the opposition, they did not succeed in replacing the AKP via elections. The main opposition party, the Republican People's Party, (Cumhuriyet Halk Partisi, CHP) has kept receiving almost half of the AKP's vote share and never passed that line in general elections since 2002. Other opposition parties performed even worse than the CHP. The only exception may count the success of the last Pro-Kurdish party, the Peoples' Democracy Party (Halklarin Demokrasi Partisi, HDP), as it has achieved surpassed the 10% nationwide election threshold for the first time in its history. However, the opposition could only win in very specific regions of Turkey in general elections. How did that happen? How was the AKP able to maintain its public support nationwide despite the economic instabilities and political turmoil? Some scholars explain the AKP's success because of electoral polarization which enables the party to maintain its mass support even under poor economic performance (Erdogan and Semerci, 2018; Somer, 2019). However, there is no consensus in the literature about the parts of various voting behavior that allow the AKP to maintain its mass support.

This study investigates the rationale behind voting behavior to understand mass support for the AKP from an empirical and spatial perspective. The study contributes to the literature on the electoral victories of illiberal incumbents under poor economic performance. More specifically it presents evidence from Turkey for the argument that peripheral bases such as religion, ethnicity, education, and space might be the main drivers of the mass support of the incumbent. Although these factors took part in the literature, a very limited number of studies measure and visualize the impact of those from an empirical and spatial perspective. In addition, this study measures the explanatory power of various voting theories that lean on different concepts and reveals the impact mechanism between the AKP and the voters. The remainder of the paper is structured as follows: The section "Economic and peripheral drivers of voting behavior" is a literature review of the theoretical background of voting mechanisms. The section "Political cleavages in Turkey" discusses a brief history of political cleavages in Turkey. Section "Data and model" introduces the model and data and includes the regression analysis that is used to analyze nationwide and local political tendencies. In the section "Spatial investigation" spatial analysis is employed to unveil the spatial components of voting behavior. Finally, the section "Conclusion" provides concluding remarks and discussion.

Economic and peripheral drivers of voting behavior

The relationship between the status of the economy and voting behavior is well-established in the literature. However, there are two distinct approaches in this area with respect to mechanisms through which the economy impacts voting. One common perspective argues that voters should reward the incumbent if their personal economic circumstances were ameliorated by the ruling party in the past. This is known as egotropic or pocketbook voting (Kinder and Kiewiet, 1981). Pocketbook voting refers to the strong reward-punishment mechanism among voters based on their past experiences. Here, there may be several drivers of pocketbook voting behavior such as unemployment (Grafstein, 2005), inflation (Kiewiet, 1981), economic growth (Palmer and Whitten, 1999), well-being (Romero and Stambough, 1996), etc. The pocketbook voting theory assumes that voters make rational choices and can effectively assess the economic performance of the government. These assumptions have been thoroughly tested in the literature (Lewis-Beck and Stegmaier, 2008). Gomez and Wilson (2001) offer a more nuanced theory that distinguishes between more sophisticated versus less sophisticated voters. According to them, pocketbook voting should be expected more by those who can make the associative linkage between their economic circumstances and governmental policy (Gomez and Wilson, 2001). However, Sanders (2000) claims that voters do not have to have deep knowledge and understanding of the economy, their "general sense" helps them make judgments of the current economic circumstances (Sanders, 2000).

Although pocketbook voting theories do have some merit, alternative theories also have been offered. Sociotropic voting aims to explain the situations when voters would still support the government even though their personal economic circumstances have not improved. The sociotropic voting explanation argues that political incumbents can still perform well in the national elections even when some of the voters' economic circumstances have not changed, or even worsened. As Kinder and Kiewiet (1981) argue, sociotropic individuals, vote "according to the country's pocketbook, not their own." This is suggestive of more altruistic voter behavior. The helpful drivers of sociotropic voting may consist of economic as well as other structural drivers such as religion (Stegmueller, 2013), nationalism (Rothwell and Diego-Rosell, 2016), moral values (De La O and Rodden, 2008), etc.

Both pocketbook and sociotropic voting behavior are components of Economic Voting Theory (EVT). Although they are motivated by different mechanisms, both focus on the economic performance of the government as the main driver for voting behavior. There has been some evidence to suggest that the sociotropic explanations of voting behavior are more powerful than the pocketbook explanations (Lewis-Beck and Stegmaier, 2008). While both pocketbook and sociotropic voting belong to EVT their causal mechanisms differ. Hansford and Gomez (2015) argue that it is likely to observe sociotropic voting when there is no incumbent on the ballot (Hansford and Gomez, 2015). This result may make us think about how the EVT has been shaped by ideological effects. For new and nonincumbent candidates, the

main source of information comes from their parties and the ideological factors they represent. In this case, ideological effect and partisanship may be more informative for the voters. Based on a multivariate analysis of 102 elections in 19 industrial countries, Powell and Whitten (1993) find that the ideological image of the government and the clarity of its political responsibility is the underlying factors between the economy and voting for or against the incumbent (Powell and Whitten, 1993). In such cases, there is an interaction effect between the ideological image and the economic performance of the incumbent, which can lead to an endogeneity problem and may cause over-estimation of EVT (Anderson et al., 2004). It is necessary to investigate the role of partisanship in shaping voter preferences. Several studies refer to redistributive politics as an important driver for partisanship behavior (Roemer, 2005). The studies examining the American elections show that inflation-related distress makes voters cast a vote for the Republicans, while unemployment-related discontent diverts them towards Democrats (Brooks and Brady, 1999; Kinder and Kiewiet, 1981). Thus, redistributive politics is an important factor in understanding partisan cleavages among voters.

In addition to economic factors, other structural drivers such as religion, ethnicity, and space also have an impact on redistributive politics, and voter preferences. Such structural drivers often serve as sources for partisan polarization. For instance, race is an extremely important determinant of redistributive choices, according to Alesina and Giuliano (2011). When the poor are clustered in an ethnic minority, the majority prefer less redistribution. Gender and age are other factors that affect redistributive politics (Alesina and Giuliano, 2011).

Among these, religion may warrant a standalone investigation because of its ethereal roots. According to Stegmueller (2013), religious voters avoid voting for the pro-redistributive parties, since they are not only morally but also economically more conservative (Stegmueller, 2013). This finding provides direct support for sociotropic voting, especially when the incumbent has difficulty maintaining support because of the economic downturn. In their well-designed work, De La O and Rodden (2008) underlines that church attendance has a significant negative impact on left voting (De La O and Rodden, 2008). According to them, moral values, such as religion, has a large impact in many countries with a multi-party system, even surpassing the economic problems in countries that contain large catholic populations where proportional representation facilitates Christian-Democrat parties.

The Center–Periphery (C–P) framework has strong explanatory power in understanding these structural drivers such as religion, ethnicity, space, etc. As mentioned, when these cleavages exist, it may be misleading to use solely EVT to understand voting behavior. The incumbent may lean on one of these structural cleavages to manage perceptions and may stimulate sociotropic voting, especially in cases when the economic performance is poor. Thus, an incumbent party may use these peripheral sensitivities as a strategy to stay in the power.

According to Lipset and Rokkan, one of such cleavages is a result of conflict between carriers of the central national-building culture and subgroups that were shaped by ethnically, linguistically, or religiously motivated populations who live in the peripheral provinces (Lipset and Rokkan, 1967). In their seminal work, Lipset and Rokkan attempt to understand cleavages of the society based on a polity center and its peripheral opposites. According to them, two main axes create a cross in the political arena. One of them (the vertical one) represents the tension between the central elite and the peripheral opposition. The other axis (the horizontal one) consists of groups that are interest-specific and in ideological opposition. The main axis, the center, and the periphery indicate the territorial dimension of the national cleavage while the other one shows the functional dimension. These two axes cut across each other and sometimes one may mitigate the net impact of the other one. Hence, Lipset and Rokkan highlight that regional grievances based on language, religion, and morality make these oppositions more resilient and cut across the problems between poorer and the better-off strata of the population. In their words:

> "Territorial-cultural conflicts do not just find political expression in secessionist and irredentist movements, however, they feed into the overall cleavage structure in the national community and help to condition the development not only of each nationwide party organization but even more of the entire system of party oppositions and alignments"

According to them, political grievances occur via tension between the subject and dominant culture, and the tension between the church and the government in countries where there has been a national revolution. In order to make this argument more concrete, they exemplify the French Revolution where compulsory education caused a pit against the government among churchgoers as broad mass movements.

The C–P presents a strong framework that can provide an explanation for the voting behavior of peripheral groups based on their ethnic and religious characteristics and moral preferences. Also, one may think that the horizontal axis that consists of economic circumstances has parallels to EVT. However, according to Lipset and Rokkan (1967), the economic references and bargaining process that occurs via the horizontal axis have a lower impact on political alignment than the ethnoreligious and spatial cleavages.

Although EVT and C–P offer different explanations for voting behavior, their impacts are measurable. It is quite likely that both sociotropic voting and peripheral motivations influence voting behavior, especially when the incumbent represents a peripheral group. EVT can be measured via economic variables while C–P can be measured via variables capturing cleavages based on religion, ethnicity, and space. In many cases, spatial factors constitute an important proxy for measuring the C–P motivations. There is plenty of empirical evidence in the literature that "space politically matters" (Burnett and Lacombe, 2012; Darmofal, 2006; Kim et al., 2003). Lipset and Rokkan (1967) further show that organized resistance against the government mostly occurs via the concentration of the counter-culture within one clear-cut territory.

Political cleavages in Turkey

One way to conceptualize Turkey's political cleavages is by focusing on tensions between central and peripheral forces. The central forces historically consist of the secular civil-military bureaucracy, as it is conceptualized in Mardin's seminal work "Center-periphery relations: A key to Turkish politics" in 1973 (Mardin, 1973). Turkey's political center was described as the military and bureaucracy, and the periphery was conceptualized by Mardin as mainly the peasantry, small farmers, and artisans, living in rural and inner regions of Turkey.

Consequently, people with religious and conservative ways of life, residing in rural and inner areas of Turkey constitute one of the main peripheral groups in Turkey (Heper, 2013; Rabasa and Larrabee, 2008). For many years, this group with religious and conservative tendencies has tried to find political representation in the bureaucratic hierarchy of the state via legal political parties. Such peripheral political parties were shut down by the Supreme Court[1] of Turkey several times, being perceived as a threat to the

centralist powers. The most recent rendition of such peripheral political parties was the AKP. The major economic crisis of 2000–2001 caused a big loss of confidence in the established centrist political powers. The newly founded AKP, presenting an inclusive and democratic agenda, benefitted from this opportunity, and was perceived by the electorate as a new hope. Particularly, the AKP has gained strong support from the inner regions of Turkey where the rural-based economy and a religious conservative way of life are dominant (Yılmaz, 2008).

Another important peripheral political group is the Kurdish population, demanding equal representation and recognition of their ethnic rights (Demiralp, 2012; Yeğen, 1999). The Kurdish question is a political problem based on the lack of fair representation of the Kurds in the Turkish political context. Kurdish people demand official recognition from the Turkish government. To accomplish this, the Kurdish population has been expressing their political demands through political parties. Historically, similar to the aforementioned religious conservative peripheral parties, these pro-Kurdish parties have also been perceived as a threat to the centralist powers, and have been shut down by the Supreme Court of Turkey, almost as quickly as they have emerged. [2] However, Kurdish politicians have continued to create new parties in pursuit of their political objectives.

Although there seem to be apparent similarities, the Pro-Kurdish representation also differs from religious/conservative representation as a peripheral group in the Turkish context, in several important ways. First, the religious/conservative periphery, perhaps as a survival strategy, engaged the nationalist centrist ideas in Turkey and created a "Turk-Islam Synthesis," which allowed them to find a seat at the table. In contrast, Pro-Kurdish parties, left-leaning and clearly not Turkish-nationalist in nature have not been able to bridge the ideological gap with the political center and have been left out. Second, Pro-Kurdish parties have always been perceived as irredentist groups by the center, and consequently have been ostracized by the centrist powers. One solid and structural example of such exclusion has been the creation of a 10% election threshold to enter parliament. Created after the 1980 coup, this rule was designed to prevent Pro-Kurdish representation at the National Assembly and has left the Kurdish population underrepresented in Turkish politics for decades to come. Third, the AKP found support from various liberal groups after the February 28 "post-modern coup" in 1997. The centrist powers tried to keep the religious conservatives out of the political arena via restrictions, such as the headscarf ban at the state universities to keep conservative women out, and age restrictions for those families who were wanting to send their children to Qur'an courses. These anti-democratic restrictions have caused a backlash from some liberal groups, creating an additional and unusual source of electoral support for the AKP. In contrast, while the Pro-Kurdish parties have found some support from small leftist groups, this was very marginal in comparison to the social consent religious/conservatives achieved. Pro-Kurdish parties did not garner the electoral empathy that the Religious/conservatives were able to achieve nationwide.

Many studies have attempted to explain voting behavior in Turkey with a focus on voter characteristics. Most of them used the C–P framework that focuses on the cleavages between conservative and secular attitudes, Turkish and Kurdish identities (Çarkoğlu and Hinich, 2006), and migration from the east to the west (Akarca and Başlevent, 2010) as the main drivers of voting behavior. However, some studies have been rooted in the EVT in the Turkish context. For example, Kalaycıoğlu (2007) claims that expected economic benefits are more important than ideological beliefs when voters support the AKP (Kalaycioğlu, 2007). However, Akarca and Tansel (2006) found that voters are taking into account the governments' economic performance only during the year before elections, which suggests that EVT effects are more short-term (Akarca and Tansel, 2006). Although the peripheral groups mentioned above exhibit spatial and regional patterns, the literature on voting behavior in the Turkish context has not adequately explored the spatial dimension of explanations. There is just one research study that has investigated the spatial effects on political competition in Turkey while it does not attempt to establish a spatial voting model for Turkey's elections (Ozen and Kalkan, 2017).

Data and model

The center–periphery (C–P) variables. In order to investigate the impact of the *Center–Periphery (C–P) Theory* and *Economic Voting Theory (EVT)*, first, we need to define the variables that can capture different causal mechanisms of C–P and EVT. It's relatively easy to measure the impact of EVT. Whether we are testing the impact of pocketbook or sociotropic voting, the most used variables are national and local economic growth rates, unemployment rates, inflation rates, etc. However, when it comes to C–P variables, it is more difficult to attain local-level data on religious and ethnic affiliation. With respect to ethnicity, there is no official data source on various ethnolinguistic groups in Turkey (this will be discussed in detail later). With respect to religion, one of the most used data is the number of mosques at the province level, which is publicly available from the webpage[3] of the Directorate of Religious Affairs in Turkey (Diyanet). Many studies have employed this data to show the impact of religion on political behavior (Gurses and Ozturk, 2020; Öztürk, 2019). However, measuring the religiosity of a locality by the number of mosques may be misleading, since the decision to construct a mosque has been legitimatized with the Village Law[4] which has been accepted in 1924, right after the establishment of the new Turkish Republic. According to the Village Law, having a mosque is a necessary condition to be recognized as a village legal entity in rural locations. This has created legal implications. For example, people who belong to the Alevi sect of Islam do not practice their beliefs in mosques, but after the establishment of the Village Law, they had to build mosques in their villages for official recognition of their village (Bayir, 2013; van Bruinessen, 1996). That's why the number of mosques as a variable for religiosity creates a significant bias. Also, the number of mosques does not predict well the AKP's vote share in empirical studies when it was controlled for with other explanatory variables (Marschall et al., 2016).

Lipset and Rokkan (1967) explained well how compulsory education under centralized secular control resulted in a crystallization of churchgoers into nationwide parties of protest in France. In a similar vein, an alternative indicator of religious conservatism in Turkey at the local level may be the attendance number in Qur'an Courses which are run by the Directorate of Religious Affairs in Turkey (Diyanet). This variable might provide useful insights, because secular centralist powers have employed a tight age restriction on the families who were sending their children to learn how to read Qur'anic Verses from Arabic letters after the 28 February 1997 military intervention. This age restriction was removed in 2012 by the AKP during its third term in power. One may think that these restrictions are about children's attendance in Qur'an courses, and do not relate to adults, and hence, cannot impact electoral behavior. However, the decision to send a child to a Qur'an course is often made by the adults in the family, and the impact of such age restrictions can arguably impact voting behavior. In addition, these courses are not only attended by children, but also by adults. As evidence, Fig. 1 illustrates the population share of attendance of Qur'an

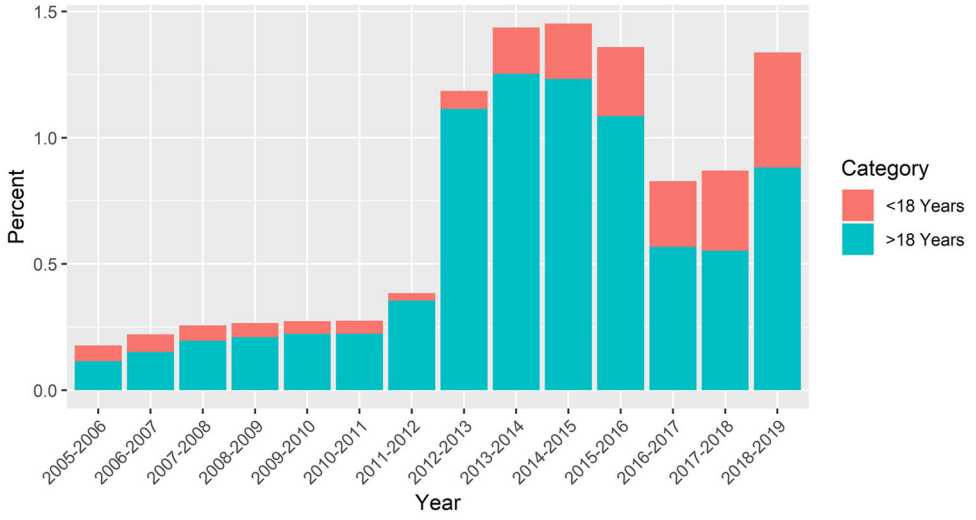

Fig. 1 Qur'an course attendance from 2005-6 to 2018-9 education year. Population share of students in Qur'an courses. Red bars represent those younger than 18 years while blue bars represent those older than 18 years.

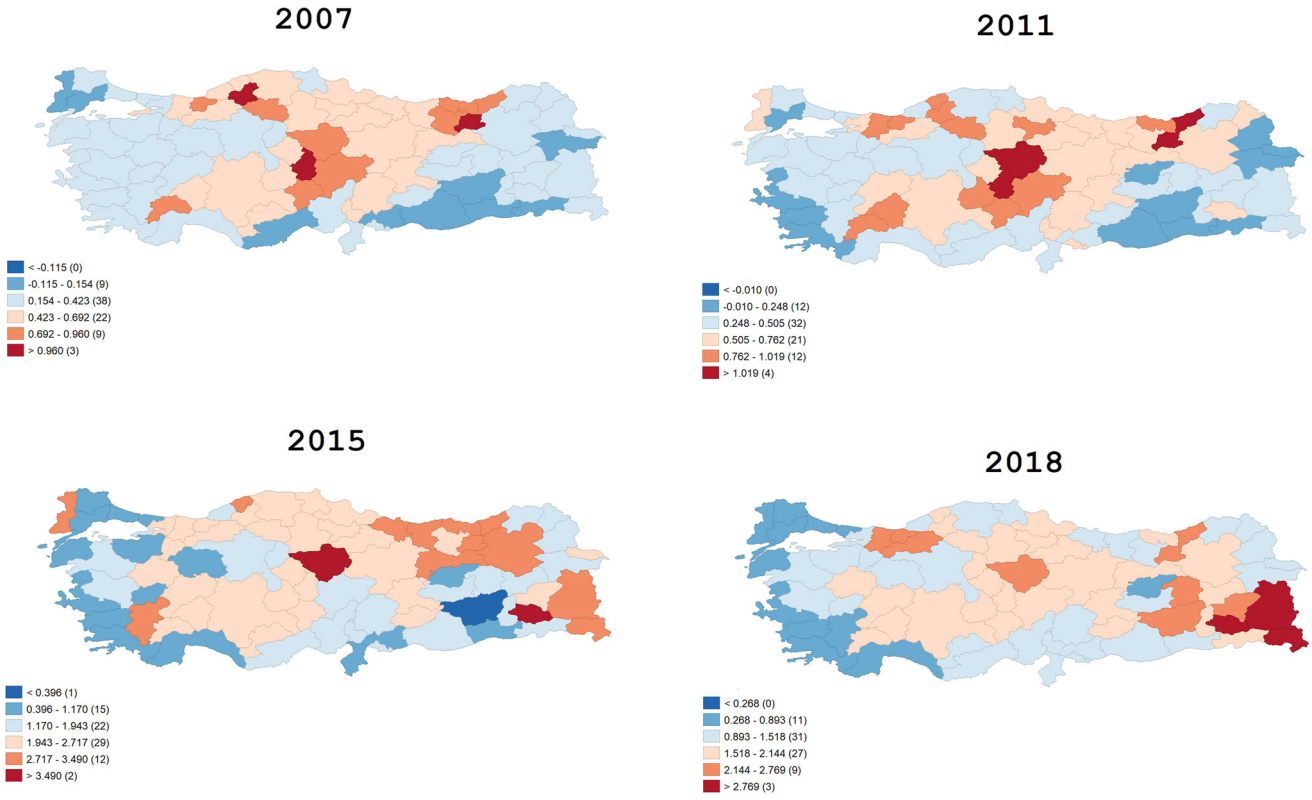

Fig. 2 Standard deviation map of attendance at the province level. Standard deviation map of the population share of attendance of Qur'an courses. Reddish colors represent more intense attendance.

Courses between 2005 and 2019 in the breakdown of age in Turkey.

As Fig. 1 clearly shows, there is a significant increase in the population share of Qur'an course attendance after 2011–2012, when the AKP government removed the age restrictions for attending such courses. Also, the AKP explicitly encouraged people to attend such courses at least once in their lifetime, and if possible more than once.[5] Attendance increased from 287,000 in the 2011–2012 academic year to 1,100,000 in the 2012–2013 academic year. By the 2018–2019 academic year, the percentage of the population attending Qur'an courses has reached 1.5% in Turkey. It is also important to note that, the share of those who are older than 18 (the green bars) is higher than the younger ones (orange bars) for the entire data. Thus, Qur'an course attendance may be a strong proxy for the religious and conservative nature of voters at the local level in Turkey. In order to understand local dynamics, it might provide better insight to look at the spatial deviation of Qur'an Course attendance at the province level. Figure 2 shows the standard deviation map of the population share of Qur'an Courses attendees.

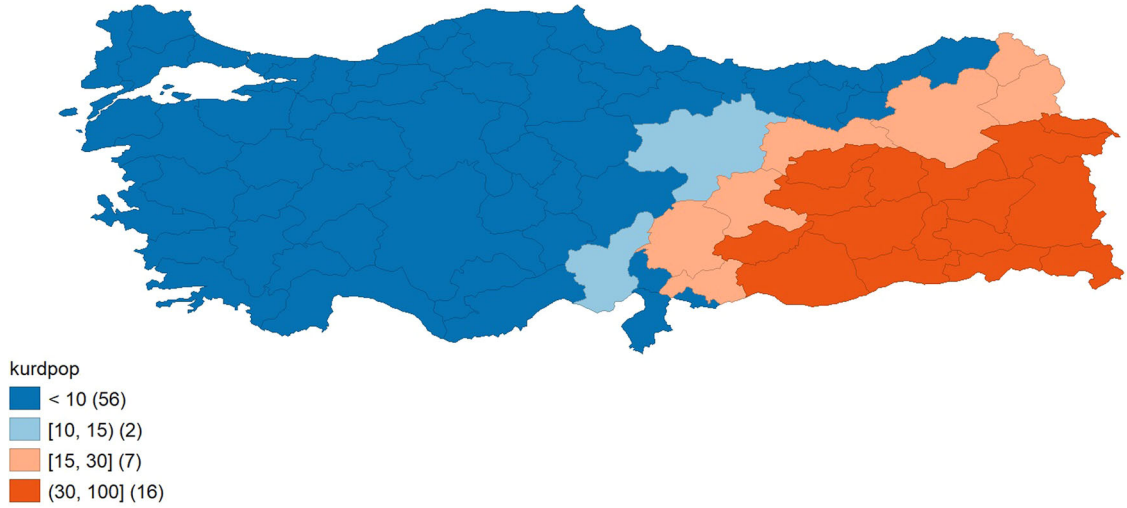

Fig. 3 The percentages of the Kurdish population. Polygon-to-Polygon spatial interpolation of Mutlu's (1996) figures from 67 provinces to the current 81 provinces. For more information see https://desktop.arcgis.com/en/arcmap/latest/extensions/geostatistical-analyst/using-areal-interpolation-to-predict-to-new-polygons.htm.

In Fig. 2, orange colors show positive deviations while blue colors show a negative deviation from the mean. According to the maps, the deviations above the mean for attendance of Qur'an courses are mostly clustered among the inner parts of Turkey and are very stable over time. It is clear from the map that only the south-eastern parts of Turkey are converting from negative to positive deviations in terms of attendance to the Qur'an Courses. Could it mean that the regions predominated by Kurdish populations are becoming more religiously conservative or politically more supportive of the AKP? This question is also important because the AKP is consistently cited as the only political party that could garner votes from the Kurdish population in Turkey (other than the Pro-Kurdish party, the HDP). Also, could it imply that the kind of religious activities that are supported by the government can be used as a political substitution for the peripheral demand of the Kurdish population? To answer this question, focusing on alternative variables, as proxies for the peripheral demand of ethnic identity would be useful. Since the values such as identity, ethnic recognition, and equality for the Kurdish population are their most important motivating factors in the voting booth, using Kurdish population data at the province level can be helpful. Unfortunately, local-level Kurdish population data does not exist; there is no official data on the ethnic or linguistic breakdown of the entire population in Turkey.

The first problem here is to predict the total number of Kurdish people at the national level. In the literature, there are few attempts to predict these numbers based on different data sources. Institute of Population Studies at Hacettepe University has been doing a broad extent Turkey Demographic Health Survey (TDHS) at the regional level since 1992. Based on the survey results from the subsequent years, we learn that the majority of the Kurds still live in eastern and south-eastern parts of Turkey despite the fact that massive migration movements in the last 40 years (Koc et al., 2008; Sirkeci, 2000), intermarriage is not a common phenomenon between Kurds and Turks, and there is a significant difference between Turkish and Kurdish populations in terms of total fertility rate (TFR), where its higher among Kurds (Eryurt and Koç, 2015). Eryurt and Koc (2015) predict the total number of Kurds was 17.2% at the national level in Turkey in 2008. Although their work has important findings such as Turks and Kurds are actors of different demographic regimes in Turkey, they do not provide certain figures at the province level in Turkey. However, Mutlu's (1996) important contribution based on the population survey questionnaire that contains the mother tongue question must be mentioned here (Mutlu, 1996). The mother tongue question has been asked via population surveys between 1927 and 1965 in Turkey, and then was banned. For the later surveys, although the question remained on the questionnaire until 1990, the Institute of Governmental Statistics (former name of TurkStat, TUIK) stopped releasing the data. Mutlu (1996) derive the numbers for 67 provinces of Turkey until 1990 based on mother tongue data from the 1965 population survey, TFRs from TDHS data, interprovincial immigration, and data on emigrants to foreign countries and returnees. Unfortunately, his figures are lacking from the newly established provinces after 1990. Currently, Turkey has 81 provinces and a comprehensive spatial analysis requires figures for all of them. However, this constraint can be overcome via spatial interpolation. Spatial interpolation allows us to derive Kurdish populations in new provinces based on spatial overlapping between old and new provinces. The map below reflects the interpolation of Mutlu's (1996) figures from 67 provinces to the current 81 provinces[6].

In the legend of Fig. 3, the first number(s) shows the percentage of the Kurdish population at the province level and the second numbers show the number of cities in that category. According to the map, the Kurdish population predominantly lives in the east and southeastern parts of Turkey. Those regions are colored red and light pink. Although the map consists of the 1990s numbers, it's not realistic to expect drastic changes when referring to the percentage of the Kurdish population in the cities. As mentioned, although there is emigration from the east to the west, the majority of the Kurds still live-in southeastern provinces (Koc et al., 2008). It is plausible to use these numbers to understand Kurdish people's voting behavior as a peripheral group. These variables can arguably capture the voting behavior based on C–P motivations. The next section will present the variables for the EVT.

Economic Voting Theory (EVT) variables. The EVT variables are intended to capture the motivations triggered by pocketbook or sociotropic voting. As aforementioned, the variables that represent pocketbook or sociotropic voting should be able to reflect voters' perceptions of their own and nationwide economic circumstances. Local GDP growth rate per capita and local inflation are effective indicators of individuals' real economic

Table 1 Descriptive statistics.

Statistic	N	Mean	Std. dev.	Min	Pctl(25)	Pctl(75)	Max
AKP	405	46.991	14.145	8.780	37.790	57.452	75.880
ProKurdish	405	11.701	20.370	0.000	0.635	10.092	86.368
NationalGrowth	405	5.460	1.944	3.500	3.900	6.800	8.600
LocalGrowth	405	5.648	4.089	−4.924	2.927	8.052	20.884
LocalUnemp	405	9.540	4.251	3.650	6.500	11.500	25.950
Religion	405	1.240	0.866	0.059	0.502	1.836	4.365
Kurdpop	405	16.338	25.670	0.020	0.760	16.220	89.470
MedAge	405	30.622	5.457	17.386	27.380	34.595	40.307
Hedu	405	10.263	4.084	1.778	7.310	13.140	23.170
*d*18	405	0.200	0.400	0	0	0	1
Depreciation	405	138.953	80.717	3.511	75.329	201.081	277.855
StrategicVoting	405	44.741	15.618	6.496	34.022	56.911	75.879
LocalInf	405	9.283	2.335	4.415	8.024	9.368	21.456

well-being at the local level, capturing pocketbook voting effects. National GDP growth rate is able to capture national economic performance, reflecting sociotropic voting effects. Consequently, these three variables offer us the ability to make an effective comparison between pocketbook and sociotropic voting. If the voters believe that their pockets are more important than the national economic performance, then the impact of local growth rates per capita on the incumbent's vote share should be higher than the impact of national growth rates. Similarly, if the voters consider that pocketbook voting is a dominant motivation when they vote, the impact of local inflation rates should be higher than the national growth rates as well. In order to enhance the fit of this measurement, the local unemployment rate is also used as a correcting variable. The local unemployment rate, and local GDP growth rate per capita variables perform in tandem to capture pocketbook voting effects. Also, in order to deal with voter myopia, per capita local GDP growth rate, local inflation, and national GDP growth rate have been weighted with four quarters[7] before each General Elections following the Akarca and Tansel (2006).

Control variables. Control variables are used to achieve more consistent coefficients through the model. Local median age (*MedAge*) and the local rate of graduation from higher education (*Hedu*) are employed as control variables for the outcome variables. Also, in order to capture various vote shifting due to the depreciation of incumbent party and strategic voting, *Depreciation* and *StrategicVoting* variables are introduced into the model as control variables. The *Depreciation* variable represents the depreciation rate of the incumbent party as an interaction term involving lagged vote share and years spent in power between general elections. The expected sign for the *Depreciation* is negative for the incumbent party because of the political turmoil that the ruling party might suffer. Additionally, the *StrategicVoting* variable was added to the model to account for the loss of the ruling party as a result of its supporters' strategic voting for other parties to counterbalance the government's power. To do that the incumbent party's first-time lag was added into the model as *StrategicVoting*. Strategic voting is equivalent to deducting the variable's coefficient from one. Mostly, the expected value is less than 1, which indicates that the ruling party may lose votes. However, the *StrategicVoting* may be greater than one in some circumstances. If it is greater than 1, it means that the incumbent garnered more votes than its previous elections and it indicates strong ideological ties between the party and the electorate. *MedAge* and *Hedu* variables are able to capture distinct socioeconomic features of the peripheral groups at the province level while *Depreciation* and *StrategicVoting* variables allow reaching more precise results.

Outcome variables. The outcome variables of this study are the vote shares of the AKP and the various versions of Pro-Kurdish parties. As previously mentioned, the AKP has come to power as the sole representative of the conservative masses. The AKP was able to find a seat at the table by engaging the combined nationalist and religious tendencies, called "Turk-Islam synthesis," and created a balance with the central powers at the juncture of state-defined nationalism and religion. This is not the case for the Pro-Kurdish parties. As the AKP and the Kurdish parties represent different peripheral tendencies, the expectation from the model is to observe different electoral behavior among voters. Thus, comparing them will allow us to scrutinize the main drivers of voting behavior that come from different peripheries.

Model.

$$\begin{aligned}\text{Party}_{it} = a_i &+ \beta_1 \text{NationalGrowth}_{it} + \beta_2 \text{LocalGrowth}_{it} + \beta_3 \text{LocalUnemp}_{it} \\ &+ \beta_4 \text{Religion} + \beta_5 \text{KurdPop}_{it} + \beta_6 \text{MedianAge}_{it} + \beta_7 \text{Hedu}_{it} \\ &+ \beta_8 d18 + \beta_9 \text{LocalInf} + \beta_{10} \text{Depraciation} \\ &+ \beta_{11} \text{StrategicVoting} + u_{it}\end{aligned}$$

The data, which was derived from Turkstat, Diyanet, and the Supreme Election Council of Turkey database, encompasses 81 provinces observed between 2007 and 2018. The model mainly covers the five general elections (2007, 2011, 2015 June 2015 November, and 2018) as a result of the panel data mechanics, and thus the time dimension of the panel data, $T = 5$. *d18* is introduced to the model as a dummy variable to capture the impact of the important events that took place between the last general election (2018) and the prior general election (2015) such as the failed coup attempt in 2016, and the presidential referendum in 2017. Finally, u_{it} is the idiosyncratic error term. In Table 1, there are descriptive statistics of the variables.

Results

Table 2 presents estimation results for the AKP and the Pro-Kurdish parties.

Regression results for the AKP and the Pro-Kurdish Parties are shown in Table 2. According to the regression results, the most expansive model for the AKP, like numbers 4 and 8, have the highest R^2 values, leading one to believe that they are the best fit for the data. R^2 does, however, rise with the number of independent variables, as is well known. Additionally, these models incorporate the dependent variable's first-time lag as the *StrategicVoting* variable, which may be another explanation for the rise in R^2 in these models. Additionally, because *StrategicVoting* also

Table 2 Regression results for the AKP and Pro-Kurdish parties.

	Dependent variable							
	AKP				ProKurdish			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	78.253***	77.185***	70.728***	36.217***	7.552	10.904	15.362*	30.355***
	(8.616)	(9.524)	(9.859)	(6.464)	(7.071)	(7.586)	(7.990)	(7.403)
NationalGrowth	2.351***	2.350***	2.034***	0.172	−0.633**	−0.630**	−0.412	0.397
	(0.350)	(0.349)	(0.336)	(0.234)	(0.263)	(0.262)	(0.261)	(0.273)
LocalGrowth	−0.106	−0.120	−0.103	−0.018	−0.039	0.005	−0.007	−0.044
	(0.148)	(0.163)	(0.166)	(0.105)	(0.114)	(0.123)	(0.123)	(0.116)
LocalUnemp	−0.382*	−0.378*	−0.361*	0.044	−0.047	−0.058	−0.070	−0.246
	(0.210)	(0.211)	(0.208)	(0.149)	(0.207)	(0.207)	(0.204)	(0.186)
Religion	7.440***	7.449***	7.175***	−1.414**	0.165	0.137	0.326	4.058***
	(0.755)	(0.756)	(0.782)	(0.652)	(0.531)	(0.530)	(0.547)	(0.752)
KurdPop	−0.379***	−0.379***	−0.346***	−0.117***	0.683***	0.682***	0.659***	0.559***
	(0.050)	(0.050)	(0.052)	(0.036)	(0.044)	(0.045)	(0.046)	(0.044)
Hedu	−0.911***	−0.911***	−0.794***	−1.585***	0.759***	0.758***	0.677***	1.021***
	(0.197)	(0.197)	(0.191)	(0.142)	(0.148)	(0.148)	(0.145)	(0.148)
MedianAge	−1.077***	−1.075***	−0.982***	−0.041	−0.362*	−0.367*	−0.432**	−0.841***
	(0.253)	(0.254)	(0.256)	(0.164)	(0.197)	(0.197)	(0.201)	(0.192)
*d*18	−3.627**	−4.317	−4.377	−3.568*	0.704	2.870	2.912	2.560
	(1.572)	(3.019)	(2.908)	(1.858)	(1.225)	(2.282)	(2.221)	(1.927)
LocalInf		0.128	0.150	−0.184		−0.401	−0.416	−0.271
		(0.415)	(0.402)	(0.260)		(0.282)	(0.278)	(0.252)
Depreciation			0.025***	−0.082***			−0.017***	0.029***
			(0.008)	(0.005)			(0.006)	(0.006)
StrategicVoting				0.995***				−0.432***
				(0.041)				(0.048)
Chow structural break (spatial regimes)	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Observations	405	405	405	405	405	405	405	405
R^2	0.383	0.383	0.400	0.779	0.824	0.824	0.828	0.863
Adjusted R^2	0.371	0.369	0.385	0.773	0.820	0.820	0.824	0.859
F statistic	30.758*** (df = 8; 396)	27.283*** (df = 9; 395)	26.266*** (df = 10; 394)	126.176*** (df = 11; 393)	231.270*** (df = 8; 396)	205.716*** (df = 9; 395)	189.663*** (df = 10; 394)	224.147*** (df = 11; 393)

White standard errors are in parentheses.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

accounts for ideological inertia, it largely conceals the overall effect of the other explanatory variables. For instance, regression numbers 4 and 8 show that the influence of religion is negative for the AKP and positive for the pro-Kurdish parties. Regarding the influence of religion on voters, it is well known that the reality is the opposite for the AKP and pro-Kurdish parties. Finally, the Chow structural break results show that these models have no effects on spatial regimes.

When comparing models with the different numbers of independent variables, Adjusted-R^2 provides better insight in terms of goodness of fit. For the Adjusted-R^2 values, regression 4 is still the best model for the AKP and regression 5 can also be thought of as the best fit for the Pro-Kurdish parties since their Adjusted-R^2 values have no appreciable increase. However, as mentioned, regression 4 has no spatial regime impact while regression 5 has. On the other hand, for the sake of completeness, it makes sense to focus on models with the highest Adjusted-R^2 that have spatial regimes like 3, and 7, since this paper investigates the spatial regimes based on voting behavior. Additionally, it is clear that the coefficients of the models that do not include *StrategicVoting* have not undergone any significant changes.

As it is said, the main drivers of EVT are economic variables. According to the results in Table 2, the voters exhibit more sociotropic voting than pocketbook voting for the incumbent AKP, since the NationalGrowth is statistically significant and has a higher impact than the local variables (*LocalGrowth*, *LocalUnemp*, *LocalInf*). With respect to sociotropic voting, the results confirm that the voters were focusing on the big picture more than their own economic circumstances. The real growth rate of local GDP per capita (*LocalGrowth*), local inflation rates (*LocalInf*), and local unemployment rate (*LocalUnemp*) do not predict the AKP's vote share in the nationwide sample as they are statistically insignificant. Therefore, the results show that sociotropic voting is a dominant component of EVT for the AKP since national economic conditions seem more important than the local economic conditions in affecting the electoral outcome. However, this finding is opposite from the literature on elections in Turkey. Most of the studies found that local economic conditions from various geographical aggregations are important as a part of the EVT in Turkish elections (Akarca, 2010; Çarkoğlu, 2009). In order to analyze this phenomenon deeper, it makes sense to investigate changes in spatial regimes that will be discussed detailed later.

As aforementioned, when sociotropic voting exists, it is quite possible to observe the impact of other factors such as religion and ethnicity as they are various components of the C–P. When we check the effect of such components via *Religion* and *KurdPop* variables, we observe that both are statistically significant as expected. The AKP has been affected negatively by the local Kurdish population size and positively by the local population's

share of Qur'an course attendance. However, in comparison to religious activity, the Kurdish population as a peripheral identity has a lower negative impact on the AKP's vote share, which limits the impact of ethnicity. It is not surprising to expect a positive relationship between religion and the AKP's vote share. However, the impact of religion is the highest and seems even more impactful than the other C–P and EVT-related variables. Thus, it can be inferred that religious conservatism is a real motivation for the AKP's supporters above and beyond other political motivations. Religious conservatism is even more powerful than the national economic performance of the government (7.175 > 2.034 in regression number 3) which is represented by the *National-Growth* variable above.

The demographic factors represented by the median age (*MedianAge*) exhibit interesting patterns for the AKP. In the entire sample, the mean median age is 30.6 for Turkey. Since the *MedianAge* is negatively correlated with the AKP's vote share, we may infer that the AKP is still a plausible choice for the voters in provinces with younger generations than the median age. Also, the *Hedu* variable that shows the percentage of the higher education level at the province level is statistically significant and has a negative correlation with the AKP's vote share as expected. In the literature, the higher education rate is a proxy for the secular tendencies in Turkey and is capable to capture reaction against the AKP because of the centralist tensions (Cinar, 2016). However, the variable that shows the depreciation of the incumbent (*Depreciation*) is statistically significant and positive in regression number 3. This is an unexpected outcome since it makes sense to expect depreciation of the incumbent's votes to some degree. Also strategic voting (*StrategicVoting*) is statistically significant and negative as expected which is compatible with Akarca (2019).

The Pro-Kurdish parties' voting model has been used to understand the impact of C–P motivations for another peripheral group that differs from the conservatives. Findings refer that national growth has a negative relationship with the Pro-Kurdish party votes since *NationalGrowth* variable is negative in regression 5, and 6, respectively. This means that EVT is in charge of the AKP. The AKP could garner more votes from the voters of the Pro-Kurdish party as long as the national growth rate is maintained. This shows that EVT is adversely working for the Pro-Kurdish parties. When the AKP is economically successful, there is a possibility for the vote to shift from the Pro-Kurdish parties to the AKP. Nevertheless, the possible occurrence of vote shifting from the Pro-Kurdish party towards the AKP is smaller than the impact of the *Religion*. This result implies that religion is a good glue to keep its supporters for the AKP when other peripheral groups are discontent. However, religion has no significant impact on the Pro-Kurdish parties' votes in regression 5–7, respectively. This validates the perception of religious conservatism as a negative motivation for the supporters of the Pro-Kurdish parties. Also, the *KurdPop* variable which is a proxy for the demand for identity as a peripheral group is positive and statistically significant for the Pro-Kurdish party's vote shares as expected in all regression results. This may imply that the Pro-Kurdish party is mostly supported by the motivation of identity struggle, although it frequently uses the concepts of peace, justice, and equality. This may be because of the local clustering of its supporters as well. Lastly, the control variables to account for the depreciation of the incumbent (*Depreciation*) are statistically significant and negative, and strategic voting (*StrategicVoting*) is statistically significant and negative as well for the Pro-Kurdish parties.

The results above exhibit interesting patterns. Based on the regression results, *KurdPop*, *Hedu*, *Depreciation*, and *StrategicVoting* variables have opposing effects on the AKPs and the Kurdish Parties' vote shares. This may be a result of different spatial clustering and polarization of the voters in Turkey. Thus, focusing on the two different parties' hegemonic spaces could provide useful insights into understanding whether EVT and C–P are nationwide or local phenomena. Hence, in the next section, the existence of different spatial regimes in terms of voting behavior will be investigated.

Spatial investigation. In order to understand the spatial regimes, focusing on spatial clusters of the parties could help us to understand whether EVT or C–P is the dominant determinant of voting behavior nationwide or in specific spatial regimes. One of the most important statistical methods that allow researchers to detect this kind of spatial cluster is Local Indicator of Spatial Association (LISA). LISA was suggested by Anselin (1995) as a way to identify spatial clusters and local spatial outliers (Anselin, 1995). The formula for LISA is

$$\begin{aligned} \mathrm{LISA}_i &= z_i \sum_j w_{ij} z_j \\ z_i &= x_i - \overline{x_i}, \\ z_j &= x_j - \overline{x_j} \end{aligned} \tag{1}$$

where x_i is political parties' vote share at location i, x_j is political parties' vote share at location j, $\bar{x}$ is the mean of political parties' vote share, and w_{ij} is the elements of the spatial weights that were created based on queen contiguity[8]. LISA has the ability to capture similar neighborhood values in a space and to detect spatial clusters and outliers. Also, LISA allows us to visualize these spatial clusters and outliers via maps. LISA statistics have four possible scenarios. High-high scenarios (red) and low-low (blue) scenarios show positive spatial autocorrelation for both high and low values across space and thus spatial clusters. Alternatively, high-low (pink) and low-high (purple) scenarios show negative spatial autocorrelation for dissimilar values on the space and thus spatial outliers. Figure 4 shows LISA maps for the AKP's vote shares between the 2002 and 2018 general elections.

According to the maps, the provinces that reflect the high-high scenario for the AKP vote share cluster around central and central-east Anatolia and the northeast Black Sea. These regions mostly have rural-based economies and religious conservative ways of life. However, blue regions show low–low clusters for AKP. It is well known that these regions in the eastern parts of Turkey are where the Kurdish population predominantly lives. Even though the AKP is consistently cited as the only political party that could receive votes from the Kurdish population in Turkey (other than the last Pro-Kurdish party, the HDP), Kurdish cities show strong negative spatial autocorrelation for the AKP. Overall, the AKP's LISA maps did not show significant changes in general elections since 2002. Distribution of high–high and low–low clusters often remain similar over time.

It might be significant to focus on the Pro-Kurdish parties' LISA maps in order the understand the Kurdish population's voting behavior as a peripheral group. Figure 5 shows the Pro-Kurdish Parties' LISA maps.

According to these maps, it is clear that Pro-Kurdish parties show strong high–high patterns in eastern cities of Turkey where the Kurdish population is very dominant. These LISA maps overlap with the map showing the Kurdish population in Fig. 3. The Pro-Kurdish parties' high–high clusters show stable patterns in the eastern part of Turkey between 2002 and 2018. Their low–low clusters appear in the east and middle Black Sea regions and central cities of Turkey. LISA maps in Figs. 4 and 5 strongly indicate that different regions exhibit strictly distinct voting behaviors with respect to AKP and the Pro-Kurdish parties.

Anselin and Rey (2014) suggest using a spatial regimes model when spatial heterogeneity is the case (Anselin and Rey, 2014).

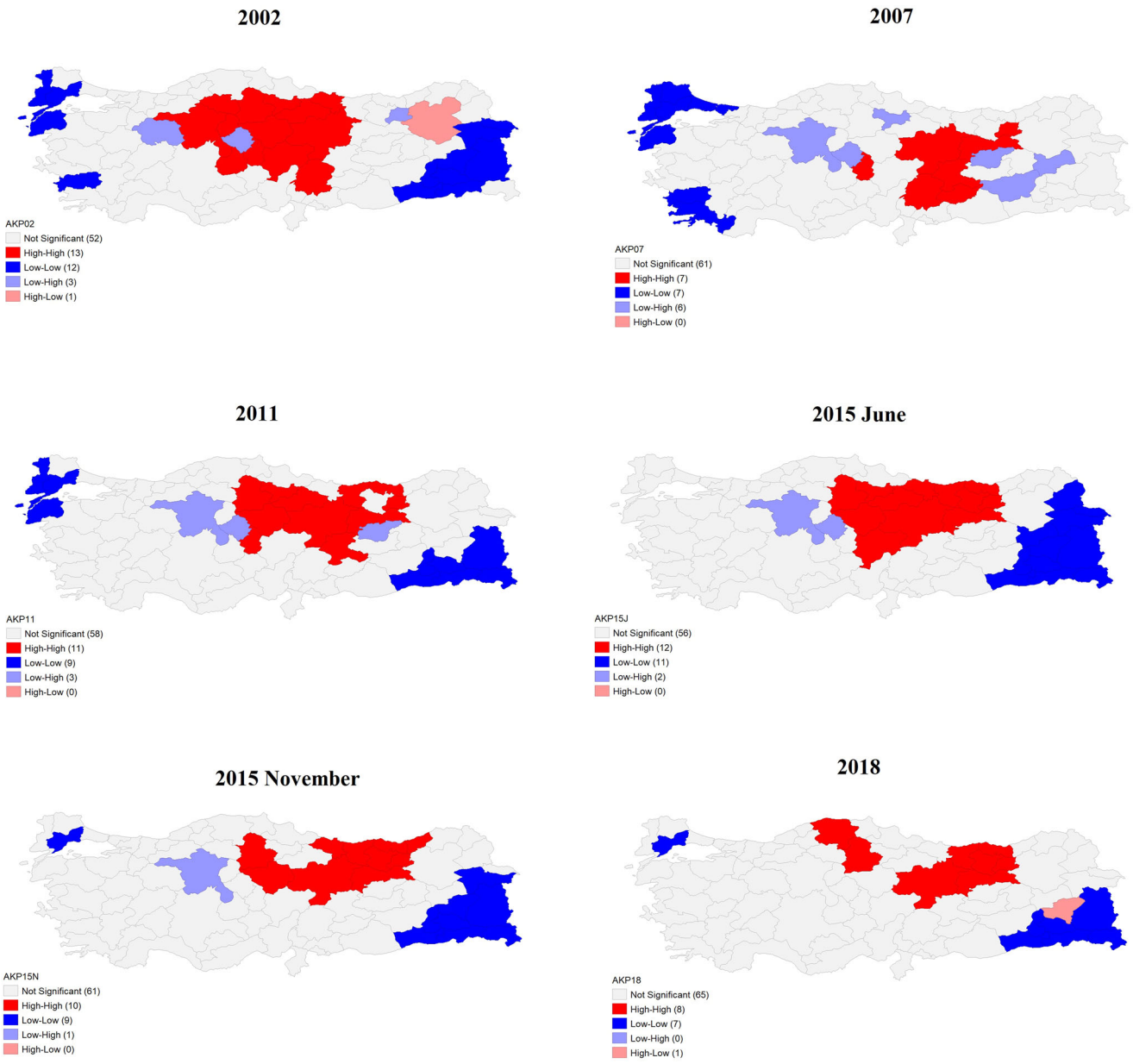

Fig. 4 LISA maps for the AKP. LISA maps have been obtained via queen contiguity.

We have a reason to expect spatial heterogeneity among high–high regions of the AKP and the Pro-Kurdish party as shown in the LISA maps. The spatial regimes model not only allows us to analyze the existence of spatial regimes but also allows us to test whether the entire model and the coefficients vary across regimes or not, via Chow's (1960) structural break test (Chow, 1960). Thus, we will be able to detect spatial variants of EVT and C–P. Accordingly, in this study, a criterion that consists of the cities where the Kurdish population is more than 15% will be used to specify spatial regimes. This criterion is quite plausible since it mostly overlaps with the LISA maps of the Pro-Kurdish party. Thus, Regime 1 will reflect the cities where the provinces are more than 15% of the Kurdish population in the eastern and southeastern regions of Turkey, and Regime 0 will reflect otherwise. Table 3 represents the results of these spatial regimes.

In the first panel of Table 3, the first two columns show the regression results based on spatial regimes, and the last column presents whether there is a structural break between spatial regimes or not, locally and globally. The GlobalChow test rejects the null hypothesis that there are no structural breaks between the spatial regimes. This result suggests that separate processes drive the spatial structure of the voting behavior between Regime 0 and Regime 1. This finding also fits with our expectations, since Regime 1 consists of provinces where the Kurdish population predominantly lives, and their political behavior is mostly shaped by their own ethnic identity in nationwide results. Moreover, the Chow test allows us to focus on each variable separately since it shows structural breaks for each regressor. From the results, we observe that *LocalGrowth*, *LocalUnemp*, *Religion*, *MedianAge*, *Hedu*, and *Depreciation* variables are significantly different between Regime 0 and Regime 1. Since most of the regressors are significantly different between regimes, it requires us to scrutinize coefficients carefully in terms of voting behavior. First, there is no structural break for the *NationalGrowth* between regimes, which validates the existence of the Sociotropic voting disregarding spatial regimes for the AKP. Second, the *Local-Growth* is significantly different between Regimes 0 and 1.

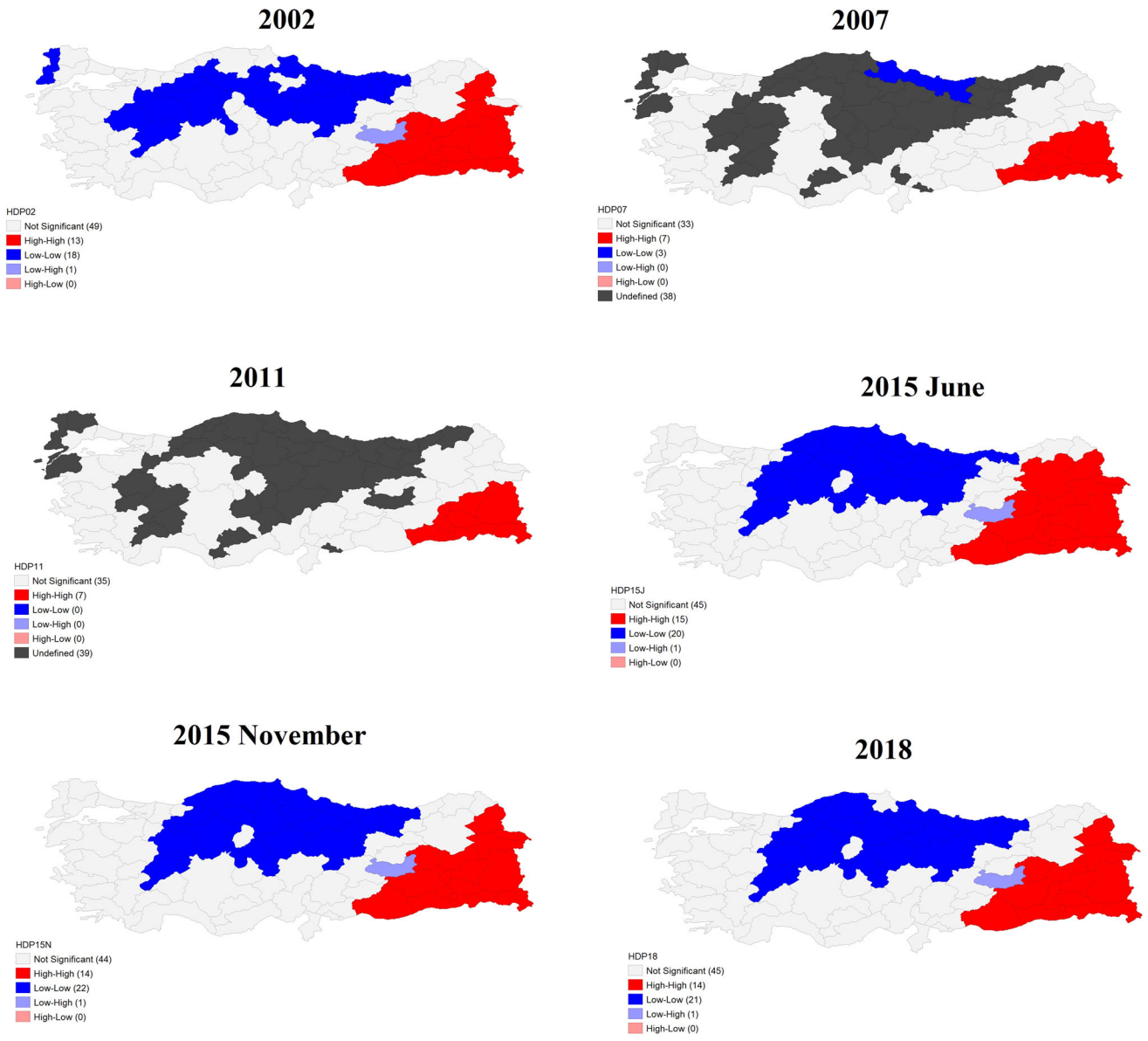

Fig. 5 LISA maps for Pro-Kurdish parties. LISA maps have been obtained via queen contiguity.

LocalGrowth is insignificant in Regime 0, similarly to the entire sample (see Table 2), it is statistically significant and negative in Regime 1. This neither fits pocketbook nor sociotropic voting theories in Regime 1 and implies that voters in Regime 1 tend to refrain voting for the AKP when their local economic conditions get better. Keeping in mind that Regime 1 consists of the provinces where the Kurdish population predominantly lives, this result may indicate that there is a different causal mechanism than EVT, driving the voting behavior in these regions. Nevertheless, it does not mean that there is no pocketbook voting effect for the AKP. Contrary to the nationwide results, pocketbook voting occurs in Regime 0 via the local unemployment rate. LocalUnemp is negative and statistically significant in Regime 0 as it represents the grievances of those who experience unemployment. This means that pocketbook voting exists in Regime 0. However, it is still smaller than the positive contribution of the *NationalGrowth*. Hence, the local unemployment levels can be ignored by the AKP, as long as the magnitude of such local grievances remains lower than the national growth performance.

We see those causal mechanisms of EVT occur in different ways in spatial regime models. While sociotropic voting occurs in both Regime 0 and Regime 1 via *NationalGrowth*, pocketbook voting only shows effects in Regime 0 via LocalUnemp. There is a similar result for the C–P variables between spatial regimes. Although the Religion variable is statistically significant and positive for the AKP vote share in both regimes, its impact is statistically lower in Regime 1, as Chow test results show. This implies that using strategies that appeal to the religious sensibilities of voters is a rational strategy for the AKP, especially in Regime 0. However, ethnic differences mitigate the effect of such religion-based political strategies in Regime 1. Nevertheless, using religion to maximize votes in Regime 1 is still a valid strategy for the AKP, since its effect on the AKP vote share is higher than the effect of *NationalGrowth*.

The controls also show different effects in different spatial regimes for the AKP. The *MedianAge* is statistically significant and negative in Regime 0, which confirms the nationwide results presented in Table 2, but it is not statistically significant in Regime 1. This means that the positive and significant

Table 3 Spatial regime results for the AKP.

Regressor	Regime 0	Regime 1	Chow (prob)
Constant	100.052*** (8.805)	31.553 (21.427)	8.743*** (0.003)
NationalGrowth	2.590*** (0.318)	2.204** (0.906)	0.161 (0.688)
LocalGrowth	0.094 (0.140)	−0.704** (0.334)	4.861** (0.027)
LocalUnemp	−1.109*** (0.215)	0.280 (0.262)	16.715*** (0.000)
Religion	9.299*** (0.849)	4.742*** (1.746)	5.505** (0.019)
KurdPop	−0.364 (0.259)	−0.301*** (0.086)	0.052 (0.818)
MedianAge	−1.755*** (0.223)	1.129 (0.748)	13.623*** (0.000)
Hedu	−0.456*** (0.173)	−2.656*** (0.746)	8.244*** (0.004)
*d*18	−0.047 (2.713)	−2.946 (5.962)	0.196 (0.658)
Depreciation	0.005 (0.007)	0.047*** (0.017)	4.845*** (0.027)
LocalInf	−0.504 (0.392)	−0.100 (1.203)	0.667 (0.414)
GlobalChow			71.025*** (0.000)
N	290	115	
R^2	0.53	0.43	
Adjusted R^2	0.51	0.38	
Spatial diagnoses			
LM (lag)	5.858 (0.0155)	3.950 (0.0469)	
Robust LM (lag)	0.607 (0.4358)	2.120 (0.1454)	
LM (error)	12.456 (0.0004)	1.997 (0.1576)	
Robust LM (error)	7.206 (0.0073)	0.166 (0.6833)	
Spatial decision	SEM	SAR	

White standard errors are in parentheses in regressions *p* values are in parentheses in spatial diagnoses.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

relationship between younger generations and the AKP vote share, which exists nationwide and also in Regime 0, does not exist in Regime 1. The *Hedu* variable, representing higher education level, has a negative and statistically significant impact on the AKP vote share in both Regime 1 and Regime 0, but its impact is higher for Regime 1 than it is for Regime 0. The *Depreciation* variable is statistically significant and positive although the coefficient is very low in Regime 1. These results show that the AKP vote share in Regime 1 is affected by both ethnic characteristics, and by socio-demographic characteristics, such as the median age and higher education level of the voters. Thus, the parameters that impact the AKP vote share show significant differences across Regime 0 and Regime 1.

It seems that EVT variables perform differently, while C–P variables exhibit similar patterns in different regimes for the AKP vote share. In both spatial regimes, the effect of *NationalGrowth* is statistically significant and higher than the effects of LocalGrowth, and LocalUnemp, indicating that sociotropic voting is a more powerful driver of AKP vote share than pocketbook voting. Table 3 shows that in Regime 0, *LocalUnemp* is negative and *NationalGrowth* is positive, and both are statistically significant, showing evidence for both pocketbook and sociotropic voting in Regime 0. However, in Regime 1 we only see evidence for sociotropic voting, because of the statistical insignificance of the *LocalUnemp*, and *LocalInf* while *NationalGrowth* remains positive and significant. It is important to note that, EVT variables have less impact on the AKP vote share than C–P variables. Specifically, the *Religion* variable is statistically significant, and has the highest positive coefficient in Regime 0 models of the AKP vote share. Here, one question arises about the existence of different spatial voting regimes. The third panel of Table 3 represents the spatial diagnosis for the regimes. Spatial diagnosis suggests that each regime has a separate spatial process and there are no voting spillovers between regimes. Once space is also thought as a peripheral framework, the results support the stronger impact of C–P variables than the EVT variables at the local level as Spatial Decision shows at the bottom of Table 3. Both Regime 0 and Regime 1 have different spatial regimes without any spatial spillover in terms of voting behavior. Similarly, focusing on the regimes via Pro-Kurdish party may provide important information for spatial voting. Table 4 represents Regime 0 and Regime 1 results for the Pro-Kurdish party vote share.

Table 4 Spatial regime results for the pro-Kurdish parties.

Regressor	Regime 0	Regime 1	Chow (prob)
Constant	−2.953*	80.801***	22.790***
	(1.617)	(17.469)	(0.000)
NationalGrowth	−0.462***	−1.759*	1.812
	(0.069)	(0.960)	(0.178)
LocalGrowth	0.061***	0.368	0.844
	(0.022)	(0.334)	(0.358)
LocalUnemp	0.023	−0.372	2.741
	(0.046)	(0.235)	(0.0978)
Religion	−0.915***	−3.056*	1.521
	(0.187)	(1.729)	(0.217)
KurdPop	0.532***	0.521***	0.008
	(0.106)	(0.069)	(0.929)
MedianAge	0.083*	−3.509***	38.591***
	(0.044)	(0.576)	(0.000)
Hedu	0.347***	4.276***	38.969***
	(0.053)	(0.627)	(0.000)
*d*18	1.321**	−0.943	0.174
	(0.623)	(5.400)	(0.677)
Depreciation	−0.001	−0.037**	5.942**
	(0.001)	(0.014)	(0.014)
LocalInf	0.027	−0.416	0.580
	(0.102)	(1.092)	(0.446)
GlobalChow			93.035***
			(0.000)
N	290	115	
R^2	0.64	0.76	
AdjustedR^2	0.63	0.74	
Spatial diagnoses			
LM (lag)	8.841	0.000	
	(0.0029)	(0.9948)	
Robust LM (lag)	5.408	0.208	
	(0.0200)	(0.6482)	
LM (error)	3.672	0.870	
	(0.0553)	(0.3510)	
Robust LM (error)	0.239	1.078	
	(0.6248)	(0.2991)	
Spatial decision	SAR	None	

White standard errors are in parentheses in regressions. *P* values are in parentheses in spatial diagnoses.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Table 4 contains the regression results for the Pro-Kurdish party vote share in for Regime 0 and Regime 1. The GlobalChow test results indicate statistically significant differences between

Regime 0 and Regime 1. Table 4 shows that the control variables *MedianAge*, *Hedu*, and *Depreciation* show statistically significant differences in Regime 0 and Regime 1. In contrast, C–P variables, *Religion*, and *KurdPop* do not show statistically significant differences between Regime 0 and Regime 1. These results lead us to make the following inferences.

First, these results may help us analyze the voting behavior of the Kurdish population at the national level, as the test results show that there is no statistically significant difference between Regime 0 and Regime 1 for the KurdPop variable. This shows evidence that Pro-Kurdish party vote share is not a regional phenomenon. If it was, as the centralist views claim, then we would have observed a statistically significant difference between Regime 0 and Regime 1, with respect to the impact of Kurdish ethnicity on Pro-Kurdish party vote share.

We expect the EVT variables to impact the Pro-Kurdish parties' vote share in an opposite direction to the AKP vote share. If the AKP governments are economically successful, then it should be able to attract the voters of other parties via economic well-being. The results indicate that *NationalGrowth* is statistically significant and negative only in Regime 0, however, its impact on the Pro-Kurdish parties' vote share in Regime 1 is insignificant. This especially may show that sociotropic voting behavior exists among the Kurdish voters only in Regime 0 where they are far from their traditional regions. The impact of the *NationalGrowth* is smaller than *Kurdpop* though. Also, we could not find evidence for the pocketbook voting impacting Pro-Kurdish parties' vote share, since local EVT variables, *LocalUnemp* and *LocalInf*, do not exhibit statistically significant effects across either regime.

Additionally, we have some concrete results about C–P voting behavior across Regime 0 and Regime 1. Religion is statistically significant (90% significance in Regime 1) and negative in both spatial regimes. The Religion variable consists of those who were attending the Qur'an courses and had showed a strong reaction against restrictive politics of regulations of central bureaucracies. As mentioned before, attending Qur'an courses has often been encouraged by the AKP. In this sense, *Religion* variable is negatively correlated with Pro-Kurdish Party vote share, for both Regimes 0 and 1. In fact, The *Religion* variable has an even higher negative impact on the Pro-Kurdish parties' vote shares in regime 1, where the population is predominantly Kurdish. This finding is quite compatible with other studies in the literature (Çiçek, 2013; Gurses and Ozturk, 2020; Karakoç and Sarıgil, 2020; Sarigil, 2010). Also, the *KurdPop* variable performs similarly across Regime 0 and Regime 1, as it is statistically significant and positive in both regimes. This indicates that voting behavior of the Kurdish population is not a regional phenomenon and supports the findings of Akarca and Baslevent (2010) which refers to origin effect on voting. In contrast, *MedianAge* has different effects in Regime 0 and Regime 1. The effect of *MedianAge* on Pro-Kurdish parties' vote share is not significant in Regime 0. In contrast, the effect of *MedianAge* on Pro-Kurdish parties' vote share is negative and significant in Regime 1, indicating that populations older than the median age in Regime 1 are less likely to vote for Pro-Kurdish parties. The corollary is that, populations younger than the median age in Regime 1 are more likely to vote for Pro-Kurdish parties. *Hedu* variable impacts the Pro-Kurdish parties' vote share in an entirely opposite way than it does the AKP vote share, indicating that having a higher education degree is positively and significantly correlated with Pro-Kurdish parties' vote share. Also, *Depreciation* variable is statistically significant and negative in Regime 1, where predominantly Kurdish population lives. These are expected outcomes since the Pro-Kurdish party is not an incumbent and subject to the depreciation as well as vote shifting is in charge, too. Finally, spatial diagnosis implies different spatial processes between spatial regimes for the Pro-Kurdish parties as well. These findings support that C–P variables of voting behavior perform stronger than the EVT variables in both regimes as drivers of both the AKP and the Pro-Kurdish Parties' vote share. Table 5 summarizes the results.

Table 5 Voting behavior by spatial regimes.

	Nationwide	Regime 0	Regime 1
Pocketbook	-	✓	-
Sociotropic	✓	✓	✓
Center–Periphery	✓	✓	✓
Dominance	C–P > St	C–P > St > Pb	C–P > St

C–P: Center–Periphery, St: Sociotropic, Pb: Pocketbook.

Discussion

One main contribution of this paper is to clearly parse out the effects of the sub-parts of the EVT, such as pocketbook and sociotropic voting behavior, by way of examining the effects of national-level and local economic variables on voting behavior. According to the results, pocketbook voting shows strong effects only in Regime 0, indicating regions in Turkey where GDP per capita is higher, relative to Regime 1. However, sociotropic voting is a common phenomenon since its effects are observed both nationwide, and in spatial regimes. Furthermore, the effects of sociotropic voting are stronger than pocketbook voting when they co-exist.

There are many studies in the literature reflect the impact of local economic conditions on voting behavior. In many studies, it is founded that the incumbent enjoys with the election results when local economic growth exists for example in USA between 1969 and 2016 at the county level (de Benedictis-Kessner and Warshaw, 2020), in India between 1990 and 2012 (Asher and Novosad, 2017), and in Brazil between 2000 and 2010 at the municipality level (Fernandes et al., 2017), etc. Moreover, many studies compare the contribution of the nationwide and local components of economic growth and find that both of them have an impact on voting for the incumbent while national growth has a stronger impact than the local economic conditions on voting behavior (Auberger and Dubois, 2005; Martins and Veiga, 2013; Veiga and Veiga, 2010). Similarly, most of the studies find similar relations between the local economy and support for the incumbent in Turkey (Akarca and Tansel, 2007; Çarkoğlu, 2009). However, it is founded that local economic variables such as the local growth rate and the local inflation rate have no impact on the incumbent party nationwide. The only local variable that has an impact on the incumbent voting rate is the local unemployment rate which shows pocketbook and voters' grievances in only Regime 0. In some studies, the reverse relationship has been found where the AKP uses the government's economic capabilities to increase its voting share via government bank credits, construction, and public employment in those provinces (Bircan and Saka, 2019; Luca, 2022).

In this manner, our results find consistent results about the C–P component of the voting behavior. The C–P voting behavior is ubiquitous behavior and has a stronger impact on voting than both pocketbook and sociotropic voting. This finding is important to understand the ongoing electoral success of the AKP. Because, when it comes to voting behavior motivated by the C–P features such as religion, ethnicity, and space, voters exhibit a more lasting and consistent voting behavior. This is the case for both the AKP and the Pro-Kurdish parties. This also may require further investigation of the voters' political polarization since there is no big change among supporters of these political parties after severe political turmoil. Also, the results show that both C–P

drivers and EVT drivers impact voting behavior. However, the most rationale strategy for the AKP is still investing in religiously motivated policies, such as removing age restrictions on Qur'an courses, since its political returns are stronger than the national economic performance in terms of vote share. This can be a potential explanation for the ever-increasing polarization on the conservative-secular dimension in Turkey.

Conclusion

In this paper, we explored the main drivers of the voting behavior of the AKP and of the Pro-Kurdish parties, both representing historically peripheral masses of Turkey. Although the religious and conservative segments of the Turkish population were ostracized by the centralist powers for a long time because of the secular-conservative tension, the AKP was successfully captured and retained their support. After the major economic crisis of 2000–2001, the AKP came to power, and its economic performance gained political approval and support, not only from its base but also from other groups. As a result, many scholars have focused on the EVT to explain the AKP's electoral success.

Moreover, many studies referred to the explanatory power of the C–P theory in terms of Turkish politics. It makes sense to refer to C–P cleavages because of the historical structure of the Turkish republic. There was always a centralist bureaucracy in the strata of the government that prevents the possible invasion of the center by peripheral groups. These centralist powers typically were excluding those who were being a threat to the modernist developmental pathway of the Turkish republic. As a result, the polarization of the peripheral voters was an expected output via the political parties. Although both the religious conservative parties and Pro-Kurdish parties have been perceived as a threat by the center, their political journeys have yielded different outcomes. The AKP made peace with the symbolic values of the center by combining nationalism and religious conservatism. This political adaptation has allowed the AKP to achieve common consent from both the centralists and the broad masses. Thus, the AKP could culminate in its voter support. This mechanism occurred via conservative politics as well as economic circumstances. Meanwhile, the Pro-Kurdish parties were trying to surpass the 10% election threshold. Once they achieved this goal, the system continued to perceive them as a threat and did not accept them as a democratic entity. The political processes have played out such that while the tensions between secular and conservative forces have decreased over time, the Pro-Kurdish parties have continued to be perceived as a threat by the center. Perhaps ironically, the new owner of the center is now the AKP. This result may be the reason for the tenacity of the voters to posit themselves in a polarized environment based on their peripheral features.

Data availability

The datasets analyzed during the current study are available in the Dataverse repository: https://doi.org/10.7910/DVN/13JX0U. This dataset has been derived from the following public domain resources: https://www.tuik.gov.tr/; https://www.ysk.gov.tr/; https://stratejigelistirme.diyanet.gov.tr/sayfa/57/istatistikler.

Received: 4 June 2022; Accepted: 27 February 2023;
Published online: 14 March 2023

Notes

1 The pro-Islamist parties banned by the Supreme Court of Turkey: National Order Party (Milli Nizam Partisi, 1971), National Salvation Party (Milli Selamet Partisi, 1980), Welfare Party (Refah Partisi, 1998), and Virtue Party (Fazilet Partisi, 2001)

2 The pro-Kurdish parties banned by the Supreme Court of Turkey: People's Labor Party (Halkin Emek Partisi, 1993), Freedom and Democracy Party (Ozgurluk ve Demokrasi Partisi, 1993), Democracy Party (Demokrasi Partisi, 1994), People's Democracy Party (Halkin Demokrasi Partisi, 2003), and Democratic Society Party (Demokratik Toplum Partisi, 2009)

3 See https://stratejigelistirme.diyanet.gov.tr/sayfa/57/istatistikler

4 https://www.mevzuat.gov.tr/MevzuatMetin/1.3.442.pdf

5 For more info see https://www.hurriyetdailynews.com/deputy-pm-defends-education-reform-17137

6 See Appendix 1, Supplementary Information, to see Mutlu's figures based on 67 provinces and spatially interpolated figures based on 81 provinces as maps and lists.

7 Weights can be seen in Appendix 3, Supplementary Information.

8 See Appendix 2, Supplementary Information, to see spatial connections that created based on queen contiguity in Turkey.

References

Akarca (2010) Analysis of the 2009 Turkish election results from an economic voting perspective. Eur Res Stud J XIII, 3–38. https://doi.org/10.35808/ersj/285

Akarca AT (2019) Economic voting in Turkey: single- vs. multi-party governments. Southeast Eur Black Sea Stud 19:523–539. https://doi.org/10.1080/14683857.2019.1702621

Akarca AT, Başlevent C (2010) The region-of-origin effect on voting behavior: the case of Turkey's internal migrants. İktisat İşletme ve Finans 25:9–36

Akarca AT, Tansel A (2007) Social and economic determinants of Turkish voter choice in the 1995 parliamentary election. Electoral Stud 26:633–647. https://doi.org/10.1016/j.electstud.2007.06.001

Akarca AT, Tansel A (2006) Economic performance and political outcomes: an analysis of the Turkish Parliamentary and Local Election results between 1950 and 2004. Public Choice 129:77–105. https://doi.org/10.1007/s11127-005-9013-9

Alesina A, Giuliano P (2011) Preferences for redistribution. In: Benhabib J, Bisin A, Jackson MO (Eds.) Handbook of social economics. Elsevier, pp. 93–131

Anderson CJ, Mendes SM, Tverdova YV (2004) Endogenous economic voting: evidence from the 1997 British election. Electoral Stud 23:683–708. https://doi.org/10.1016/j.electstud.2003.10.001

Anselin L (1995) Local indicators of spatial association—LISA. Geogr Anal 27:93–115. https://doi.org/10.1111/j.1538-4632.1995.tb00338.x

Anselin L, Rey SJ (2014) Modern spatial econometrics in practice: a guide to GeoDa, GeoDaSpace and PySAL. GeoDa Press, Chicago, IL

Asher S, Novosad P (2017) Politics and local economic growth: evidence from India. Am Econ J Appl Econ 9:229–73

Auberger A, Dubois E (2005) The influence of local and national economic conditions on French legislative elections. Public Choice 125:363–383. https://doi.org/10.1007/s11127-005-3056-9

Bayir D (2013) Representation of the Kurds by the Turkish Judiciary. Hum Rts Q 35:116

Bircan C, Saka O (2019) Elections and economic cycles: what can we learn from the recent Turkish experience? Oxford University Press

Brooks C, Brady D (1999) Income, economic voting, and long-term political change in the US, 1952–1996. Soc Forces 77:1339–1374

Burnett JW, Lacombe DJ (2012) Accounting for spatial autocorrelation in the 2004 presidential popular vote: a reassessment of the evidence. Rev Reg Stud 42:75–89

Çarkoğlu A (2009) The March 2009 local elections in Turkey: a signal for takers or the inevitable beginning of the end for AKP? South Eur Soc Politics 14:295–316. https://doi.org/10.1080/13608740903425734

Çarkoğlu A, Hinich MJ (2006) A spatial analysis of Turkish party preferences. Elect Stud 25:369–392

Chow GC (1960) Tests of equality between sets of coefficients in two linear regressions. Econometrica 28:591. https://doi.org/10.2307/1910133

Çiçek C (2013) The pro-Islamic challenge for the Kurdish movement. Dialect Anthropol 37:159–163. https://doi.org/10.1007/s10624-013-9299-9

Cinar K (2016) Local determinants of an emerging electoral hegemony: the case of Justice and Development Party (AKP) in Turkey. Democratization 23:1216–1235. https://doi.org/10.1080/13510347.2015.1077228

Cizre Ü, Yeldan E (2005) The Turkish encounter with neo-liberalism: economics and politics in the 2000/2001 crises. Rev Int Political Econ 12:387–408. https://doi.org/10.1080/09692290500170692

Darmofal D (2006) Spatial econometrics and political science. Society for Political Methodology Working Paper Archive: http://polmeth.wustl.edu/workingpapers.php

de Benedictis-Kessner J, Warshaw C (2020) Accountability for the local economy at all levels of government in United States elections. Am Political Sci Rev 114:660–676

De La O AL, Rodden JA (2008) Does religion distract the poor?: Income and issue voting around the world. Comp Political Stud 41:437–476. https://doi.org/10.1177/0010414007313114

Demiralp S (2012) The Odd Tango of the Islamic Right and Kurdish Left in Turkey: a peripheral alliance to redesign the centre. Middle Eastern Stud 48:287–302. https://doi.org/10.1080/00263206.2011.652780
Erdogan E, Semerci PU (2018) Fanus' ta Diyaloglar: Türkiye'de Kutuplaşmanın Boyutları (Dialogues in Bell Glass: the dimensions of polarization in Turkey). Bilgi Üniversitesi Yayınları, Istanbul
Eryurt MA, Koç İ (2015) Demography of ethnicity in Turkey. In: Sáenz R, Embrick D, Rodríguez N (Eds.) The International Handbook of the Demography of Race and Ethnicity. Springer, pp. 483–502
Fernandes IF, de AL, Fernandes GA, de AL (2017) The importance of local economic growth on the elections of Brazilian chief executives of governments. Rev Adm Pública 51:653–688. https://doi.org/10.1590/0034-7612146091
Gomez BT, Wilson JM (2001) Political sophistication and economic voting in the American Electorate: a theory of heterogeneous attribution. Am J Political Sci 45:899. https://doi.org/10.2307/2669331
Grafstein R (2005) The impact of employment status on voting behavior. J Politics 67:804–824. https://doi.org/10.1111/j.1468-2508.2005.00340.x
Gurses M, Ozturk AE (2020) Religion and armed conflict: evidence from the Kurdish Conflict in Turkey. J Sci Study Relig 59:327–340. https://doi.org/10.1111/jssr.12652
Hansford TG, Gomez BT (2015) Reevaluating the sociotropic economic voting hypothesis. Elect Stud 39:15–25. https://doi.org/10.1016/j.electstud.2015.03.005
Heper M (2013) Islam, conservatism, and democracy in Turkey: comparing Turgut Özal and Recep Tayyip Erdoğn. Insight Turkey 15:141–156
Kadri Ekinci N, Alp Ertürk K (2007) Turkish currency crisis of 2000–2001, revisited. Int Rev Appl Econ 21:29–41. https://doi.org/10.1080/02692170601034986
Kalaycioğlu E (2007) Politics of conservatism in Turkey. Turk Stud 8:233–252. https://doi.org/10.1080/14683840701312211
Karakoç E, Sarıgil Z (2020) Why religious people support ethnic insurgency? Kurds, religion and support for the PKK. Politics Relig 13:245–272. https://doi.org/10.1017/S1755048319000312
Kiewiet DR (1981) Policy-oriented voting in response to economic issues. Am Political Sci Rev 75:448–459. https://doi.org/10.2307/1961377
Kim J, Elliott E, Wang D-M (2003) A spatial analysis of county-level outcomes in US Presidential elections: 1988–2000. Electoral Stud 22:741–761. https://doi.org/10.1016/S0261-3794(02)00008-2
Kinder DR, Kiewiet DR (1981) Sociotropic Politics: the American case. Br J Political Sci 11:129–161. https://doi.org/10.1017/S0007123400002544
Koc I, Hancioglu A, Cavlin A (2008) Demographic differentials and demographic integration of Turkish and Kurdish populations in Turkey. Popul Res Policy Rev 27:447–457. https://doi.org/10.1007/s11113-008-9072-y
Lewis-Beck MS, Stegmaier M (2008) The economic vote in transitional democracies. J Elections Public Opin Parties 18:303–323. https://doi.org/10.1080/17457280802227710
Lipset SM, Rokkan S (1967) Cleavage structures, party systems, and voter alignments: an introduction. Free Press
Luca D (2022) National elections, sub-national growth: the politics of Turkey's provincial economic dynamics under AKP rule. J Econ Geogr 22:829–851. https://doi.org/10.1093/jeg/lbab041
Mardin Ş (1973) Center–periphery relations: a key to Turkish politics? Daedalus 102:169–190
Marschall M, Aydogan A, Bulut A (2016) Does housing create votes? Explaining the electoral success of the AKP in Turkey. Elect Stud 42:201–212
Martins R, Veiga FJ (2013) Economic performance and turnout at national and local elections. Public Choice 157:429–448. https://doi.org/10.1007/s11127-012-0047-5
Mutlu S (1996) Ethnic Kurds in Turkey: a demographic study. Int J Middle East Stud 28:517–541. https://doi.org/10.1017/S0020743800063819
Ozen IC, Kalkan KO (2017) Spatial analysis of contemporary Turkish elections: a comprehensive approach. Turk Stud 18:358–377. https://doi.org/10.1080/14683849.2016.1259576
Öztürk AE (2019) An alternative reading of religion and authoritarianism: the new logic between religion and state in the AKP's New Turkey. Southeast Eur Black Sea Stud 19:79–98. https://doi.org/10.1080/14683857.2019.1576370
Palmer HD, Whitten GD (1999) The electoral impact of unexpected inflation and economic growth. Br J Political Sci 29:623–639. https://doi.org/10.1017/S0007123499000307
Powell GB, Whitten GD (1993) A cross-national analysis of economic voting: taking account of the political context. Am J Political Sci 37:391. https://doi.org/10.2307/2111378
Rabasa A, Larrabee FS (2008) The rise of political Islam in Turkey. Rand Corporation
Roemer JE (2005) Distribution and politics: a brief history and prospect. Soc Choice Welf 25:507–525. https://doi.org/10.1007/s00355-005-0016-8
Romero DW, Stambough SJ (1996) Personal economic well-being and the individual vote for Congress: a pooled analysis, 1980–1990. Political Res Q 49:607–616
Rothwell JT, Diego-Rosell P (2016) Explaining nationalist political views: the case of Donald Trump. Available at SSRN 2822059
Sanders, D., 2000. The real economy and the perceived economy in popularity functions: how much do voters need to know? A study of British data, 1974–97. Electoral Stud 20
Sarigil Z (2010) Curbing Kurdish ethno-nationalism in Turkey: an empirical assessment of pro-Islamic and socio-economic approaches. Ethn Racial Stud 33:533–553. https://doi.org/10.1080/01419870903118114
Sirkeci I (2000) Exploring the Kurdish population in the Turkish context. Genus 56:149–175
Somer M (2019) Turkey: the slippery slope from reformist to revolutionary polarization and democratic breakdown. Ann Am Acad Political Soc Sci 681:42–61. https://doi.org/10.1177/0002716218818056
Stegmueller D (2013) Religion and redistributive voting in Western Europe. J Politics 75:1064–1076. https://doi.org/10.1017/S0022381613001023
van Bruinessen M (1996) Kurds, Turks and the Alevi Revival in Turkey. Middle East Rep 7. https://doi.org/10.2307/3013260
Veiga FJ, Veiga LG (2010) The impact of local and national economic conditions on legislative election results. Appl Econ 42:1727–1734. https://doi.org/10.1080/00036840701736107
Yeğen M (1999) The Kurdish question in Turkish state discourse. J Contemp Hist 34:555–568
Yılmaz H (2008) Conservatism in Turkey. Turk Policy Q 7:57–63

Acknowledgements

For valuable feedback and assistance on this work, we thank Ozlem Elgun, Prof. Dr. Hakan Yetkiner, and the study group of the Center for Spatial Data Science at the University of Chicago.

Competing interests

The author declares no competing interests.

Ethical approval

This article does not contain any studies with human participants performed by any of the authors.

Informed consent

This article does not contain any studies with human participants performed by any of the authors.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1057/s41599-023-01584-3.

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