When Do Citizens Respond Politically to the Local Economy? Evidence from Registry Data on Local Housing Markets

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Abstract

Recent studies of how economic conditions shape incumbent support have focused on the role of the local economy, but with inconclusive results. We propose that the political impact of the local economy is conditional on voters' interaction with it in their everyday lives. We provide evidence for this proposition by focusing on the influence of local housing markets on support for the incumbent government. Linking uniquely detailed and comprehensive data on housing prices from Danish public registries to both precinct-level election returns and a two-wave individual-level panel survey, we find that when individuals interact with the housing market, their support for the incumbent government is more responsive to changes in local housing prices. The study thus provides a framework for understanding when citizens respond politically to local economic conditions.

1 Introduction

Retrospective evaluations of the state of the economy shape voters' decision to support or reject incumbent politicians. This type of retrospective economic voting is desirable from the perspective of democratic accountability, as the economy provides voters with an effective shorthand for evaluating the performance of incumbent politicians and hence for punishing and rewarding them accordingly (Ashworth, 2012; Healy and Malhotra, 2013). Scrutinizing whether and how voters engage in economic voting is therefore important to further our understanding of a key mechanism for keeping governments in check.

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After long having focused almost exclusively on either the individuals' personal economic situation, or that of the nation she inhabits, the economic voting literature has recently turned its attention to the meso-level in terms of local economic conditions. However, a consensus about local economic voting, i.e. the role of local economic conditions play in shaping support for national governments, has not yet emerged.[1] For example, recent work from Hansford and Gomez (2015) and Healy and Lenz (2017) has found that county-level unemployment rates, as well as the number of loan delinquencies in local areas, shape support for national incumbents in the US. At the same time, Hill et al. (2010) and Wright (2012) find small or insignificant effects of county-level unemployment rates on support for the incumbent president. These recent findings from the US are symptomatic of the findings from the existing literature on local economic voting, which are, generally speaking, inconclusive.

The increased attention paid to the role of local economic conditions in the economic voting literature parallels a resurgence in the study of effects of local residential contexts more generally in the political behavior literature (e.g., Enos, 2016; Hopkins, 2010). Two key insights stand out from recent studies within the latter line of research. First, concrete everyday exposure to different social phenomena in the immediate residential context at the local level—in neighborhoods or even more locally—is a crucial mechanism underpinning local context effects (Dinesen and Sønderskov, 2015; Enos, 2016; Hjorth, 2017; Moore and Reeves, 2017). Second, such local experiences are more consequential for political attitudes when they are more salient in the minds of citizens—something typically attributed to the priming influence of news media coverage, often ignited by focusing events (Davenport, 2015; Hopkins, 2010; Legewie, 2013). In other words, existing research indicates that the local context matters for political behavior, but more so when experienced very locally and when salient to its inhabitants. However, these innovations have eluded previous studies of local economic voting, which have focused on across-the-board effects of local economic conditions measured in aggregate contextual units (though see Bisgaard et al., 2016; Healy and Lenz, 2017). As a consequence, some of these studies may have overlooked the elusive, yet important, effect of local economic conditions on

[1] Although economic voting can also occur purely at the local level (i.e. local economic conditions influencing local elections) (see e.g. Burnett and Kogan, 2017; Hopkins and Pettingill, 2017), we use 'local economic voting' throughout to refer to voting in national elections based on local conditions.

incumbent support.

In this paper, we incorporate these new insights from the wider context literature to the study of local economic voting. In so doing, we offer two distinct contributions. First, we provide a theoretical framework for understanding when local economic conditions matter for incumbent support. Drawing on insights from political psychology, we argue that voters rarely have a comprehensive overview of local economic conditions, and these conditions will therefore need to be made salient in order to influence voters' evaluation of government performance. Unlike national economic conditions, which are typically made salient by elite actors such as the media (Hart, 2013) or political parties (Bisgaard and Slothuus, 2017), we suggest that specific features of the local economy can be primed by voters' own interactions with the local economy—e.g., voters become more attuned to the state of the local housing markets when buying or selling a home. This conditional theory of local economic voting provides an explanation for why local economic conditions only sometimes factor into vote choice, and helps resolve the tension between positive and null findings in the existing literature.

Second, we leverage a research design and data that are close to optimal for testing the proposition that local economic conditions shape support for national governments. More specifically, we focus on local housing markets, which was a salient feature of local economies in the period under study (the housing boom and bust around the Great Recession) and therefore likely to provide a basis for local economic voting. Following recent innovations in the economic voting literature (Healy et al., 2017), we use comprehensive and highly granular registry data from Denmark on both individuals and local contexts. This allows us to define local housing markets using flexible measures tailored to each individual respondent, thereby making for a more accurate reflection of individuals' local experiences than in almost all previous studies that use (much) more aggregate contextual units. Furthermore, these data enable us to examine the suggested mechanism—salience of the local housing market—by subsetting our analyses by individuals' interactions with this aspect of the local economy.

We examine the relationship between local housing market activity and incumbent government support in Denmark using two complementary empirical approaches. First, we link data on local housing prices to election results at the precinct level across four national elections,

allowing us to study whether support for parties in government increases more in precincts where housing prices are rising rather than falling (i.e., a difference in differences approach). Second, to test the hypothesized causal relationship more rigorously, we zoom in on individual voters' local contexts. Specifically, we link a two-period panel survey to precise and flexible measures of the survey respondents' local housing market.

We find the hypothesized positive relationship between local housing prices and support for governing parties at both the precinct level and at the individual level. We estimate that a 50 pct. year-on-year increase in local housing prices, equivalent to the sharp price increases of the pre-crisis housing boom, is associated with a 1 to 2 percentage point(s) increase in electoral support for the sitting government. We find no evidence that housing prices affect the respondents' ideological orientation, or that the effect of housing prices on incumbent support depends on homeownership. Furthermore, supporting our argument that the extent and nature of local economic voting depends on the salience of a given aspect of the local economy, we show that the effect of local housing prices is more pronounced among individuals who are more heavily exposed to their local housing market. More specifically, voters respond more strongly to local housing prices in areas where local housing market activity is high and thus plausibly more salient to voters. The effect of local housing prices is also much larger for voters who have recently or who will soon be moving, and therefore plausibly more attuned to local housing markets. Taken together, the results suggest that voters respond to changes in local housing prices not because it changes their preferences for specific policy interventions or their own economic situation, but because they rely on the state of their local housing market as a signal about incumbent performance when this particular signal is salient to them.

2 When Local Economic Conditions Affect Incumbent Support

The rationale underlying retrospective economic voting is that voters reward or punish incumbents based on their economic performance. While egotropic pocketbook concerns are not absent in voters' calculus (Healy et al., 2017; Tilley et al., 2017), the primary metric for evaluating

the incumbent governments is the state of the national economy (Kinder and Kiewiet, 1979; Lewis-Beck and Stegmaier, 2013). This in turn raises the second-order question of how voters form perceptions of the national economy—a highly abstract aggregate—on which to base their evaluation of incumbents' economic stewardship (Reeves and Gimpel, 2012).

It is well-established that the mass media plays a key role in transmitting information about national economic aggregates (e.g., Soroka et al., 2015). Yet, recent research indicates that voters do not evaluate incumbents exclusively based on mass mediated information. They may also – to some extent – rely on local economic conditions as a shorthand for evaluating the national economy (Bisgaard et al., 2016; Reeves and Gimpel, 2012) and in turn the economic stewardship of the sitting government. Exposure to local cues about the state of the economy may stem from both direct, personal involvement with the local economy through activities such as a job search or buying or selling a home, as well as more indirect casual observation of changing supermarket prices, shuttered stores, or job postings. As Popkin (1994, p. 24) notes "[p]olitical information is acquired while making individual economic decisions and navigating daily life: shoppers learn about inflation of retail prices; home buyers find out the trends in mortgage-loan interest rates (...)" (see also Fiorina, 1981, p. 5). Substantiating the importance of locally observable cues, Ansolabehere et al. (2012) find that citizens are far better at estimating familiar, locally visible quantities like the price of gas than harder to observe quantities such as the unemployment rate. In short, the local context embodies information about the state of the national economy that voters might use when evaluating incumbent government.

A number of previous studies have examined voters' responsiveness to local economic conditions; typically local unemployment, but in some cases supplemented by other local features such as the number of loan delinquencies (Healy and Lenz, 2017) or gas prices (Reeves and Gimpel, 2012). One set of studies examines the direct link between local economic conditions and support for incumbent politicians (Auberger and Dubois, 2005; Eisenberg and Ketcham, 2004; Elinder, 2010; Hansford and Gomez, 2015; Healy and Lenz, 2017; Hill et al., 2010; Johnston and Pattie, 2001; Kim et al., 2003; Veiga and Veiga, 2010; Wright, 2012), while another looks at the extent to which various features of the local economy shape voter perceptions of the national economy — i.e.,perceptions that have downstream consequences for

which should eventually shape voters' assessment of the government as well (Anderson and Roy, 2011; Ansolabehere et al., 2014; Books and Prysby, 1999; Reeves and Gimpel, 2012). Studies from both strands of the literature yield inconsistent results finding either small or no effects of local economic conditions on a given outcome.

Common for almost all of the previous studies is a focus on very aggregate 'local' contexts (for an exception see Bisgaard et al., 2016; Healy and Lenz, 2017). Even comparatively disaggregate local contexts such as census tracts in the US, are often geographically vast and therefore at best imprecise proxies for local experiences (Bisgaard et al., 2016; Dinesen and Sønderskov, 2015; Moore et al., 2017). This compromises the ability of these studies to get at the purported mechanism of experiential learning from the local context. Further, because aggregate contexts often overlap with local media markets, any effect may in fact be confounded with mass mediated information (Books and Prysby, 1999; Reeves and Gimpel, 2012). In this paper, we bring the study of local economic voting closer to the proposed mechanism of local experiential learning by studying how support for the incumbent government is shaped by economic conditions, specifically housing markets, in very local contexts, measured in a variety of ways and with high precision and flexibility. From this design, we can more safely infer if locally experienced economic cues actually underlie local economic voting.

In summary and in keeping with the existing literature, we thus expect local economic conditions to factor into citizens' retrospective evaluations of — and ultimately support for — the incumbent national government. More specifically, we hypothesize:

> *H1 (Local economic conditions hypothesis): When local housing prices rise, individuals are more likely to support the incumbent government.*

Adding to this, we further develop an explanation for when local economic conditions matter for voters' support for the incumbent government. Drawing on insights from political psychology, we further argue that citizens factor in specific aspects of the local economy in their evaluation of the incumbent government based on how cognitively salient that aspect is to them. Specifically, we suggest that the aspects of the local economy that citizens have been exposed to more frequently and more recently, are more likely to figure as such salient "top-of-mind" considerations (Zaller, 1992).

The concept of priming in political psychology provides an instructive parallel to our theoretical reasoning in this regard. In the priming literature, media coverage of particular political issues causes those issues to be more salient to voters, and ultimately carry more weight in their evaluation of the incumbent government (Iyengar and Kinder, 1987; Iyengar et al., 1982; Krosnick and Kinder, 1990).

In applying such a priming framework to the study of effects of local contexts, we follow in the footsteps of earlier work examining how national focusing events can prime the importance of local conditions (e.g., Hopkins, 2010; Legewie, 2013). However, in contrast to this body of work, which emphasizes priming as the result of top-down processes—specifically media coverage ignited by national-level developments or shocks such as terrorism—we propose that contextual priming may also be the result of 'horizontal' micro-level processes in the form of interactions with that particular aspect of the local economy. More specifically, we expect that more frequent and more recent interactions with a particular aspect of the local economy can serve a priming function, prompting this aspect to feature more prominently in voters' evaluation of the incumbent. In terms of our empirical context, we expect increased exposure to local housing markets to sensitize citizens to this feature of the economy when evaluating the incumbent government. The priming of local housing markets thus occurs as a by-product of citizens' exposure to this aspect of the local economy. In this way, our argument builds on the logic of priming, but shifts the theorized cause of increased attention to a particular issue from the mass media to citizens' interactions with local economic conditions.

This leads to our second hypothesis, namely that the association posited in H1 is stronger where voters are primed to focus on local housing market though more intense exposure to this aspect of the economy:

> *H2 (Contextual priming hypothesis): The association between changes in local housing prices and support for the incumbent government is stronger when individuals are more exposed to local housing market activity.*

This conditional theory of local economic voting connects with several theoretical developments, within the retrospective economic voting literature as well as more broadly, and relates may help explain to the inconsistencies in previous empirical studies.

The economic voting literature has not been silent on the conditional effects of national economic voting, but has hitherto predominantly focused on the moderating influence of political institutions (Duch and Stevenson, 2008; Powell Jr and Whitten, 1993, cf.). However, a more recent set of studies suggests that the extent of economic voting does not only vary by system-level institutional features, but also by features of individuals. These studies argue that certain individuals are more attuned to the national economy, either because they are more knowledgeable in general (Vries and Giger, 2014) or because they work in a sector of the economy where continued employment is (especially) contingent on good economic conditions (Fossati, 2014; Singer, 2011a,b, 2013). Here, we surmise that something similar is at work for local economic voting; specifically, that more pronounced exposure to local housing markets make voters more attuned to this aspect of the local economy and therefore more inclined to use it as the basis for local economic voting.

More generally, our contextual priming hypothesis ties into several neighboring literatures. First, as already highlighted, our study builds on and adds to the growing literature on 'context effects' exploring when political behavior and attitudes are shaped by local contexts (e.g., Danckert et al., 2017; Hopkins, 2010). Second, it examines priming outside of the confines of political psychology and as such potentially broaden the scope of this concept to also include adjacent fields. Third, our study more broadly also ties in with a recently emerged strand of research in political economy highlighting the influence of home ownership – in itself or as part of a portfolio of economic assets – on redistribution and social policy preference as well as voting (Ansell, 2014; Nadeau et al., 2010; Stubager et al., 2013).

Finally, on an empirical level, our conditional theory of local economic voting might help explain why previous studies have found inconsistent results. If the impact of local economic conditions depends on the extent of citizen interaction with the local economy, then we should expect the effect of local economic conditions to be moderated by individual voters' relation to this part of the economy. The extent and intensity of voters' relation with different facets of the local economy – whether this is housing, unemployment or gas prices – probably vary significantly across time and space. In this light, it is not odd that previous research has been inconsistent, identifying local economic voting in some contexts but not in others.

3 Empirical Setting: Local Housing Markets in Denmark

We study the effect of changes in local housing prices on support for the incumbent government in Denmark in the years surrounding the onset of the Great Recession. We focus on spatial variation in local housing markets because several features make them a plausible basis for local economic voting. First, housing markets saw a global boom followed by a bust in the period around the great recession (see Figure 1 below)—our timeframe in this study—with severe economic implications for well-being of both individual households and the overall state of the economy. Second, governments influenced the severity of the market crash to a considerable extent through housing and monetary policies (Dam et al., 2011), which in turn makes housing markets a meaningful source of information about incumbent performance. Third, housing markets are not a monolithic national phenomenon, but vary substantially across geographical contexts, thereby providing voters with visible, locally specific information. Fourth, due to the availability of Danish registry data (see below), we are able to measure activity in local housing markets in exceptional detail. Collectively, these features enable us to leverage a strong test of our hypotheses.

Furthermore, Denmark is a particularly useful setting for studying the hypothesized relationships due to extraordinarily large temporal variations in housing prices in the period we study. The boom and bust of the Danish real-estate market before and during the Great Recession were large, even by international standards. Figure 1 shows the trajectory of Denmark's housing bubble compared with other prominent international cases. Although many economies experienced large increases in real housing prices, Denmark's housing bubble was exceptionally volatile, characterized by a late, rapid increase quickly succeeded by an equally rapid crash. The bulk of Denmark's housing boom and bust occurred in just four years, from 2005 to 2009. In contrast, the housing bubble in the United States (also highlighted in Figure 1), although far bigger in absolute terms, was relatively protracted in comparison. Consequently, local housing markets in Denmark saw year-to-year changes in housing prices that were, even by the standards of a globally economically volatile period, unusually large. This provides us with ample variation in the independent variable of interest.

Turning to the political context, the government in our period of study (2002-2015) consisted

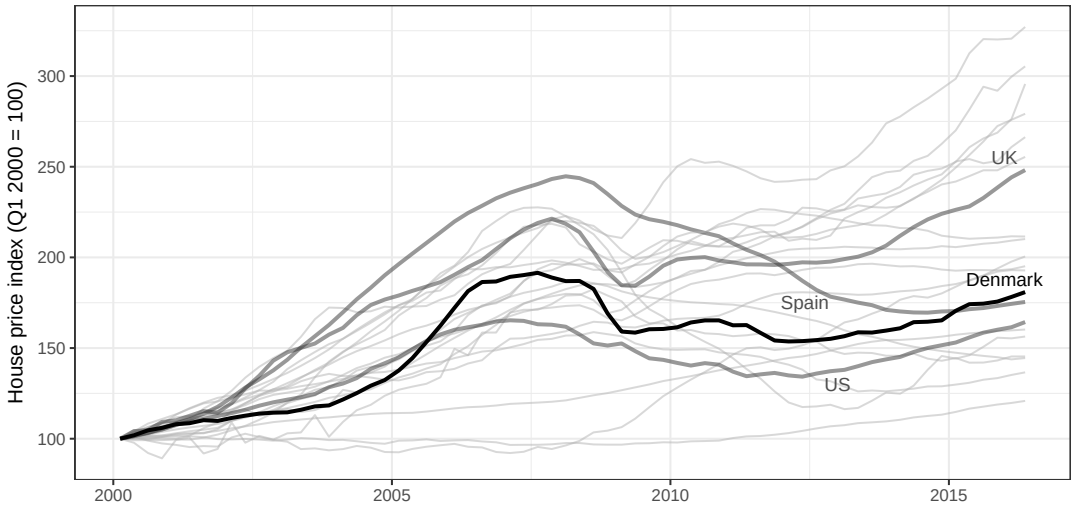

Figure 1: Trends in real housing prices in Denmark (black line), Spain, the UK, and the US (dark gray lines) and selected other countries (light gray lines), 2000-2016 (2000 level = 100). Based on the International House Price Database maintained by the Dallas Fed. The authors acknowledge use of the dataset described in Mack and Martinez-Garcia (2011).

of several different parties. From 2001 to 2011 the Liberal party formed a right-wing government along with the Conservative party, and from 2011 to 2015 the Social Democratic party formed a left-wing government together with the Social-Liberal Party and the Socialist People's Party (the latter withdrew from the government in 2014). The fact that our study period covers governments led by parties from the centre-left and centre-right, respectively, is analytically advantageous as it enables us to differentiate local economic voting from other shifts in voter preferences. More specifically, because the policies exacerbating the housing bubble were introduced by the right-wing government holding office from 2001 to 2011, this renders support for the incumbent government observationally indistinguishable from voters becoming more ideologically conservative, a plausible consequence of increases in housing wealth (Ansell, 2014), in this period. By exploiting the change in incumbency in 2011-2015, we can ascertain that changes in local housing prices affect support for any incumbent government (local economic voting), and not merely increased support for a right-wing government (see Section 5).

4 Research Design and Data

Methodologically, we advance the study of local economic voting by exploiting comprehensive and highly granular data on housing market transactions available in Danish public registries.

We link detailed registry data on local housing prices to both precinct-level panel data on national election outcomes as well as individual-level panel survey data (see below). These data ameliorate three methodological challenges confronting previous studies of the role of local economic conditions as well as the broader class of studies scrutinizing local influences on political attitudes and behavior.

First, by utilizing precise and highly local measures of housing prices drawn from public registries we address the common problem of confounding local contexts with local media markets. Distinguishing between the two influences is rarely possible due to data constraints, specifically focusing on local economic conditions in more aggregated geographical contexts, where local context and local media markets overlap (Bisgaard et al., 2016).

Second, and related to the previous point, measures of local economic conditions are often sample-based, which makes the estimation of conditions at lower geographical levels imprecise, thus causing attenuation bias (i.e. a downward bias) in the estimated relationship with support for the incumbent government (Healy and Lenz, 2017). We avoid such problems through the use of data from the full population, which enable us to measure local housing prices with very high precision.

Third, most previous studies have relied on cross-sectional data (e.g., Ansolabehere et al., 2014; Books and Prysby, 1999; Reeves and Gimpel, 2012). While such data are often the best at hand, they come with the risk of confounding a relationship between local housing prices and support for incumbents by structural economic differences (e.g. differences in industry composition) between local contexts. This is perhaps best exemplified by the strong urban-rural gradient in local economic conditions, which would likely confound any observed cross-sectional relationship between such conditions and support for the sitting government. Using panel data, we can rule out confounding due to such time-invariant structural differences between local contexts by using only within-precinct/within-individual variation in local housing prices by means of precinct/individual fixed effects.

Some previous studies address some of these methodological challenges, but our study is, to the best of our knowledge, the first to address all of these at once. In the remainder of this section, we present in more detail the two data sources we use to test our hypotheses; a precinct-level

and an individual-level data set.

4.1 Precinct-level Data and Measures

We begin our analysis of the relationship between the state of local housing markets and incumbent support by looking at precinct-level election returns in Danish Parliamentary elections in 2005, 2007, 2011 and 2015. We match electoral support for parties in government in these precincts with change in the price of all house sales in and around the precincts in order to, examine the extent to which local housing prices and local electoral support for government parties go hand in hand.

The dependent variable in this analysis is *percent of votes cast for government parties* in electoral precincts. Each electoral precinct corresponds to a single polling place, which is the smallest unit at which voting returns can be observed in Danish elections. We measure this for all precincts in all four elections. There are roughly 1,400 precincts, each consisting of, on average, about 3,000 eligible voters and covering an area of 30 square kilometers. A number of precincts are redistricted between each election. This is problematic, as we want to use the precincts as part of a panel data set. One way to deal with this is to drop precincts if their geographical boundaries were altered. Under this strategy, roughly 15 pct. of the data on the dependent variable would be dropped. We therefore opt for an alternative solution, namely to fix the precincts geographical boundaries at one reference election (2015), and then recalculate vote returns in any changed precincts to match up with precincts in the reference election. We prefer this strategy, allowing us to use the full sample of precincts, as the changes in geographical boundaries from election to election are generally minor with only a few major changes.[2] The results presented below do not change substantially if we drop precincts that change boundaries, see Appendix I.

We obtain data on the independent variable, local housing prices, from The Danish Mortgage Banks' Federation (*Realkreditforeningen*), which publishes quarterly data on the average price per square meter of all sales at the zip code level, aggregated from registry data on individual

[2]For details of how returns from the redistricted precincts are calculated, see Søren Risbjerg Thomsen's research note at `bit.ly/2050lPi`.

sales.[3] We focus on changes in prices rather than price levels. This is motivated by the well-documented general tendency of human perceptions to be more responsive to changes in conditions than to absolute levels (Kahneman and Tversky, 1979). It is also in keeping with the extant economic voting literature which, to the extent that it has looked at prices, has had a similar focus on changes (i.e., inflation, e.g. Kramer, 1971). At the local level, changes in housing prices will translate into shorter or longer turnaround times, as sellers and buyers try to adjust to the new prices, leaving visible traces of these changes in voters' immediate context. These traces may take the form of "for sale" signs in front yards and windows, or the speed at which old neighbors are exchanged for new ones. More precisely, we measure changes in housing prices as the percentage change in the price of houses sold in the quarter of a given election compared to the same quarter one year before. We merge observations of house prices and incumbent support by assigning every polling station to the year-on-year price change in its zip code. Additional details on this assignment procedure can be found in Appendix A.

To test the contextual priming hypothesis, we measure local housing market activity by the (logged) number of trades in the zip code area (also based on data from The Danish Mortgage Banks' Federation). This is premised on the assumption that the number of trades in the zip code area manifests itself in various visible ways (e.g. more "for sale" signs coming up and going down and a higher turnover in neighbors), which makes inhabitants more attuned to the state of their local housing markets and, in turn, makes support for the incumbent government (more) contingent on this part of the local economy.

Finally, in the statistical models we control for the unemployment rate and median income at the zip-code level in order to isolate the effect of local housing markets from other features of the local economy. Like the independent variable, these are population-based measures calculated from public registries provided by Statistics Denmark.

4.2 Individual-level Data and Measures

Although our precinct-level data is comprehensive, our hypotheses concern individuals, and testing individual-level theories with aggregate-level data is fraught with problems of ecological

[3] Available at `statistik.realkreditforeningen.dk`.

inference. Hence, we also analyze individual-level data from a two-wave panel survey collected between 2002 and 2011. The first wave of the panel survey consists of respondents who participated in round 1 (2002/3), 2 (2004/5) or 4 (2008/9) of the Danish Version of the European Social Survey (ESS); a nationally representative high-quality survey conducted bi-annually in most European countries.[4] The second wave of the panel consists of re-interviewed respondents from these three rounds. Specifically, the full sample of ESS rounds 1 and 4, and 40 percent (randomly selected) of ESS round 2, were invited for a re-interview in the winter of 2011-12. In total, 1,743 people – equivalent to a retention rate of 47 pct. – were interviewed in both rounds.

From the survey, we use the following question as our dependent variable: "Which party did you vote for at the last parliamentary election?" Respondents were presented with all the parties, which ran in the previous election. For the analyses we create a dummy variable indicating whether the respondent voted for a party in government at the time of the election as the dependent variable.[5]

We measure the independent variable, local housing markets, using data from the national Danish population registers, which are linked to the survey via anonymized civil registration numbers. The registers contain very detailed information about all individuals legally residing in Denmark, including the exact geographical location of their residence, the price of any real estate they sell, and a range of other socio-demographic characteristics (Thygesen et al., 2011). Importantly for our purposes, the registers make it possible to calculate the distance between the individuals in the survey and all other individuals in Denmark and, in turn, the distance to any individuals who are selling their home. Due to the detail and flexibility of the registry data, we can measure housing markets at a very local level, which, as discussed above, allows for assessing the local economic conditions hypothesis at a much more theoretically appropriate level of analysis than in previous studies. If local economic voting can be observed based on very localized housing markets, it is a strong indication that local experiences are driving this relationship.

[4] http://www.europeansocialsurvey.org/

[5] The second survey wave and ESS rounds 1 and 4 were fielded a relatively short time after national elections. For these rounds the reported party choice is thus temporally subsequent to economic changes over the past year. This is not the case for round 2, however, we only have a small number of observations from this survey round (n=267) and as reported in Appendix J the results are not markedly different in this round.

We measure local housing markets in three different ways and thereby address concerns related to the modifiable area unit problem (MAUP)—a thorny issue within contextual research in general—by examining whether our findings are tied to a particular geographic aggregation of housing prices. First, and similarly to what we did for the precinct-level data, we use the respondents' zip code area, comparing housing sold within the same zip code a year apart. Second, we look at the prices of the 20 or 40 units of housing sold closest to the respondents own home, comparing the prices of housing sold in the immediate proximity of the respondent to that of housing sold one year earlier. Third, we look at the price of housing sold within a fixed radius of 1000 or 1500 meters of the respondent. These latter ways of defining the respondents' residential contexts have the benefit of being centered on the respondent, alleviating the problem that the context of a respondent living far from the centroid of one zip-code might be better represented by an adjoining zip-code. Note also that these latter two types of residential context differ in important ways: whereas the first method takes number of sales as fixed, but varies the geographical dispersion of these sales, the second method holds geographical dispersion fixed, but varies the number of sales.[6]

More specifically, our independent variable is again year-over-year changes in housing prices in the residential context of the respondent. We measure the change by comparing the price of housing sold in the quarter prior to the data collection and the price of housing sold in the same quarter a year earlier. Unlike for the precinct-level data, we do not have data on prices per square meter. This makes the individual-level housing price change variable more sensitive to random variation in the types of housing put up for sale in the two time periods we compare. As such, year-to-year changes in prices may partly reflect that larger houses were put up for sale in a given year. To take this as well as other structural differences in the type of housing put up for sale into account, we divide the sales price of each unit of housing by its public valuation before calculating the year-over-year change.[7]

Lastly, for evaluating the contextual priming hypothesis, we develop a measure of individual-level involvement with the local housing market. We construct a variable from public registries

[6]See Appendix B for details of how we arrive at the housing price estimates.

[7]The Danish government produces biannual estimates of the price of all housing in Denmark for the purpose of calculating property taxes. The public evaluation was constant across the two year time periods we use to estimate housing price changes.

measuring whether the respondent moved within six months before or after being surveyed. The variable takes the value of one if respondents move within this period of time and zero otherwise. This variable can be viewed as a proxy for whether respondents are interacting with the housing market and thus whether they were exposed to information about the trajectory of local housing prices.

We also include a number of additional variables in the analysis for statistical control, interaction analyses and placebo tests. We present these as we use them in the analysis.

5 Precinct-level Evidence

In the following, we present precinct-level evidence on our two hypotheses. Table 1 evaluates the proposition that voters reward (punish) the incumbent government for increases (decreases) in local housing prices by means of a set of linear regression models. More specifically, the table presents the estimated effect of year-over-year changes in local housing prices on electoral support for the parties in government. All models are estimated using robust standard errors clustered at the precinct level. Model 1 is a simple linear regression of electoral support on changes in housing prices. Model 2 includes year fixed effects, holding trends in incumbent support and rates of housing price change constant. Model 3 adds precinct fixed effects to this specification, thus constituting a difference-in-difference model that evaluates whether increases in housing prices are related to incumbent support within precincts and net of any time trend (i.e., whether incumbent support increases more in precincts where housing prices increase more). In Model 4, we add the zip code-level unemployment rate and median income as covariates, thereby controlling for overall trends in the precincts' economic situation.

Table 1 shows a statistically significant positive relationship between changes in housing prices and vote for the incumbent. In other words, consistent with the local economic conditions hypothesis, a larger fraction of the electorate casts their vote for governing parties in precincts where housing prices are increasing. Notably, finding that the local unemployment rate is significantly negatively related to incumbent support in Model 4 is further support for the local economic conditions hypothesis. This also highlights that different aspects of the local

Table 1: Estimated effects of housing prices on electoral support for governing parties.

	(1)	(2)	(3)	(4)
Δ housing price	0.104**	0.048**	0.053**	0.030**
	(0.008)	(0.007)	(0.008)	(0.007)
Unemployment rate				-1.904**
				(0.221)
Median income (1000 DKK)				-0.887**
				(0.064)
Year FE		✓	✓	✓
Precinct FE			✓	✓
Observations	4199	4199	4199	4179
RMSE	8.405	6.749	5.715	5.325

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

economy matter independently of each other, rather than reflecting the same underlying economic conditions.

Unsurprisingly, the effect of housing prices is larger in the less restrictive models. The effect size drops from 0.1 to 0.05 when introducing the time and precinct fixed effects, and drops additionally to 0.03 when introducing the economic controls. This highlights the strength of using a difference-in-difference approach and controlling for detailed information about other aspects of the local economy, as this evidently picks up important sources of confounding. In substantive terms, a coefficient of 0.03 implies that when the price of housing sold in a precinct's zip-code area doubles from one year to the next, electoral support for governing parties in this precinct increases by roughly 3 percentage points. This corresponds to one third of a standard deviation in the dependent variable. This is a modest but non-negligible effect. In other words, local housing prices do matter on average, however, if we look across all voters it does not seem to be an extremely powerful force. The effect is smaller, in absolute terms, than the effect of local unemployment. (This is also the case if we standardize the variables.) While it is hard to make straightforward comparisons to existing work because results have been so inconsistent, this effect is also on the small side compared to the estimates in Healy and Lenz (2017). Here they find that moving from the 1st to the 99th percentile in local economic conditions (i.e., wage growth and loan delinquencies) increase incumbent support between 7 and 9 percentage points.

Despite having employed a rigorous control strategy, a potential threat to our results is that

that the effect of local housing markets on support for incumbents is a reflection of some secular trend predating changes in housing prices – i.e., that governing parties were already becoming more/less popular in places where housing prices eventually increase/decrease. To address this concern about violation of the parallel trends assumption, we estimate the same type of models as in Table 1 using support for the governing party at the *previous election* as the dependent variable (i.e. a lagged dependent variable). If we observe a significant relationship between prior support for incumbents and subsequent rises in housing prices, this would indicate that the parallel trends assumption is violated. We plot the estimated effects of housing prices on the lagged dependent variable as well as on the actual dependent variable in Figure 2. The figure shows a significant effect of housing prices on the lagged dependent variable in the less restrictive models. However, in the final and most restrictive model, the estimated effect of housing prices on lagged incumbent support is 0.005 – less than a sixth of the effect estimate for subsequent support – and statistically insignificant. This indicates that trends in incumbent support are similar across precincts where prices are about to increase and precincts where prices are about to decrease. That is, pre-'treatment' trends in treated and non-treated units are likely parallel.

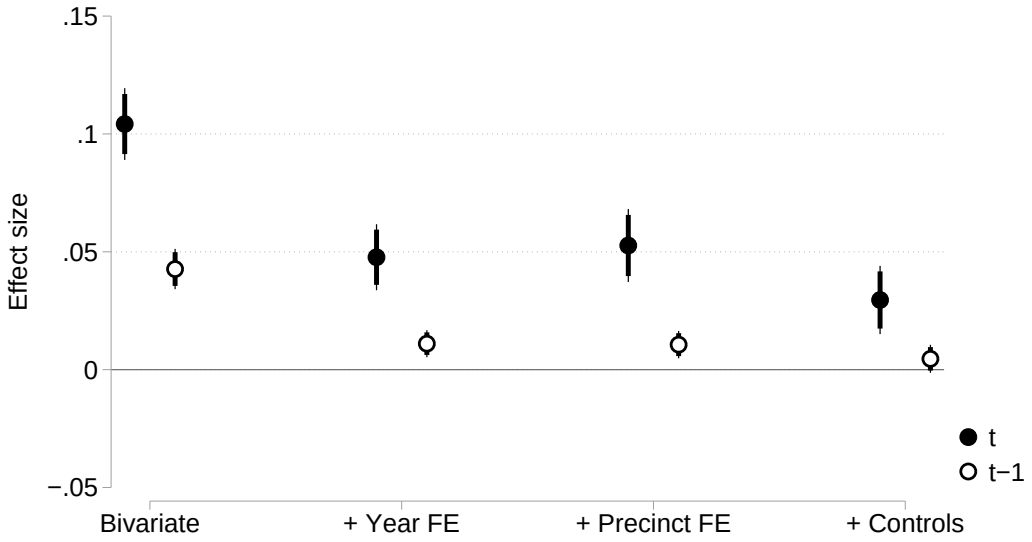

Figure 2: Effects of Housing Prices on support for governing party at the present election (t) and the last election (t-1) with 90 and 95 pct. confidence intervals

We proceed to evaluate the contextual priming hypothesis, testing whether the relationship

between changes in local housing prices and incumbent support is moderated by local housing market activity. Table 2 reports a set of models similar to those presented in Table 1, but with changes in housing prices interacted with the (logged) number of trades in the preceding quarter as an indicator of housing market activity. As noted previously, we expect greater local housing market activity to manifest itself locally in various visible ways (e.g. neighbors selling their houses more rapidly), which in turn makes housing prices more salient and thus consequential for voters' support for incumbents. Consistent with the contextual priming hypothesis, we observe a statistically significant positive interaction between local housing prices and housing market activity in all models. That is, local housing prices are more strongly related to incumbent support in areas with higher levels of housing market activity.

Table 2: Estimated effects of housing price across number of trades.

	(1)	(2)	(3)	(4)
Δ housing price	-0.038	-0.102**	-0.077**	-0.079**
	(0.027)	(0.021)	(0.023)	(0.023)
Log(trades)	-2.030**	-1.494**	3.327**	1.995**
	(0.184)	(0.184)	(0.530)	(0.484)
Δ housing price × Log(trades)	0.049**	0.050**	0.038**	0.033**
	(0.008)	(0.007)	(0.007)	(0.007)
Unemployment rate				-1.649**
				(0.217)
Median income (1000 DKK)				-0.855**
				(0.063)
Precinct FE			✓	✓
Year FE		✓	✓	✓
Observations	4199	4199	4199	4179
RMSE	8.496	6.733	5.636	5.288

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

Since interaction models can be difficult to interpret based on reported coefficients alone, we visualize the result in Figure 3. For each model specification, the figure shows the predicted effect of local housing prices on incumbent support for zip code area economic activity corresponding to the 25th and 75th percentile. Focusing on the most restrictive model, the most notable result is that there is essentially no effect of local housing prices at the bottom 25th percentile of local housing market activity, while the effect is about twice the size of the average effect (i.e., 0.06)

at the 75th percentile. The latter corresponds to electoral support for governing parties increasing by roughly 6 percentage points in a precinct, where house prices in the zip-code area doubles from one year to the next. Interestingly, the effect at the 75th percentile is roughly in line with the findings in Healy and Lenz (2017) described above. We thus find clear support for the contextual priming hypothesis. In localities where the local housing market is more active, and thus ostensibly more salient to voters, housing prices feature more prominently in the evaluation of incumbents.

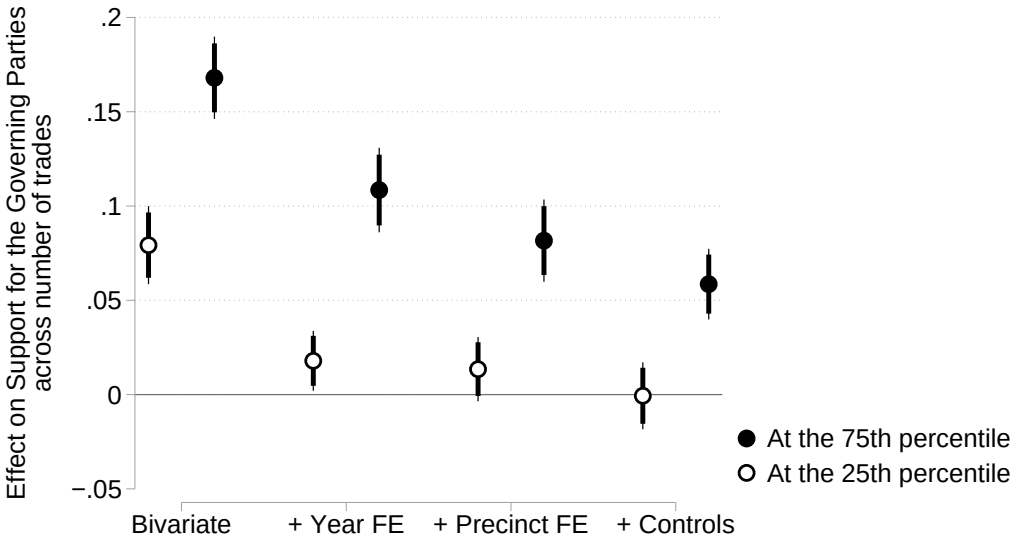

Figure 3: Marginal effects of housing prices across levels of economic activity with 90 and 95 pct. confidence intervals. Marginal effects derived based on table 2 at the 25th and 75th percentile.

One potential concern in relation to this analysis is that housing prices and market activity measure the same underlying phenomenon, thereby complicating the interpretation of the interaction term. However, as we show in Appendix G, the two are in fact very weakly correlated ($r = 0.1$), implying that they essentially vary independently of one another. Another concern is that number of trades is a proxy for population size. To test this, we estimate a model including an interaction between housing prices and logged number of eligible voters in the precinct as well as the interaction between housing prices and number of trades. In this model, we find no significant interaction between housing prices and population size, whereas the interaction between housing prices and number of trades remains statistically significant and of the same approximate size. This, suggests that our results are driven by variation in market activity, which

is in itself independent of market size. These results are reported in Appendix H.

We made no specific prediction about whether contextual priming of local housing markets would lessen the effect of other economic conditions. However, if one accepts that voter attention is limited, one might think that it would do just that (this is a common assertion in the broader priming literature, see for instance Krosnick and Kinder, 1990). In Appendix H we tentatively examine whether this is the case by interacting our measure of local housing market activity with the unemployment rate. We find that unemployment does seem to matter a bit less when the local housing market is more active, but the pattern is not very strong.

5.1 Auxiliary Analyses and Robustness Checks

Table 3 presents a series of robustness checks of the results presented above. For these analyses, we only report the estimated average effect of housing prices and the interaction between (logged) number of trades and housing prices. The full models are reported in Appendix E.

Table 3: Robustness of the Average Effect and the Interaction Term

	Average Effect	Interaction Term
Two year change	0.02*	0.02*
	(0.01)	(0.00)
First Differenced Controls	0.06*	0.05*
	(0.01)	(0.01)
First Differenced DV	0.03*	0.01*
	(0.00)	(0.00)
Lagged DV	0.06*	0.09*
	(0.01)	(0.01)
Positive changes	0.03*	0.08*
	(0.01)	(0.01)
Negative changes	-0.03*	0.05*
	(0.02)	(0.02)
Year FE	✓	✓
Precinct FE	✓	✓
Economic Controls	✓	✓

See Appendix E for the full models
*p<0.05

We begin by looking at whether the chosen time period, i.e. year-over-year changes, affects the results. To do so, we re-estimate the most restrictive model from tables 1–2 using the change in housing prices over two years rather than just one. The results, reported in the first row in Table 3, are similar using this measure of more long run changes in housing prices, although the estimated effects tend to be smaller than reported above. This squares with previous work

showing that voters are, by and large, myopic when it comes to relating economic indicators to incumbent support (Healy and Lenz, 2014; Healy and Malhotra, 2009).

As mentioned above, we use changes in housing prices rather than levels. However, in our models we control for the level of income and the level of unemployment. As a consequence, we may fail to capture something important about how the economic status of the precinct is changing, which could in turn confound the effect of changes in housing prices. To examine whether this is the case, we re-estimate the different models using first-differenced (FD) controls. As can be seen in the second row of Table 3, this does not alter the main conclusion. In fact, the estimated effects of local housing prices doubles in size in this specification. We also estimate a set of complete change models using an FD dependent variable. The estimates from these models are reported in the third row of Table 3. While somewhat smaller, the effect of housing prices remains statistically significant in the differenced model.

To test for nonlinearities in the observed relationship, we split the housing price variable in two, creating one variable measuring the size of positive changes with negative changes set to zero, and another one measuring the size of negative changes with positive changes set to zero. This makes it possible to study the effect of increases and decreases in housing prices separately. We report the result of these analyses in the last two rows of Table 3. Interestingly, we find no evidence of negativity bias: the effect of negative changes and positive changes are both roughly 0.03 in absolute numbers. This symmetry is important because it shows that voters not only reward governing politicians when housing prices are on the rise, but also punish them when they fall. Moreover, the effect of positive and negative changes, respectively, are both conditioned by the number of trades. This contrasts with earlier studies finding that voters respond more strongly to negative economic changes (e.g. Bloom and Price, 1975; Headrick and Lanoue, 1991; Soroka, 2014).

Another concern relates to whether the effect is only present for right-wing incumbents. As housing prices in an area increase, the wealth of the voters living in this area also increases on average, which might lead to increased support for right-wing politicians Ansell (2014). This problem is especially acute in our data, as the government parties in power from 2001 to 2011 were right-wing. To address this concern, we estimate models predicting support for

Figure 4: The marginal effect of housing prices on electoral support for either the left-wing or the right-wing government coalition conditional on which coalition is in office. The vertical lines represent 90 and 95 pct. confidence intervals of the marginal effects. See Appendix D of the supplementary materials for the model underlying this figure.

the left-wing government coalition (Social Democrats and the Social-Liberal Party) and the right-wing government coalition (Liberal Party and Conservative Party) using housing prices, precinct and year fixed effects, as well as the local economic controls. We then interact the housing prices measure with a binary indicator for whether the parties are in office.[8] Figure 4 presents the key estimates from this model. As shown, increasing housing prices have a positive estimated effect on electoral support for right-wing as well as left-wing incumbent government parties. Our result can thus not be explained by increased housing wealth causing a conservative shift in the electorate. The relationship between changes in local housing prices and support for incumbent governments is independent of the partisan composition of the government.

Finally, one might suspect that the interaction term is non-linear. Using the binning estimator presented in Hainmueller et al. (2016), we find some evidence of this, as the effect of housing prices only seems to materialize in the upper tercile of the moderator. We present this analysis in Appendix G. However, even when relaxing the linearity constraint on the moderator, the

[8]We estimated this model on a dataset which included all precinct-years twice: once with the left-wing coalition support and once with right-wing coalition support. The housing price effect is conditioned on a two-way interaction between government coalition (i.e., whether we are predicting support for left-wing or right-wing government coalition) and whether this coalition is in office. See Appendix D in the supplementary materials for the full model.

observed relationship is consistent with the contextual priming hypothesisas we did not specify that the relationship between local housing market activity and the effect of housing prices was monotonically increasing.

In sum, we find clear evidence for both the local economic conditions hypothesisand the contextual priming hypothesisin the precinct-level data. We now proceed to testing the hypotheses using the individual-level data, and thus get a stronger hold of the purported individual-level mechanisms at play.

6 Individual-level Evidence

In Table 4 we report results from a set of linear probability models, estimating the probability of voting for a party in government as a function of changes in local housing prices. We choose to estimate linear probability models in the interest of simplicity, but we show in Appendix F that the results are virtually identical when estimated using conditional logistic regression models. We include individual (respondent) fixed effects, and fixed effects for which of the three initial survey rounds the respondent initially participated in (ESS rounds 1, 2 or 4). All models include controls for the average income and unemployment rate in the respondent's context, as well as indicators of the respondent's own income and whether someone in the household is unemployed. Like in the precinct-level analyses, we include these controls to isolate the effect of local housing markets from trends in overall economic circumstances. However, unlike for the precinct-level data, we can now control for trends in both the respondent's personal economy and for the economy of her larger social context. In effect, we utilize a similar identification strategy as for the precinct-level data: a difference-in-difference model that controls for trends in economic conditions. All models include robust standard errors clustered at the individual-level.

All models include the same set of variables, but differ in how the contextual variables are defined. In column one we present a model where housing price change is calculated based on the 20 sales closest to each respondent, and where the other contextual variables – average income and unemployment rate – are measured within a 500 meter radius of each respondent. In column two we use the 40 closest sales, but leave the remaining variables measured as in column

one. In columns three and four we define all contextual variables (house prices, unemployment rate and average income) as based on 1000 and 1500 meter radii around the respondent. Finally, in column five, we define all contextual variables at the level of zip code areas.

Table 4: Linear Regression of Voting for Governing party

	20 Closest	40 Closest	1000 metres	1500 metres	Zip code
Δ housing price	0.017	0.043	0.064	0.107*	0.022
	(0.035)	(0.041)	(0.045)	(0.044)	(0.070)
Unemployment rate (context)	0.297	0.288	-0.466	0.764	0.257
	(0.375)	(0.373)	(0.633)	(0.577)	(0.595)
Average income (context)	-0.002	-0.002	-0.005	-0.005	-0.013+
	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)
Personal income	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Unnemployed (household)	-0.031	-0.031	-0.066	-0.050	-0.030
	(0.035)	(0.035)	(0.043)	(0.040)	(0.036)
Round FE	Yes	Yes	Yes	Yes	Yes
Voter FE	Yes	Yes	Yes	Yes	Yes
Observations	3479	3479	2790	2992	3394

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$

The estimated effect of changes in local housing prices is positive across the different models, although the size of the coefficient varies somewhat, ranging from 0.04 to 0.11. The effect is only statistically significantly different from zero in the specification measuring sales within 1500 meters of the respondent.

While we only observe a statistically significant relationship between changes in housing prices and voting for the incumbent in one out of five models, it is important to highlight that the estimated relationships are consistent with what we found in the precinct-level data. To illustrate this, Figure 5 plots the estimated effect of housing prices estimated for the individual-level data in Table 4 and for the precinct-level data in Table 1.

As is clear from the figure, the effect sizes are similar across the two levels of analysis. If anything, the estimated effects appear slightly larger for the individual-level data. This tentatively suggests that the estimated coefficients do not represent a true null effect, but rather an imprecisely estimated one. One plausible reason for this imprecision is measurement error in the dependent variable as voter recall data are known to be erroneously reported (e.g., Bernstein

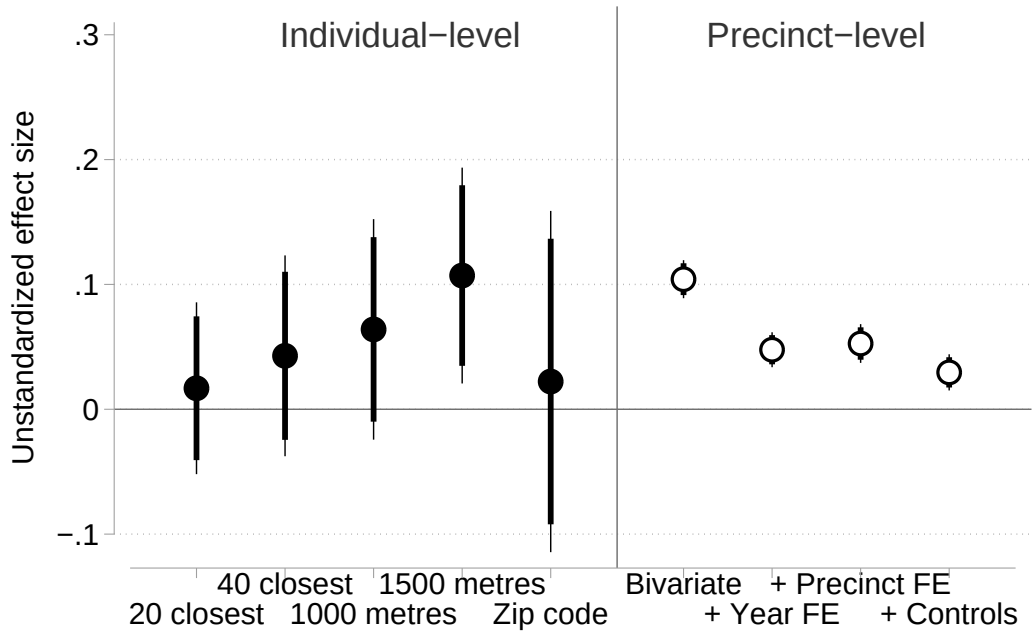

Figure 5: Effects of Housing Prices across levels of analysis with 90 and 95 pct. confidence intervals

et al., 2001). In sum, we find mixed support for the local economic conditions hypothesisin the individual-level data, as the effect of housing prices is statistically insignificant in most specifications, but comparable in sign and magnitude to the precinct-level results.

We now test the contextual priming hypothesisusing the individual level data. Following our contextual priming argument, we expect those who recently interacted with their local housing market to have considerations regarding local housing more readily available when evaluating the incumbent government. One such group is those who have just moved or who are on the cusp of moving, as they are currently, or have recently, been exposed to information regarding local housing markets as a result of selling their present home and looking for a new one.

Table 5 presents a set of re-estimated individual-level models from table 4, where the housing price change variable is interacted with an indicator for whether or not the respondent is a mover (i.e., those who moved six months before/after being surveyed). The estimated interaction effect is statistically significant and positive in all specifications ($p < .05$), thus showing that the group of movers are in fact significantly more responsive to changes in local housing prices.

Figure 6 presents marginal effects for movers and non-movers derived from the models in Table 5. As shown, housing prices have large significant ($p < .05$) estimated effects for movers

and a negligible effect — often essentially no effect — for non-movers. For movers, the effect of changes in housing prices is estimated to be between 0.2 and 0.4 depending on the model. In substantive terms, this means that when housing prices double, the probability of voting for the incumbent increases by 20 to 40 percentage points for voters who are currently involved with local housing market. This is quite a large effect — much larger than even the largest effects identified in the previous literature on local economic voting (Healy and Lenz, 2017) — which suggests that when an individual is attuned to a part of their local economy, this part of the economy plays an essential role in their decision to support the national government. Because of the large sampling variability, we cannot say anything about whether the effect is larger at any particular level of aggregation. However, given potential concerns about the MAUP, it is reassuring that we find the same overall pattern across these different levels of aggregation.

Overall, these results strongly support the contextual priming hypothesis by showing that changes in local housing prices play a larger role in incumbent evaluations among individuals who been more exposed to their local housing market though their interaction with it.

Table 5: Linear Regression of Voting for Governing party

	20 Closest	40 Closest	1000 metres	1500 metres	Zip code
Δ housing price	-0.005	0.021	0.040	0.086^{+}	-0.007
	(0.038)	(0.044)	(0.046)	(0.046)	(0.073)
Mover	0.010	0.012	0.004	0.025	0.032
	(0.030)	(0.031)	(0.036)	(0.032)	(0.031)
Δ housing price × Mover	0.180*	0.233*	0.266*	0.304*	0.390*
	(0.084)	(0.108)	(0.121)	(0.111)	(0.148)
Unemployment rate (context)	0.260	0.259	-0.491	0.740	0.180
	(0.374)	(0.375)	(0.634)	(0.586)	(0.601)
Average income (context)	-0.002	-0.002	-0.005	-0.004	-0.013^{+}
	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)
Personal income	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Unnemployed (household)	-0.034	-0.034	-0.070	-0.054	-0.031
	(0.035)	(0.035)	(0.043)	(0.040)	(0.036)
Round FE	Yes	Yes	Yes	Yes	Yes
Voter FE	Yes	Yes	Yes	Yes	Yes
Observations	3479	3479	2790	2992	3394

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$

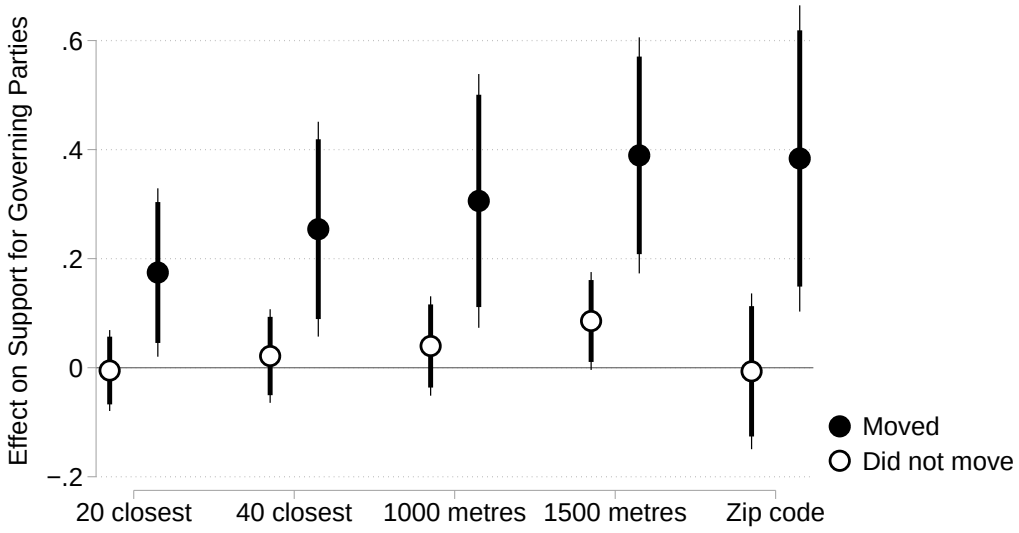

Figure 6: Effects of Changes in Housing Prices for those who had just or were going to move and those who did not with 90 and 95 pct. confidence intervals.

6.1 Auxiliary Analyses and Robustness Checks

Although the individual-level data are more constrained in terms of number of observations and number of time periods, we also conducted a number of supplementary analyses of these (see Appendix F for detailed results of these additional analyses). For one, we tried to re-estimate the models using a conditional logit model (i.e. logit with unit fixed effects). This takes into account that the dependent variable is dichotomous, but also entails that all observations that do not change voting behavior between the two periods are omitted from the sample. These logit models reveal the same basic pattern as the linear models reported above.

We also examined whether the effect of local housing prices varies by home ownership status. In most models we find positive, yet statistically insignificant interactions. While this may be seen as a weak indication that local housing markets are somewhat more salient to those more financially involved with them, the more proper conclusion to draw is arguably that cues about the state of the local economy diffuse from the local context independently of strong personal involvement.

Finally, following the party-specific analysis for the precinct-level data, which explored whether voters' responses to local economic conditions had an ideological bent, we look at whether changes in local housing prices affect voters self-placement on a ten point left to right

ideological scale. The estimated effects are generally small, statistically insignificant, and negative, suggesting that if anything, voters become more left-wing as housing prices increase. This again runs counter to the notion that our findings can be explained by voters responding to increases in local housing prices by becoming more conservative.

Taken together, consistent with our hypotheses, the individual-level analyses suggest that voters' decision to support the sitting government is partly based on changes in local housing prices (the local economic conditions hypothesis), and even more so for those individuals particularly attuned to the housing market (the contextual priming hypothesis).

7 Discussion and Conclusion

Following the lead of previous efforts, this paper has examined the phenomenon of local economic voting—the notion that voters in part base their electoral support for national governments on the economic situation in their local community. We have proposed and empirically tested two hypotheses. First, the local economic conditions hypothesis stating—in line with previous studies—that local economic conditions affect support for incumbent governments. Second, the contextual priming hypothesis, which suggests that local economic conditions are more salient to voters, who are more exposed to them, and therefore more consequential for their support for incumbents.

Using exceptionally precise and flexible registry data on local housing markets from Denmark merged with precinct-level panel data on election outcomes and individual-level panel survey data on vote choice in the period around the housing bubble preceding the Great Recession, we find support for both hypotheses.

More specifically, wewe find strong support for the economic conditions hypothesis in the precinct-level data and also, more tentatively, in the individual-level data. In the precinct-level data, a 50 percent year-on-year increase in local housing prices translates into a 1 to 2 percentage point increase in electoral support for the governing parties. Findings from both the precinct-level data and the individual-level data support the contextual priming hypothesis. In precincts with higher economic activity, local house prices are more consequential for voters' support for

the incumbent. Similarly, among individuals who are exposed to the housing market through the process of selling a home, local house prices figure more prominently in their evaluation of the incumbent government. In short, local economic voting based on the fate of local housing markets does occur, and more prominently so when this aspect of the local economy is more salient to voters.

While we believe that our data are very well suited for testing the proposed hypotheses and constitute a clear improvement over previous related studies in several regards, a number of caveats are warranted. First, our data are observational and in the absence of fully or quasi-experimental variation in housing prices, we cannot be sure that the estimated effects are not confounded by unobserved heterogeneity. Building on this study, one promising avenue for future research is therefore to identify settings with plausibly exogenous variation in local housing prices (Jerzak and Libgober, 2016). Second, while our overall result regarding the existence of local economic voting confirms findings from other countries (in more aggregate local contexts), we cannot know whetherthe extent to which our novel finding regarding contextual priming travels to other contexts. A priori, we have no reasons to expect this finding to be idiosyncratic to Denmark, but this remains an empirical question.

Our results carry several implications for the literature on economic voting in particular as well as research on political behavior in general. Most obviously, with regard to the former, our study adds to the evidence for local economic voting. Consistent with some existing studies, we find modest, but non-negligible effects Healy and Malhotra (2013) of local economic context on support for the incumbent government. However, we do so using data from highly localized contexts rather than more aggregate contextual units, where local experiences may be confounded by other factors. This speaks to the fruitfulness of further exploration of how cues of economic performance experienced very locally may influence incumbent support and other evaluations and beliefs related to national politics (e.g., Burnett and Kogan, 2017).

We have focused on local housing markets, but our theoretical arguments concern the importance of local economic context more generally. As noted, we also find a significant (negative) effect of local unemployment on support for incumbents in the precinct-level data, which shows that the local economy is a multifaceted phenomenon. This suggests that examining

which aspects of the local economy shape electoral support for the sitting government at a given point in time—and the potential interplay between them—is a fruitful next step in the analysis of local economic voting. This may also provide further leverage for refining our contextual priming hypothesis. One implication of classical theories of priming is that once one set of concerns become salient, other concerns fade (Krosnick and Kinder, 1990). Similarly, we may expect that when one aspect of the local economic context takes center stage due to voters' involvement with it, other aspects of the local economy diminish in importance. The precinct-level data reveal a pattern consistent with this conjecture. Whereas local housing prices become much more important for support for the incumbent government in contexts with highly active housing markets, the effect of local unemployment drops somewhat (although not significantly) in these contexts. We believe this is an interesting conjecture that could be tested further in future work to advance our understanding of when certain aspects of the local economy matter for local economic voting.

In relation to the priming literature within political psychology, our results indicate that priming does not only happen as the result of elite messaging, but may also stem from personal involvement with a specific aspect of society, in our case local housing markets. Exploring other 'horizontal' sources of priming of predispositions or personal experiences would provide an important complement to the heavy focus on elite-driven ('top down') media influences presently characterizing the priming literature.

What does voters' use of local housing markets as a shorthand for evaluating national incumbents tell us about the nature of voters' motives and democratic accountability? As noted, in the individual-level data we find that local economic voting occurs largely independently of home ownership status. This in turn suggests that local economic voting primarily reflects sociotropic—whether related to the local community or the nation as a whole—rather than personal financial (egotropic) concerns. However, our findings are ambiguous as to whether local economic voting is an effective heuristic for holding national politicians accountable. On the one hand, using local economic conditions to inform voting can be seen as an economic way for voters to reward or punish the national government for progress or hardship they experience in their local environment. Yet, on the other hand, such local developments may be weak signals

of overall government performance.

Relatedly, our findings suggest that local economic voting is adaptive rather than static. Voters do not seem transfixed by certain parts of their local economy, such as unemployment or housing prices. Instead, they focus on the parts of the economy, which they are currently involved with. It is unclear whether this is good or bad news in the context of electoral accountability. On one hand, this undoubtedly means that voters will often get a very selective and unreliable impression of local economic conditions. As such, two voters who live in the same local context might arrive at drastically different impression of their local economy depending on whether they are engaged in a job search or a search for a new house. On the other hand, it is clearly positive that voters are able to refocus their attention towards new parts of the economy, such as the housing market, as they become relevant to their own lives. If they did not, reelection-oriented incumbents would not have any incentive to dynamically direct their attention to new parts of the economy.

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Appendix: For Online Publication

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A Linking Polling Places to Zip Codes

Zip codes are a substantively interesting level of aggregation when it comes to the price of housing, as it is the level at which housing prices are most often reported in Denmark (cf. the fact they are published by The Danish Mortgage Banks' Federation). However, merging zip code-level data on housing prices to the precinct-level data on electoral outcomes is non-trivial. Ideally we would extract the zip code of the address of each polling place and link the polling place to housing prices in that zip code. Unfortunately, full addresses are not available for all polling places. Instead, we use a three-stage approach to linking polling places to zip codes. First, we extract the street address and higher-level voting district of each polling place (the full resulting string is of the format 'Streetname streetnumber, City, Denmark'). Second, we pass this string to the Google Maps API, which geocodes the string and returns latitude-longitude coordinates.[9] Third and last, we pass these coordinates to the Danish Addresses Web API (DAWA), a public service provided by the Danish Geodata Agency.[10] The DAWA returns the zip code for each address, allowing us to link polling places to zip codes.

[9] Available at `developers.google.com/maps/documentation/geocoding/intro`.
[10] Available at `dawa.aws.dk`.

B Estimates of Local Housing Prices

We use all housing sales registered in the national register EJSA except for those that fall into one or more of the following categories:

1. Sales of part of a house or apartment (10 pct. of all sales). We exclude these as these are typically quasi-commercial, as part of a house or apartment is sold to a business. Many of these sales are between farmers who sell and buy land from one another.

2. Sales of commercial real estate (9 pct). These are excluded because we are interested in residential real-estate.

3. Sales of apartments or houses valued at more than DKK 10 million (0.2 pct. of all sales). These are considered outliers, which tell us little about the state of the local housing market experienced by the typical Danish voter.

4. Sales with what Statistics Denmark calls an irregular price (i.e. if the sales price is more than three times the public valuation or less than forty percent of the valuation, 6 pct. of all sales). This will usually mean that sellers and buyers are not part of the regular housing market (e.g., family members or friends selling or buying).

For more details on the EJSA register see `http://www.dst.dk/`.

C Descriptive Statistics

Descriptive statistics for the precinct-level data can be found in table C1. Descriptive statistics for the individual-level data can be found in table C2. We do not include maximum and minimum values for the individual-level variables, because this would go against the data protection guidelines provided by Statstics Denmark.

Figure C7 graphs the distribution of housing price changes in the precinct-level data.

Table C1: Descriptive statistics, Precinct-level data

	Mean	SD	Min	Max	n
Log(Voters)	2.03	0.12	1.41	2.31	5476
Support for Social Democratic Party	0.25	0.06	0.04	0.52	5476
Support for Social Liberal Party	0.06	0.04	0.00	0.28	5476
Support for Conservative Party	0.07	0.04	0.00	0.35	5476
Support for Liberal Party	0.28	0.09	0.04	0.59	5476
Δ housing price	4.36	14.37	-41.94	127.12	4199
Δ housing price (2 years)	11.57	17.88	-55.36	167.12	4183
Support for Governing Parties (pct.)	35.92	9.58	6.01	75.35	5476
Δ housing price (positive)	7.89	10.47	0.00	127.12	4199
Δ housing price (negative)	3.53	6.41	0.00	41.94	4199
Trades	46.44	51.22	0.00	459.00	4980
Log(trades)	3.25	1.21	0.00	6.13	4928
Median income (1000 DKK)	149.03	18.68	96.36	267.86	5000
Unemployment rate	11.99	2.85	4.54	30.26	5000
Median income (change)	3.29	3.02	-94.40	21.58	5000
Unemployment rate (change)	-0.46	0.74	-11.13	5.88	5000
Change in Support for Governing Parties (pct.)	-3.87	2.91	-17.97	9.97	4107
Estimated vote returns	0.15	0.35	0.00	1.00	5476
Change in Log(Trades)	-0.02	0.57	-2.77	2.43	3664

Table C2: Descriptive Statistics, Individual-level data

Variable	**Mean**	**Std. Dev.**	**N**
Left/Right Scale	0.532	0.217	3350
Unnemployed (household)	0.062	0.241	3483
Unemployment rate 1000 meters	0.067	0.035	3481
Unemployment rate 1500 meters	0.068	0.031	3481
Home Owner	0.736	0.441	3451
Average income zip code	17.928	3.532	3485
Unemployment rate zip code	0.069	0.028	3485
Δ housing price 1000 meters	-0.05	0.236	2792
Average income 1000 meters	17.915	3.905	3481
Δ housing price 1500 meters	-0.051	0.227	2994
Average income 1500 meters	17.892	3.624	3481
Personal income	20.859	22.277	3486
Δ housing price zip code	-0.066	0.138	3396
Δ housing price 20 closest	-0.046	0.218	3482
Δ housing price 40 closest	-0.05	0.182	3482
Government Voter	0.299	0.458	3486
Mover	0.077	0.267	3486

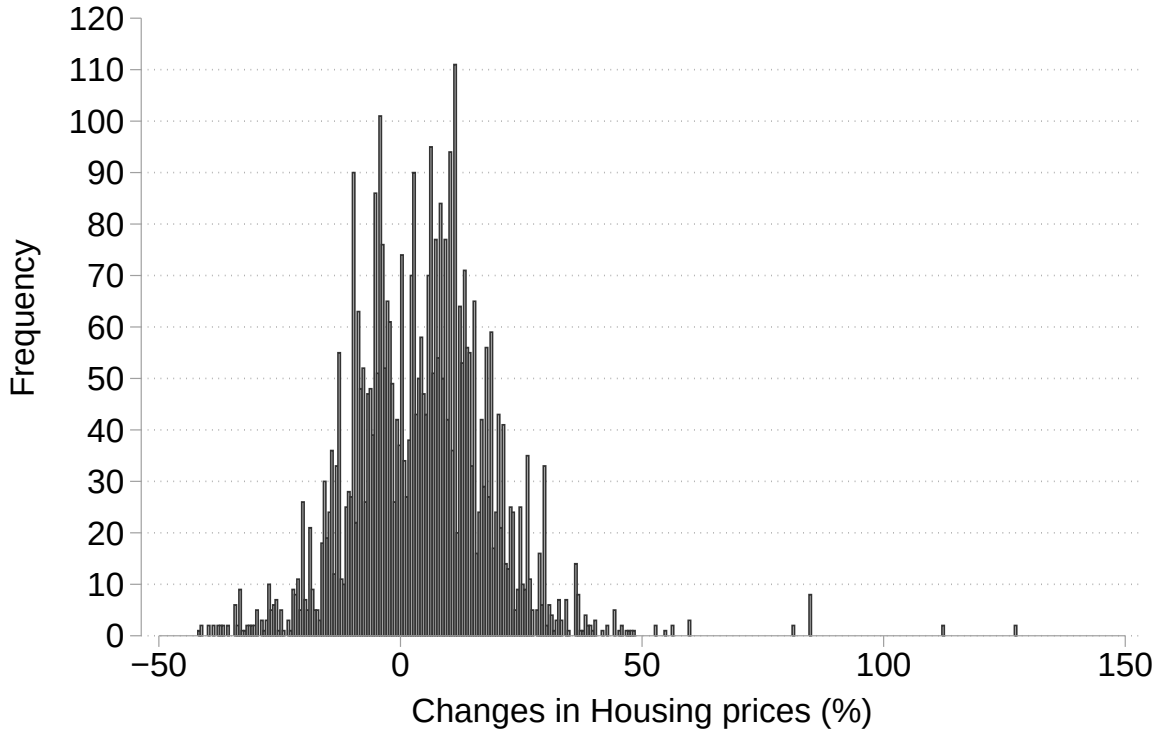

Figure C7: Distribution of the year-over-year changes in housing prices (precinct-level data).

D Party Specific Analysis in Precinct-level Data

Table D1 presents the estimates for the model underlying Figure 4.

Table D1: Party Specific Analysis.

	(1)
Δ housing price	0.083**
	(0.007)
Δ housing price $\times$ Left-wing Incumbent	-0.123**
	(0.016)
Δ housing price $\times$ Left-wing Support	-0.146**
	(0.010)
Left-wing Incumbent $\times$ Left-wing Support	10.651**
	(0.233)
Δ housing price $\times$ Left-wing Incumbent $\times$ Left-wing Support	0.284**
	(0.025)
Unemployment rate	0.104
	(0.080)
Median income (1000 DKK)	-0.002
	(0.021)
Precinct FE	✓
Year FE	✓
Observations	8358
RMSE	7.727

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

E Full Models from Robustness Checks of Precinct-level Evidence

Table E1 presents the models shown in Table 3 with covariates. The different models are described in detail in the main text. The most important take-away, however, is that across specifications and across different definitions of the housing price variable, we find that that the estimated main-effect of changes in housing prices and the estimated interaction effect between housing prices and logged number of trades are consistently positive and statistically significant.

Table E1: Robustness checks of the Precinct-level data.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Δ housing price	0.030**	-0.079**			0.058**	-0.105**	0.027**	0.010	0.060**	-0.207**		
	(0.007)	(0.023)			(0.008)	(0.024)	(0.005)	(0.016)	(0.008)	(0.029)		
Δ housing price (2 years)			0.020**	-0.042**								
			(0.007)	(0.015)								
Δ housing price (positive)											0.030**	-0.229**
											(0.011)	(0.040)
Δ housing price (negative)											-0.029	-0.168**
											(0.019)	(0.060)
Log(trades)		1.995**		2.002**		3.480**		0.671**		0.225**		1.268*
		(0.484)		(0.474)		(0.525)		(0.237)		(0.080)		(0.545)
Δ housing price × Log(trades)		0.033**				0.048**		0.005		0.089**		
		(0.007)				(0.008)		(0.005)		(0.010)		
Δ housing price (2 years) × Log(trades)				0.017**								
				(0.005)								
Δ housing price (positive) × Log(trades)												0.080**
												(0.013)
Δ housing price (negative) × Log(trades)												0.049*
												(0.019)
Median income (1000 DKK)	-0.887**	-0.855**	-0.935**	-0.909**			0.150**	0.170**	-0.034**	-0.025**	-0.887**	-0.869**
	(0.064)	(0.063)	(0.060)	(0.060)			(0.019)	(0.019)	(0.008)	(0.008)	(0.064)	(0.064)
Unemployment rate	-1.904**	-1.649**	-1.952**	-1.662**			0.098	0.221*	-0.220**	-0.202**	-1.904**	-1.726**
	(0.221)	(0.217)	(0.225)	(0.223)			(0.101)	(0.112)	(0.040)	(0.041)	(0.222)	(0.222)
Median income (change)					-0.430**	-0.558**						
					(0.075)	(0.079)						
Unemployment rate (change)					0.005	0.003						
					(0.215)	(0.216)						
L.Support for Governing Parties (pct.)									0.513**	0.515**		
									(0.008)	(0.008)		
Precinct FE	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	4179	4179	4163	4163	4179	4179	3091	3091	3091	3091	4179	4179
RMSE	5.325	5.288	5.246	5.218	5.690	5.592	2.124	2.119	6.252	6.153	5.326	5.278

Standard errors in parentheses
Models 7 and 8 have a first-differenced version of the dependent variable.
* $p < 0.05$, ** $p < 0.01$

F Full Models from Robustness Checks of Individual-level Evidence

Tables F1 and F2 re-estimates the linear regression models presented in table 4 and 5 using conditional logit models. While it is hard to compare effect sizes, the substantive findings (i.e., direction and significance of coefficients) from these models line up with those presented in the main analysis.

Table F3 present the results of the home-ownership by housing price interaction. The interaction is positive but statistically insignificant except for in the 20 closest houses specification where it is negative and insignificant. This suggest that home-owners do not respond in substantively different ways than renters perhaps reflecting that even renters are part of the housing market.

Table F4 examines the relationship between changes in housing prices and self-placement on an ideological left-right scale. The estimates are for the most part negative and statistically insignificant across all specifications. If anything, voters in our sample thus become more left-wing when local housing prices increase.

Table F1: Logistic Regression of Voting for Governing party

	20 Closest	40 Closest	1000 metres	1500 metres	Zip code
Δ housing price	0.331	0.657	0.846^{+}	1.217*	0.018
	(0.492)	(0.633)	(0.467)	(0.545)	(0.759)
Unemployment rate (context)	3.177	3.053	-4.854	12.371^{+}	4.999
	(5.122)	(5.120)	(6.602)	(7.419)	(8.810)
Average income (context)	-0.045	-0.046	-0.073	-0.078	-0.205*
	(0.048)	(0.048)	(0.061)	(0.073)	(0.096)
Personal income	-0.001	-0.001	0.000	-0.000	0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Unnemployed (household)	-0.203	-0.191	-0.524	-0.245	-0.244
	(0.476)	(0.477)	(0.614)	(0.584)	(0.488)
Round FE	Yes	Yes	Yes	Yes	Yes
Voter FE	Yes	Yes	Yes	Yes	Yes
Observations	622	622	458	496	608

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$

Table F2: Logistic Regression of Voting for Governing party

	20 Closest	40 Closest	1000 metres	1500 metres	Zip code
Δ housing price	0.039	0.465	0.479	0.915^{+}	-0.235
	(0.512)	(0.643)	(0.491)	(0.540)	(0.773)
Mover	0.079	0.037	-0.026	0.716	0.730
	(0.367)	(0.363)	(0.421)	(0.482)	(0.503)
Δ housing price × Mover	4.052*	5.303*	4.565*	7.713*	9.220*
	(1.884)	(2.421)	(2.063)	(2.910)	(3.780)
Unemployment rate (context)	1.870	3.174	-6.715	13.059^{+}	5.438
	(5.237)	(5.236)	(6.781)	(7.672)	(8.883)
Average income (context)	-0.040	-0.042	-0.073	-0.082	-0.191^{+}
	(0.048)	(0.048)	(0.063)	(0.076)	(0.098)
Personal income	-0.001	-0.001	0.000	-0.000	0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Unnemployed (household)	-0.226	-0.201	-0.526	-0.191	-0.199
	(0.478)	(0.480)	(0.624)	(0.598)	(0.494)
Round FE	Yes	Yes	Yes	Yes	Yes
Voter FE	Yes	Yes	Yes	Yes	Yes
Observations	622	622	458	496	608

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$

Table F3: Linear Regression of Voting for Governing party

	20 Closest	40 Closest	1000 metres	1500 metres	Zip code
Δ housing price	0.043	0.030	0.043	0.029	-0.101
	(0.047)	(0.056)	(0.068)	(0.081)	(0.096)
Home Owner	-0.014	-0.012	-0.025	-0.016	-0.012
	(0.033)	(0.033)	(0.041)	(0.038)	(0.035)
Δ housing price × Home Owner	-0.047	0.024	0.001	0.096	0.171
	(0.060)	(0.072)	(0.079)	(0.088)	(0.105)
Unemployment rate (context)	0.147	0.134	-0.786	0.500	0.296
	(0.393)	(0.391)	(0.651)	(0.596)	(0.627)
Average income (context)	-0.003	-0.003	-0.007	-0.006	-0.013^{+}
	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)
Personal income	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Unnemployed (household)	-0.024	-0.024	-0.060	-0.043	-0.022
	(0.036)	(0.036)	(0.044)	(0.042)	(0.037)
Round FE	Yes	Yes	Yes	Yes	Yes
Voter FE	Yes	Yes	Yes	Yes	Yes
Observations	3447	3447	2767	2965	3372

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$

Table F4: Linear Regression of Left-Right Self Placement (Ideology)

	20 Closest	40 Closest	1000 metres	1500 metres	Zip code
Δ housing price	-0.020	-0.016	0.018	-0.007	-0.002
	(0.022)	(0.021)	(0.024)	(0.019)	(0.031)
Unemployment rate (context)	-0.298	-0.311	-0.392	-0.271	-0.297
	(0.242)	(0.238)	(0.300)	(0.281)	(0.297)
Average income (context)	-0.001	-0.001	0.001	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Personal income	0.000	0.000	0.000*	0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unnemployed (household)	-0.021	-0.022	-0.039	-0.035	-0.021
	(0.020)	(0.020)	(0.025)	(0.023)	(0.021)
Round FE	Yes	Yes	Yes	Yes	Yes
Voter FE	Yes	Yes	Yes	Yes	Yes
Observations	3343	3343	2683	2878	3262

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$

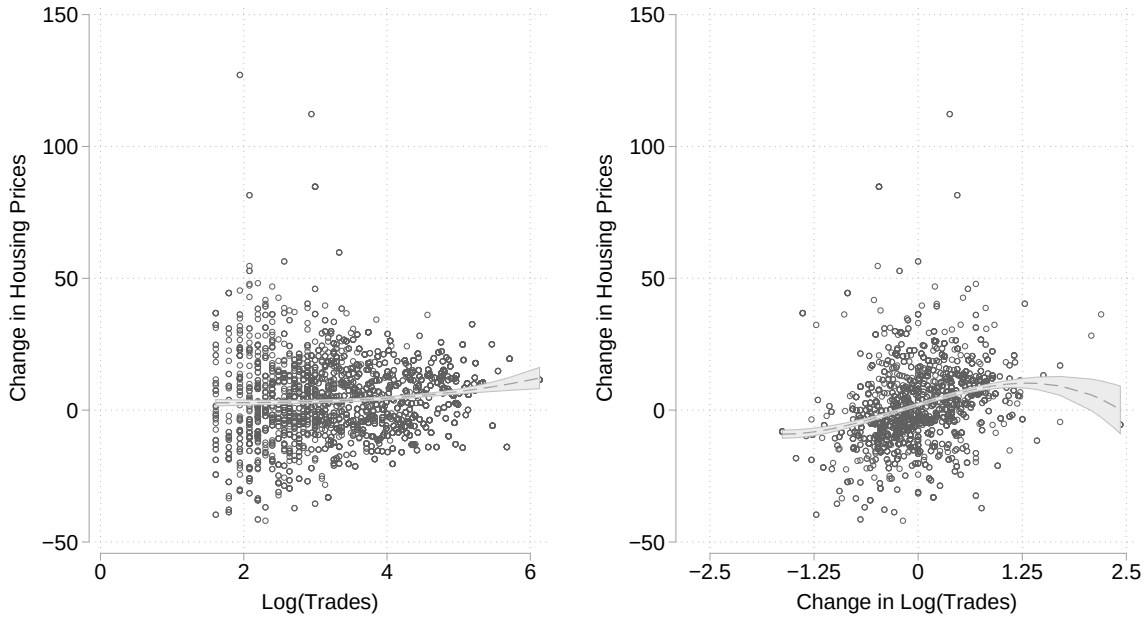

Figure G1: How Closely Related is Number of Trades and Changes in Housing Prices? Dots are observations, line is fractional polynomial fit and area represents 95 pct. confidence interval of this fit. For number of trades the overall Pearson correlation with prices is 0.1 ($n = 4,199$), for the change variable it is 0.3 ($n = 3,100$).

G The Interaction with Logged Number of Trades

Figure G1 examines how strongly related the logged number of trades in a zip code is with changes in housing prices. As can be seen from this plot, there is a weak correlation between logged number of trades and changes in housing prices, but a stronger correlation between changes in logged number of trades and changes in housing prices. However, even though the correlation is stronger in the latter case, it is evident that there is a lot of independent variation in number of trades for different levels of housing prices, and, as such, it seems reasonable to use number of trades as a moderator.

Figure G2 uses the binning estimator developed by Hainmueller et al. (2016) to test for linearity of the interaction. As can be seen from this model, the interaction does not seem to be perfectly linear. Rather, the marginal effect seems to low and stable at low and middling levels of number of trades and then increase at high levels (i.e., the upper tercile).

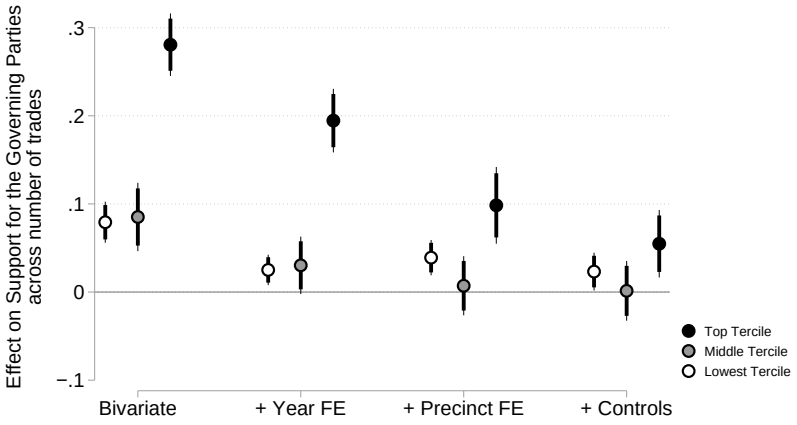

Figure G2: Interaction estimation using the binning estimator developed by Hainmueller, Mummolo and Xu (2016). The binning estimator is applied to all four specification presented in table 1.

H Some Additional Interactions in the Precinct-Level Data

In model 1 of Table H1 we examine whether there is an interaction effect between the logged number of eligible voters and housing prices. We find no evidence for such an interaction effect. Furthermore, even if we include this interaction the main results hold up in that the housing price by logged number of trades is statistically significant and of the same approximate size. This is reassuring, because it suggests that, as we hypothesized, it is local housing market activity rather than market size that moderates the impact of local housing prices.

In model 2 of Table H1 we examine whether there is an interaction effect between local housing market activity and the effect of unemployment. We do identify such an interaction effect. The effect is positive, which implies that the negative effect of local unemployment on incumbent support decreases as local housing market activity increases. In particular, we find that moving from the 25th to the 75th percentile of log(trades) decreases the impact of the unemployment rate with 0.3 corresponding to a little less than 20 pct. of the average effect estimated in Table 1.

Table H1: Some additional interactions

	(1)	(2)
Δ housing price	-0.178*	-0.067*
	(0.071)	(0.030)
Log(trades)	1.943**	-0.446
	(0.447)	(1.121)
Log(Voters)	2.333	
	(1.688)	
Δ housing price × Log(trades)	0.029**	0.028**
	(0.009)	(0.009)
Δ housing price × Log(Voters)	0.014	
	(0.010)	
Median income (1000 DKK)	-0.850**	-0.834**
	(0.044)	(0.044)
Unemployment rate	-1.623**	-2.349**
	(0.190)	(0.351)
Unemployment rate × Log(trades)		0.205*
		(0.086)
Precinct FE	✓	✓
Year FE	✓	✓
Observations	4179	4179
RMSE	6.217	6.214

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

I Precint-Level Results Without Estimated Precints

As mentioned in the paper, 15 pct. of the electoral precincts merge or split up in different ways across our period of study. For these precincts, we calculate vote returns using an interpolation method developed by Søren Risbjerg Thomsen. This method is described at `bit.ly/205OlPi`. To make sure that this procedure is not driving our results, Table I1 re-estimate our full model, including year and precinct fixed effects as well as economic controls, with and without the logged number og trades interaction, but without these estimated precincts. The results remain unchanged.

Table I1: Main results excluding amalgamated precincts

	(1)	(2)
Δ housing price	0.038**	-0.092**
	(0.010)	(0.035)
Median income (1000 DKK)	-0.969**	-0.916**
	(0.052)	(0.052)
Unemployment rate	-2.117**	-1.723**
	(0.223)	(0.229)
Log(trades)		2.299**
		(0.518)
Δ housing price $\times$ Log(trades)		0.040**
		(0.011)
Precinct FE	✓	✓
Year FE	✓	✓
Observations	3523	3523
RMSE	6.559	6.500

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

J Do the Individual-Level Results Differ Depending on Whether Respondents participated in ESS Round 2?

In the table J1 we examine whether the individual-level results differ based on whether respondents participated in ESS round 2, where the last election was not held right before the survey ran. To do this we include an interaction between whether the respondent initially participated in round 2 and changes in housing prices. The results are not substantially or significantly different for those interviewed in round 2.

Table J1: Linear Regression of Voting for Governing party

	20 Closest	40 Closest	1000 metres	1500 metres	Zip code
Δ housing price	-0.014	-0.024	0.030	-0.007	0.000
	(0.025)	(0.026)	(0.030)	(0.022)	(0.037)
Δ housing price × ESS round 2	-0.031	0.031	-0.057	-0.001	-0.015
	(0.043)	(0.043)	(0.045)	(0.042)	(0.068)
Unemployment rate (context)	-0.295	-0.306	-0.394	-0.271	-0.301
	(0.242)	(0.238)	(0.300)	(0.281)	(0.298)
Average income (context)	-0.001	-0.001	0.000	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Personal income	0.000	0.000	0.000*	0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unnemployed (household)	-0.021	-0.022	-0.038	-0.035	-0.021
	(0.020)	(0.020)	(0.025)	(0.023)	(0.021)
Round FE	Yes	Yes	Yes	Yes	Yes
Voter FE	Yes	Yes	Yes	Yes	Yes
Observations	3339	3339	2680	2875	3258

Standard errors in parentheses
$^{+}$ $p < 0.1$, * $p < 0.05$