

Does Residential Sorting Explain Geographic Polarization?

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Abstract

Political preferences in the US are highly correlated with population density, at national, state, and metropolitan-area scales. Using new data from voter registration records, we assess the extent to which this pattern can be explained by geographic mobility. We find that the revealed preferences of voters who move from one residence to another correlate with partisan affiliation, though voters appear to be sorting on non-political neighborhood attributes that covary with partisan preferences rather than explicitly seeking politically congruent neighbors. But, critically, we demonstrate through a simulation study that the estimated partisan bias in moving choices is far too small to sustain the current geographic polarization of preferences. We conclude that geography must have some influence on political preference, rather than the other way around, and provide evidence in support of this theory.

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Speaking at the 2004 Democratic National Convention, Barack Obama, then a candidate for the U.S. Senate, famously declared that “there’s not a liberal America and a conservative America; there’s the United States of America.” Obama then went on to decry political pundits who “like to slice and dice our country into red states and blue states” (Obama, 2004). The implication of Obama’s speech was that the perception of geographic sorting of the country into reliably Democratic and Republican areas was not based in fact, but was instead a false narrative imposed by the media.

Obama’s rhetoric of unity and homogeneity across party lines notwithstanding, there is substantial evidence that cultural and lifestyle preferences correlate strongly with political tastes. Political scientists have demonstrated that political ideology and party ID are predictive of choices in areas as varied as mate selection (Huber and Malhotra, 2012; Hitsch et al., 2010); media consumption (Prior, 2007; Levendusky, 2009); and housing decisions (Tam Cho et al., 2013; Mummolo and Nall, 2016). If such correlations between political and lifestyle preferences are strong enough, the implication is clear: we should expect to find a geographically divided electorate of exactly the kind that Obama’s speech sought to deny. Rodden’s (2010) excellent survey shows that this pattern is indeed evident in American voting behavior: both within and across metropolitan areas, and at surprisingly small geographic scales, locations with higher population density (and associated characteristics such as smaller housing units, proximity to cultural amenities, and access to mass transit) have higher proportions of Democratic voters than do locations with lower density (and associated larger homes, more greenery and greater privacy from neighbors).¹

Geographic polarization of this form is not merely a political curiosity. In fact, it has serious consequences for at least three normative standards of democratic performance. First, increasing the local homogeneity of citizens’ political preferences will tend to produce more homogeneous legislative districts, leading to more districts where election outcomes are in little doubt. As electoral competitiveness is an essential ingredient in voters’ ability to exert control over their representatives (Ferejohn, 1986; Gordon

¹Though Rodden’s analysis demonstrates the existence of this spatial pattern at much higher resolution than previous work, this is not an entirely new observation. Long before the advent of fine-grained GIS data and spatial analysis tools, Lipset and Rokkan (1967) argued that urbanism is correlated with secularism and ideological liberalism.

et al., 2007), geographic polarization poses a potentially serious threat to elections' accountability function. Second, the specific pattern of one party's voters concentrating themselves in densely populated areas generates a bias in representation that reduces that party's seat share in a single-member-district legislature, relative to its prevalence in the overall electorate (Chen and Rodden, 2013). This bias makes the composition of Congress and state legislatures unrepresentative of voters' aggregate partisan preferences. Third, geographic polarization makes it less likely that citizens encounter others whose political views differ from their own in their daily lives. Hence, it is a potential cause of increasing affective polarization² in the US since the 1980s.

Given the substantive importance of the phenomenon, political scientists have posited several theoretical explanations. In one prevalent theory, lifestyle tastes are the exogenous factor driving the emergence of the observed geographic pattern of partisanship. Political tastes are simply brought along for the ride as conservatives pining for a three-car garage move to suburbs and liberals wanting to walk to work move to central cities. An alternative theory, originating in the sociological concept of homophily, posits that desire to live among politically like-minded neighbors is the generative force driving geographic sorting (Bishop, 2008; Lang and Pearson-Merkowitz, 2014). In this conception, partisans are actively "seeking politically compatible neighbors" when making choices about where to live (Gimpel and Hui, 2015), rather than simply happening to find themselves living among co-partisans who share their tastes for non-political housing characteristics.

Though they differ on the ultimate cause, both theories rely on a common element: the willingness and ability of individuals to "vote with their feet" and move away from areas that are a worse match to their tastes - political or lifestyle - and into areas that are a better match. If voters' residential mobility is highly constrained, then no matter how strong is the correlation between lifestyle and political tastes, or how strong is the desire to live near others with similar political preferences, a geographically polarized

²Feelings of hostility between opposing partisans driven by group-identity concerns rather than ideological differences (Iyengar et al., 2012; Iyengar and Westwood, 2015).

pattern cannot emerge. The degree to which voters' housing choices are constrained by external factors, then, is a crucial determinant of observed levels of geographic polarization. This critical element of the theory has been largely neglected in the political geography literature.³

In this paper, we ask *how much* of the observed geographic polarization in preferences can be explained by selection into politically congruent neighborhoods - "residential sorting." To that end, we first conduct a direct measurement of the influence of political preferences on voters' moving decisions, relative to nonpolitical factors. With precise estimates of this quantity in hand, we then conduct a simulation analysis to understand the influence of residential sorting on the over-time evolution of the geographic distribution of preferences, and therefore the functioning of elections as preference aggregation and accountability mechanisms.

Our evidence comes from two large-N datasets of registered voters drawn from public voter files: a random sample of voters who moved from one state to another, and the universe of registered voters who moved from one location to another within the state of Florida between 2008 and 2010. Unlike studies using survey data that focus on the degree to which partisans would *like to* sort in a hypothetical situation, we measure how much they *do* sort in reality: the combination of both internal desires and external constraints. We find that individuals are, in fact, able to sort into politically more like-minded locations, but that the magnitude of this sorting is small.

Registered Democrats moving within Florida, for instance, on average move to locations about 5 log points more dense than observably comparable registered Republicans, a differential which, though precisely measured and statistically different from zero at the 99% level, is less than 4% of one standard deviation of the change in log density of within-Florida moves in our sample. We also test the hypothesis

³An important exception is Nall (2015), who argues that the construction of the Interstate Highway System, by opening up new tracts of land for development that were previously too far away to allow commuting to central-city jobs, generated an abrupt expansion in the feasible set of housing options available to white-collar workers. This dramatic relaxation of constraints on sorting generated a measurable increase in partisan segregation along "an urban-to-suburban continuum." In related work, Mummolo and Nall (2016) argue that flexibility in neighborhood choice is constrained by universal desires like affordability, low crime rates, and quality of education.

that sorting results from the direct choice of politically congruent neighbors, rather than indirectly due to choice of politically-correlated neighborhood attributes. We find similarly small but nonzero partisan biases: registered Democrats moving within Florida on average move to locations with about 2 percentage points lower 2008 Republican presidential vote shares than observably comparable registered Republicans.⁴

We then test whether the partisan bias in moving decisions that we measure is sufficient to sustain the observed level of geographic polarization. The answer, perhaps surprisingly, is a resounding “no.” Americans move frequently enough, and the partisan biases in location choice we measure are small enough, that repeated rounds of sorting quickly homogenize the geographic distribution of partisanship. The degree of geographic polarization that we observe in the American electorate today cannot be sustained by residential sorting alone. In a hypothetical world where individuals’ partisan identities were fixed and residential sorting the only causal force operating on the geographic distribution of preferences, the equilibrium level of geographic polarization would be much lower.

Relatedly, our simulation results also show that the effects of residential mobility on the normative performance of elections are benign. Residential mobility, on its own, increases the fraction of competitive districts, reduces the likelihood of legislatures whose composition differs substantially from that of the voting population, and increases local political heterogeneity. To the extent that these criteria have worsened in the US in recent decades, the culprit lies elsewhere.

These results provide indirect evidence that social influences on voters’ political preferences matter. The observed correlation between housing characteristics and party preference cannot be sustained entirely by the (weak) residential sorting we document. Hence, we infer that the reverse causal channel - that living in denser areas makes voters more likely to vote for Democratic candidates, and vice versa - has nonzero magnitude. We provide some suggestive evidence for this channel by showing that voters

⁴However, these differences largely disappear when nonpolitical attributes of the destination neighborhood are controlled for, suggesting that residential location choices are driven primarily by tastes for housing characteristics that correlate with partisanship, rather than a desire for partisan compatibility per se.

who move to less politically congruent locations are more likely to subsequently change their party affiliation to match the new location. This result is congruent with existing work demonstrating that structure and context influence patterns of individual behavior (Sinclair, 2012; Klar, 2014), including seminal works within political science which show that social context can influence voting decisions (Berelson et al., 1954) and the information one receives (Huckfeldt and Sprague, 1995).

Measuring Partisan Sorting and its Determinants

To begin, we briefly describe the data employed in our analyses. The primary datasets are drawn from public voter registration files in states which have partisan registration. There are two main advantages of this data source. First, we observe very large sample sizes, in the millions of individual voters, which allows precise estimates of the quantities of interest: partisan influence on moving patterns. As will become clear in the simulation section, estimating the precise magnitude of influence of partisanship on moving choices is critical for understanding the aggregate electoral consequences of geographic sorting: small effects and large effects, even if they point in the same direction, can produce very different implications for substantive outcomes. Second, our data allows us to identify the same individual voter's residential location before and after a move, as well as his or her party of registration before and after. This individual-level data avoids problems of ecological inference that would plague an analogous design relying on local aggregates.⁵

Our data comprises four primary sources: (1) a random sample of 50,000 individual registered voters who moved from one state to another prior to the 2016 election cycle; (2) the universe of registered voters in the state of Florida between 2006 and 2012, among which our primary analyses focus on the subset who moved from one residence to another between 2008 and 2010; (3) precinct-level vote totals for the

⁵With aggregate-level data, we would see only an average rate of in-migration and out-migration and an average rate of change in voting preference, without observing the actual composition of the moving population.

2008 elections; and (4) population characteristics from the US Census bureau, generally at the level of the census tract. The first dataset is a sample from the database of the political consulting firm and data vendor Catalist, which is privately maintained but relies on public voter files. The second dataset is drawn directly from the publicly available voter files maintained by the Florida secretary of state. The third dataset is taken from Ansolabehere et al. (2014); the fourth were downloaded from the database maintained by the Minnesota Population Center (2011), and appended with additional information we collected. We briefly describe the sample and the variables included in each dataset in what follows; summary statistics and details of the data cleaning and joining process are presented in the Appendix.

Catalist Sample

The Catalist data consists of 50,000 individual voters. The data are a random sample from the set of voters tracked in Catalist's national voter database who moved out of one state with partisan registration to another state which also has partisan registration.⁶ As a result of the restriction to moves within the set of states with partisan registration, we observe voters' designated party affiliation on both ends of the move. The data also allow us to identify the voter's state, county, census tract and census block of residence on both ends of the move, which we use to join to the other datasets.

Table 1 in the Appendix shows the distribution of combinations of party affiliation (pre- and post-move) in the Catalist sample. The diagonal cells are voters who preserve their party affiliation after the move; off-diagonal cells indicate a change in affiliation upon the voter's registration in the new state. A nontrivial fraction of voters' affiliations change following their move: about 68% retain the same affiliation. Switches from Independent to one of the two major parties and vice versa (each about 13% of the sample) are more common than movements from one party to the other (just over 4% each), but all combinations are present in the data.

⁶The matching of individuals' registration records in the origin state to their new records in the destination state was done for us by Catalist.

Figure 7 in the Appendix shows the distribution of voters in the sample by origin state. The distribution roughly follows state population, although the restriction to moves between states which both have partisan registration means that the sample is not nationally representative.

Florida Voter Files

The second data source is the public voter file for the state of Florida in the years 2006-2012. This data contains residence addresses, as well as party of registration and basic demographic information for every registered voter in Florida. Florida assigns voters a unique ID number, which we used to match the same individual across multiple years. Our main analysis focuses on the years 2008-2010, as Florida's precinct boundaries changed little during this period, making matching addresses to 2008 presidential voting totals straightforward in both years. Of the 12,566,804 individuals present in the 2008 voter file, we were able to locate 11,670,474 (92.8%) in the 2010 voter file. Among those voters who appeared in both files, we searched for voters whose residence address changed between 2008 and 2010. 1,435,698 voters (12.3%) met this criterion. Most of these moves were quite local: 83% of moving voters moved to a different census tract, but only 23% moved to a different county.

Table 2 in the Appendix shows summary statistics of the variables included in the Florida voter files, for the set of voters who moved between 2008 and 2010. The state collects basic demographic variables including age, race, and gender, as well as allowing voters to state a party affiliation. The mean age in the Florida movers dataset is just over 41 years old; 43% are male; 64% of those who moved are white, 16% are black, and 14% are Hispanic. Moreover, 42% of those who moved are registered Democrats and nearly 38% are Republicans. As in the Catalist data, voters who move change their party affiliation at a non-negligible rate. Table 3, also in the Appendix, shows the distribution of combinations of party affiliation (in 2008 and 2010) among Florida voters who moved between 2008 and 2010.

It is worth noting that the 1.4M individuals who moved within Florida in 2008-2010 are not repre-

sentative of the full population of 12.5M registered voters in the state. Those who moved tend to be younger, more urban, and more racially diverse than average.⁷ However, as the phenomenon we study is partisan influence on moving decisions, people who move are the population of interest. The relevant comparison population for our Florida sample is registered voters in the U.S. who moved between 2008 and 2010.⁸ Additionally, though our population of interest – and, therefore, the population to which our results generalize – is those who decide to move, our simulation analysis first accounts for an individual’s propensity to move at all and then simulates location choice conditional on deciding to move. Thus, the sample from which we conduct our simulation includes both individuals who move from one location to another and those who do not.

Aggregate Voting, Population and Housing Data

Ansolabehere et al. (2014) provide precinct-level election results for all voting precincts in the United States for the 2008 presidential general election. We downloaded tract-level census population and housing characteristics from the database maintained by the Minnesota Population Center (2011). The database maintains tract-level demographic and housing information derived from the 2010 Census and 2007-2012 American Community Survey. The variables included in our analyses are listed in the Appendix as well as the notes to each regression table.

To the voting and census variables, we added the Walk Score⁹ of the geographic centroid of the voter’s current voting precinct. Walk Scores are a proprietary measure - produced by the Redfin real estate listing service - that aims to measure the “walkability” of a geographic location on a 0-100 scale, by

⁷The median age of all registered voters in Florida in 2010 is 50; 68% are white, 13% black, and 12% Hispanic.

⁸According to data from the Current Population Survey (CPS), approximately 12.5% of the population moved from one location to another between 2008-2009 and 2009-2010. This is nearly equivalent to the 12.3% of Floridians who moved between 2008-2010 in our data. In 2008, the mean age of CPS respondents who moved within their own state was 35.6 years old. Approximately 77% of movers were white and 14% were black. 48% were male. CPS data do not allow us to subset to registered voters, meaning the comparison is imperfect, but the Florida mover sample is comparable to the national CPS sample of movers along these dimensions.

⁹<http://www.walkscore.com>

computing the number of restaurants, retail locations, offices, parks, etc. within walking distance of a location. Walk Scores are commonly used by real estate agents, buyers and renters to evaluate homes and apartments. Walk Scores are a useful metric for studying partisan sorting because Mummolo and Nall (2016) show that the ability to walk to work, shopping and services is the housing characteristic that displays the greatest degree of differentiation in tastes between liberals and conservatives, with liberals placing high weight on this characteristic and conservatives placing low weight.

Within-State Sorting: Florida

Our first set of analyses measure the strength of partisan influences on moving decisions within a single state (Florida), conditional on other observable characteristics of the individual and of their initial place of residence. The data in these analyses are the universe of Florida registered voters who moved from one location to another within the state of Florida between 2008 and 2010, comprising approximately 1.1 million individuals.¹⁰ We focus attention on three dependent variables: the logged population density, the Walk Score, and the 2008 Republican presidential vote share of the voter's *destination* precinct, e.g., the precinct where he or she resided and registered to vote in 2010.

We focus on these dependent variables because each sheds light on a different aspect of the motivating question. Measuring the degree to which Democrats are attracted to (and Republicans repelled by) high-density precincts when they move allows us to estimate the contribution of residential mobility to the empirical correlation between density and partisanship, and the associated malapportionment of seats in Congress or the Florida state legislature. Walk Scores are a highly salient housing characteristic on which liberal and conservative voters' preferences appear to diverge sharply (Mummolo and Nall, 2016); hence, measuring the differential impact of partisanship on choice of Walk Score allows us

¹⁰Because our dependent variables are measured at either the census tract or precinct level, we include only movers who moved across precinct or tract boundaries: 1.12 million individuals moved across precincts, and 1.06 million moved across tracts.

to measure the degree to which divergence in stated preference in surveys translates into divergence in behavioral outcomes. Finally, the difference in Republican presidential vote share of the destination precinct between Democratic and Republican voters is informative about the increase in district homogeneity, and associated decline in competitiveness, that can be attributed to residential sorting. Comparison of the estimated effects in this regression with those in the Walk Score regression additionally allows us to compare the performance of the housing-characteristic-driven versus partisanship-driven theories of partisan sorting.

In all regressions, we include on the right-hand side the value of the dependent variable for the same individual's *origin* precinct, e.g., the precinct where he or she resided and registered to vote in 2008. The logic is that the origin precinct value captures unobserved preferences or constraints of the individual that are likely to be preserved both before and after a move. For example, suppose the individual holds a job which requires her to live in a place with certain characteristics: perhaps she is a farmer and will, even if she moves from one house to another far away, likely remain in a rural, unwalkable, majority Republican precinct. What we are attempting to measure are differential effects of partisanship on moving decisions that predict variation in the outcome variables above and beyond what would be expected if voters' 2008-2010 moves simply preserved the characteristics of their 2008 neighborhoods.

Each analysis is conducted with no fixed effects, with fixed effects for the voter's 2010 (e.g., post-move) county of residence, and with fixed effects for the voter's 2010 zip code of residence. The logic for including fixed effects for 2010 geographies is to understand whether even among voters who moved to the same county (zip code), registered partisans chose measurably different neighborhoods within that county (zip code).

The three sets of results, with various combinations of fixed effects and control variables, are presented together in visual form in Figure 1.¹¹ The vertical labels on the right-hand side denote the dependent variable in each model. We describe each in turn.

¹¹Results are also presented separately in tabular form in the Appendix, Tables 4, 5, and 6.

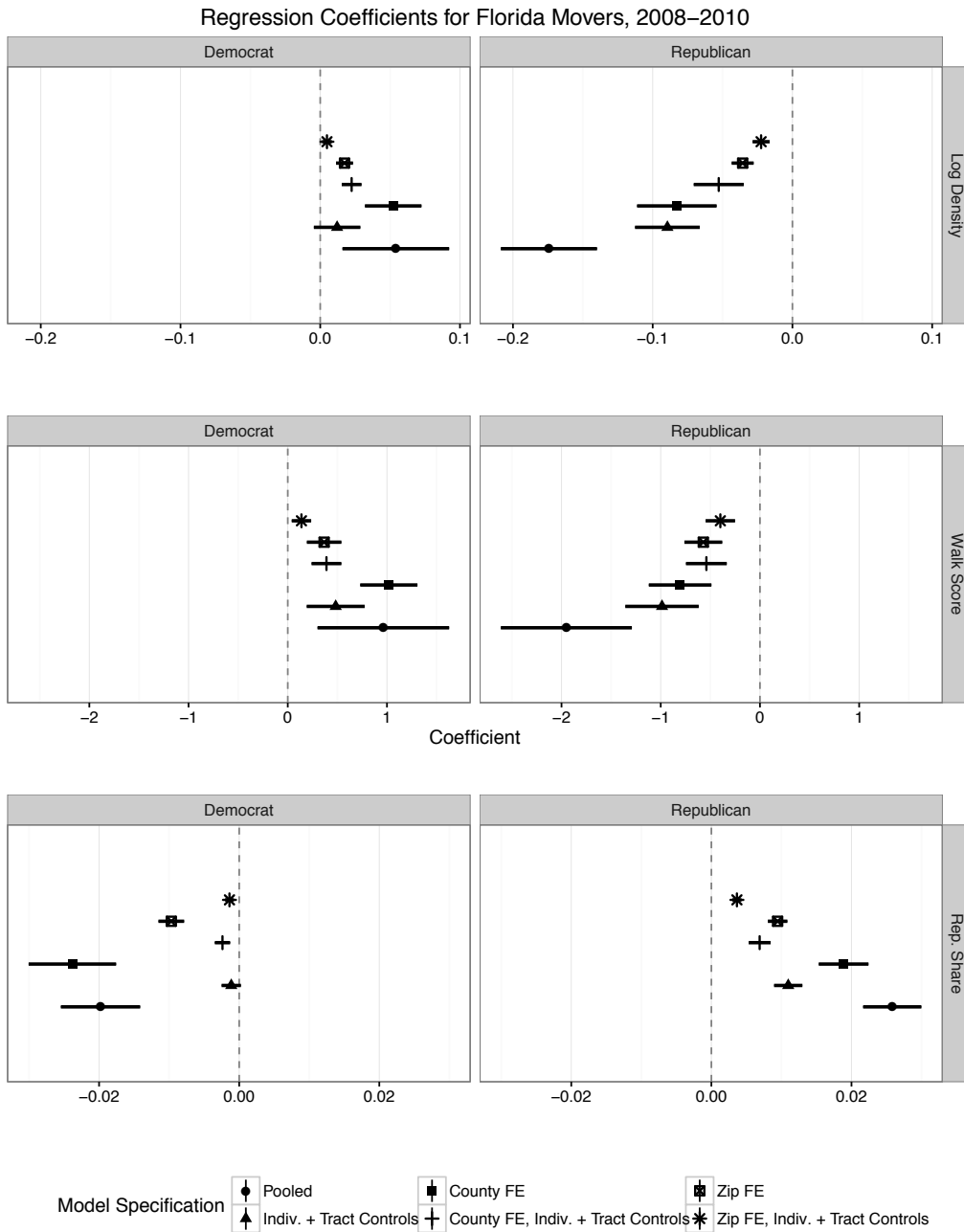


Figure 1: Coefficient estimates for Florida movers sample.

Density In the first model shown in Figure 1, the dependent variable is the log density of the Census tract to which an individual moved in 2010. The figure displays coefficient estimates and 95% confidence intervals¹² of dummy variables for Democratic and Republican partisan registration in 2008.¹³

We present the results with and without conditioning on additional observable characteristics of both the individual and his census tract. The tract-level attributes are measured for the origin (2008) tract. We include these to ensure that the partisan effects we measure are not simply picking up differences in the composition of the source populations across parties. For instance, the fraction of registered Democrats is higher in heavily African-American precincts. The model estimated here is:

$$d_{i,2010} = \alpha d_{i,2008} + \beta_D D_{i,2008} + \beta_R R_{i,2008} + \gamma_1 X_{i,2008}^1 + \gamma_2 X_{i,2008}^2 + \delta' Z_{i,2010} + \epsilon_i \quad (1)$$

Where $d_{i,2008}$ and $d_{i,2010}$ are the log density of voter i 's census tract of residence in 2008 and 2010, respectively; $D_{i,2008}$ and $R_{i,2008}$ are dummies for Democratic and Republican partisan registration in 2008 (at most one of which can equal one); $X_{i,2008}^1$ are individual-level and $X_{i,2008}^2$ are tract-level covariates for voter i or her tract of residence in 2008; and $Z_{i,2010}$ is a set (possibly singleton, in the pooled regression) of dummies for geography of residence in 2010. Figure 1 displays estimates and confidence intervals for β_R and β_D ; Appendix Table 4 additionally shows estimates and confidence intervals for α .

The results show that there is a measurable partisan correlation in moving decisions. According to the base model estimates, a registered Republican voter is expected to move to a new location that is 17.5 log points (i.e., approximately 17.5%) *less* dense than an independent voter moving from a comparably dense origin location. Registered Democrats move to locations 5.3 log points *more* dense than independents from comparably dense origins. The magnitudes decline somewhat when individual- and origin-tract-level covariates are included, to -8.9 and +1.2 log points respectively; with errors clustered

¹²Because the “treatment” variables are assigned not at the individual level but at the geographic-area level, in all analyses we compute cluster-robust standard errors, using 2010 county of residence as the clustering variable.

¹³Registered voters without a stated partisan affiliation in 2008 are the excluded category.

at the county level only the Republican dummy remains significantly different from zero. For comparison, the 25th percentile census tract in Florida has log population density of 6.04; the corresponding 75th percentile is 7.51. The observed partisan differences are thus fairly small compared to the overall variation present in the data.

When we include fixed effects for destination geographies, the magnitudes decline - mechanically, because there is by definition less possible variation in density within a particular county, and even less within a particular zip code, than there is within the entire state¹⁴ - but precision increases substantially. We can reject the hypothesis that β_R and β_D are zero for all specifications at the 99% level. The magnitudes indicate that if we observed two voters, one a registered Republican and the other a registered Democrat, moving to the same zip code from origin locations with similar observable characteristics, we would expect the Republican voter to choose a tract approximately 3 log points less dense than the Democrat.

The magnitude of these differences are small relative to the possible variation in density available, which suggests that the ability of partisans to sort on population density is highly constrained by other factors. Nonetheless, the partisan differences in location choice are statistically significant and all in the direction that would tend to amplify the existing correlation between partisanship and density. Repeated over several election cycles, this observed rate of sorting has the potential to meaningfully increase the concentration of Democrats in dense areas and attendant malapportionment of legislative seats, a hypothesis which we evaluate through a simulation exercise presented in the next section.

Walk Scores The second set of results depicted in Figure 1 is identical to the specification of Equation 1, with the exception that the 2008 and 2010 values of log density are replaced, respectively, with the 2008 and 2010 values of Walk Score. Mummolo and Nall (2016) find that there are significant partisan differences in preferences over the walkability of a neighborhood, with Democrats valuing this neighborhood

¹⁴Standard deviations of log density for Florida as a whole, within county, and within zip code are 1.56, 1.14, and 0.85, respectively.

attribute relatively heavily and Republicans relatively much less. Conditional on a move, then, we expect Democrats to be more likely to select into more-walkable neighborhoods and Republicans to be more willing to sacrifice this characteristic for other desirable features such as home size or affordability.

Much as in our models of log density, the results show a distinct partisan correlation with preference for high Walk Scores. The models in the second row of Figure 1 show that Democratic partisans tend to sort into precincts with higher Walk Scores and Republican partisans tend to move to precincts with lower Walk Scores. Also similar to the results for log density, estimates of α presented in Table 5 show that individuals who lived in precincts with high Walk Scores in 2008 moved to precincts with high Walk Scores in 2010, indicating the existence of heterogeneity in tastes for walkability across individuals. And even among the set of voters who moved to the same county (zip code), the Republicans sought out less walkable precincts of the county (zip code) and Democrats more walkable precincts of the county (zip code).

The magnitude of the partisan effects is such that a registered Republican voter is expected to move to a new location with Walk Score about 2 points less than an independent from a comparably walkable origin location; a registered Democratic voter is expected to move to a location with 1 point higher Walk Score. Including individual- and tract-level covariates reduces the magnitude of these effects by about half, although all remain significant at the 99% level. Including fixed effects for destination counties or zip codes reduces the magnitude of the effects (again, mechanically) but leaves the direction and significance level unchanged.

Walk Scores are measured on a 0-100 scale, with a distribution that is highly left-skewed: the 25th percentile Walk Score among Florida precincts is 1, while the 75th is 36.¹⁵ The standard deviation across all Florida precincts is 23.5. Again, the partisan difference is consistent and robust to the inclusion of numerous control variables, but its magnitude is small relative to the overall variation present in the data: about one-eighth of a standard deviation. The Republican-to-Democrat difference is on the order

¹⁵Any score less than 50 is rated “car dependent.”

of typical differences between houses in the same neighborhood, not the difference in average score between central-city and suburban locations.

Republican Presidential Vote Share The models we have shown thus far indicate that there are consistent, though fairly small, partisan differences in revealed preferences over certain housing characteristics. There are at least two distinct sorting mechanisms by which this partisan difference could emerge. In one, political tastes and housing tastes are correlated but have no causal relationship, perhaps because both are driven by the same unobserved personality factor. In the other, voters' desire to live near co-partisans generates the observed correlation: for historical reasons large numbers of Democrats tend to live in denser parts of cities, and hence when Democrats try to live near each other they invariably choose to live in denser locations, preserving the historical pattern.

To distinguish these two mechanisms, we also present in Figure 1 models of a third dependent variable in the Florida mover sample: the 2008 Republican presidential vote share in the destination precinct. That is, we regress the 2008 Republican presidential vote share of the precinct in which the voter resided *in 2010* on the 2008 Republican presidential vote share of the same voter's 2008 precinct, plus dummies for partisanship and additional conditioning variables and fixed effects. The model estimated here is:

$$s_{i,2010} = \alpha s_{i,2008} + \beta_D D_{i,2008} + \beta_R R_{i,2008} + \gamma_1 X_{i,2008}^1 + \gamma_2 X_{i,2010}^2 + \delta' Z_{i,2010} + \epsilon_i \quad (2)$$

Here, $s_{i,2008}$ is the Republican 2008 presidential vote share of the voter's precinct of residence in 2008, and $s_{i,2010}$ is the Republican 2008 presidential vote share of the voter's precinct of residence in 2010. The only other difference between Equations 2 and 1 is that the tract-level attributes are measured for the destination (2010) tract rather than the origin (2008) tract. We include these to make possible an evaluation of whether or not the partisan effect persists once we account for the physical and population characteristics of a location. In other words, we would like to know whether an unexpectedly Democratic precinct could still act as an attractor of Democrats even if it had none of the housing characteristics we

typically expect Democrats to prefer.

A comparison of the regression coefficients in specifications with and without controls for non-political housing and neighborhood characteristics is informative in distinguishing the driving factor behind the observed partisan sorting patterns. Suppose we see a homophilic sorting pattern (that is, registered Republicans moving to more Republican precincts and registered Democrats moving to more Democratic precincts) in the unconditional regression, but the coefficients decline to zero once neighborhood and housing characteristics are conditioned on. This observation would indicate that sorting is driven by non-political neighborhood characteristics, but nonetheless generates a partisan gap in moving patterns due to the correlation of those characteristics with residents' political tastes. On the other hand, suppose the coefficients are unchanged when neighborhood controls are added. This pattern would indicate that partisans are attracted to places with more co-partisans, *independently* of those places' physical characteristics.

For example, imagine a precinct whose housing stock is comprised mostly of small apartments and which is densely populated with recent college graduates, but unlike most precincts fitting that description has a large population of registered Republicans. We are interested in whether or not such a precinct would attract a disproportionate share of Republican in-migrants. A comparison of the regression coefficients β_D and β_R using the raw versus residualized Republican presidential vote share - which is exactly what is achieved by including housing and population characteristics of the destination tract on the right hand side of the equation - can distinguish between these two possibilities.

The results in the third row of Figure 1 show that there is some degree of homophily in moving decisions: registered Republicans tend to move to more Republican precincts, and Democrats to less, compared to independents moving from precincts with similar voting patterns. Comparisons of the coefficients on the Democratic dummy between the models with and without tract-level control variables show that the apparent Democratic homophily in moving decisions is essentially eliminated by inclusion of controls. The coefficients shrink by an order of magnitude, and in the pooled regression lose

significance, when tract demographic and housing controls are added, suggesting that Democrats preferentially move to less Republican precincts only to the extent that Republican vote share correlates with other, nonpolitical neighborhood attributes like walkability, housing stock, and so on.

The Republican dummy also shrinks toward zero when controls are added, but the difference is much less dramatic: the magnitudes decline by about half. Though the Democratic and Republican effect sizes are very similar in magnitude in the unconditional regression, when destination neighborhood controls are added the Republican dummy ranges from 4 to 10 times as large, depending on the set of fixed effects included. For partisans of both types, nonpolitical neighborhood characteristics appear to be the primary factor driving location decisions. For registered Republicans, however, a high percentage of co-partisans remains an independently attractive feature of a neighborhood, regardless of that neighborhood's nonpolitical physical and demographic attributes.

As before, the effect sizes are fairly small but non-negligible. A registered Democrat is expected to move to a precinct that is about 2% less Republican than an independent voter moving out of a precinct with similar voting patterns. The corresponding effect for Republicans is slightly larger, at 2.6%, and in the opposite direction. As Republicans are moving to more Republican precincts and Democrats to more Democratic precincts, presumably making the Democratic precincts more Democratic and the Republican precincts more Republican in the next election cycle, the results shown in the last row of Figure 1 are consistent with increasing geographic polarization, and a concomitant decline in the competitiveness of sub-state-level elections, over time. Later in the paper, we introduce a simulation exercise to address the question of the rate at which precinct-level polarization is increasing and electoral competitiveness declining due to the observed sorting patterns.

Cross-State Sorting

To demonstrate that the effects just measured are not specific to the state of Florida or to the 2008-2010 time period, we replicate the same analyses on a separate dataset: our 50,000-person sample from the Catalist voter database. The Catalist data is a random sample from the set of voters who moved from one state to another at some point prior to 2016¹⁶ and both origin and destination states have partisan registration. In all respects but two the specifications are identical to those estimated on the Florida data. The differences are that 1) Catalist did not provide individual-level demographic attributes, so we use only the tract-level covariates in specifications with additional controls, and 2) there is variation in the timing of moves in the Catalist data, and hence instead of attributes of 2008 (2010) residence locations we have attributes of pre-move (post-move) residence locations.

Again, regression coefficients for the party dummies (β_D, β_R in Equations 1 and 2) are presented together in visual form, in Figure 8 in the Appendix; regression output is also reported in tabular form in Tables 7, 8, and 9 in the Appendix. The pattern of directionality and statistical significance is extremely similar to that reported for the Florida movers data.

The most significant difference between the two sets of results is that the magnitudes in the specifications without fixed effects for destination geographies are much larger: for example, the unconditional Democratic effect in the pooled specification where log density is the outcome is 0.228, whereas the corresponding coefficient in the Florida data is about a quarter as large, at 0.054. The pattern is similar for the other two outcome variables. Again, this is a consequence of the fact that there is much more possible variation across all of the 29 partisan registration states than within the single state of Florida. Once we add fixed effects so that we compare only among voters moving to the same county or zip code, the magnitudes become very similar to those reported for the Florida movers dataset.

The Catalist replication confirms the results that there are small but nonzero differences in location

¹⁶In the Catalist sample, moves occurred between 2005 and 2016; the timing varies by individual.

preferences across partisan types: registered Republicans (Democrats) who choose to move choose destinations that are less (more) dense, walkable, and Democratic-leaning in presidential elections than independents moving from similar locations. These choices suggest that residential mobility may contribute to increases in the local homogeneity of political preferences, and to the correlation of partisanship with population density. These changes are generated primarily as a side effect of selection on nonpolitical neighborhood attributes, though for Republicans there is some evidence that a desire for political compatibility per se partly explains moving patterns.

Simulating Substantive Effects

The results presented thus far are consistent with small but consistent partisan homophily in relocation decisions. In this section, we conduct a simulation analysis that allows us to translate the effects we measure on residential location choices into their consequences for electoral competitiveness, bias in legislative representation, and the geographic polarization of political preferences. We simulate a scenario where the observed rates of partisan sorting over a single election cycle (measured from our dataset of Florida voters in 2008-2010) are repeated over several election cycles, and measure the consequences for these three substantive outcomes. We treat individuals voters' preferences as fixed and simulate only changes in their location, in order to isolate the effect of residential sorting alone on electoral outcomes.

The simulation consists of three steps, each based on regression estimates from the Florida dataset. In the first step, we estimate the probability that every voter registered in Florida in both 2008 and 2010 moves between 2008 and 2010, conditional on observed individual- and tract-level demographic information. We fit this step using a linear probability model of the decision to move or not, presented in Appendix Table 10, column (2). This model contains both the party registration dummies as well as the same set of individual- and tract-level covariates used in the regression models presented previously.¹⁷

¹⁷The party dummies have null effect in this model, unlike the other two models employed in the simulation. Other covariates

Using each individual registered voter's estimated probability of moving, we draw a simulated moving decision from a Bernoulli distribution. In each round of our simulation, approximately 12% of individuals decide to move, consistent with the fraction of 2008 registered voters in Florida who moved from 2008-2010.

In the second step, every voter who decided to move in step one moves to a new precinct according to a variant of the model of Equation 2 with fixed effects for *origin* rather than destination geographies, parameter estimates of which are presented in Table 10, column (3). This model generates a predicted Republican presidential vote share of the moved-to precinct, along with a prediction variance from the regression error. We draw a new Republican share from a beta distribution with mean equal to the model prediction and variance equal to the prediction variance,¹⁸ and assign the voter to the precinct whose Republican presidential vote share is closest to this draw.

Finally, we re-compute Republican presidential vote and registration shares in every precinct once moving is complete. We treat individuals' presidential votes and registration choices as fixed; the only thing that may vary over time is their residential location. The state-wide population of voters and hence state-wide Republican shares are fixed throughout the course of the simulation. All that may potentially change is the composition of lower-level geographic units such as precincts, state house or congressional districts.

For partisan registration choices, we simply use the observed party of registration in 2008 from the voter file. For presidential votes, we estimate a model of 2008 Republican presidential vote probability given demographics and party of registration from the Florida voter file. This model is:

such as individual age and urbanity of the individual's census tract are much more highly predictive of decisions to move.

¹⁸Given the form of the Beta distribution, it is not possible to choose parameters that exactly match the prediction variance for all possible predicted means. We hold the Beta's second shape parameter constant, calibrated to match the prediction variance from the regression when the predicted mean is one-half. We then allow the first shape parameter to vary by individual to match the individual's predicted mean from the regression. The variances of the resulting distributions are thus highest for voters predicted to choose new precincts with close to one-half Republican vote share, and decline towards the extremes of one and zero.

$$s_{i,2008} = \beta_D D_{i,2008} + \beta_R R_{i,2008} + \gamma_1 X_{i,2008}^1 + \gamma_2 X_{i,2008}^2 + \delta' Z_{i,2008} + \epsilon_i \quad (3)$$

Where $s_{i,2008}$ is the Republican presidential vote share of voter i 's precinct of residence in 2008. Estimates of this model are presented in Appendix Table 10, column (1). Using the predicted probabilities of Republican presidential vote from this model, we draw a simulated Republican presidential vote for each individual from the corresponding Bernoulli distribution. Again, these simulated votes are computed only once at the beginning (in 2008) and remain fixed throughout the course of the remaining cycles.

We repeat this process for 10 iterations, at each step recording the new precincts of residence for every individual. Given the new precinct assignments, we can compute simulated quantities such as Republican vote or registration shares by congressional district, and examine the trends resulting from repeated rounds of residential sorting.

Competitiveness We first examine the effects of sorting on the competitiveness of Congressional elections. In Figure 2 we plot two measures of the partisan composition of each of Florida's 25 Congressional districts over the course of the simulation: the fraction of voters in each district with simulated Republican presidential votes in 2008, and the fraction of Republican registrants in each district, among the district's registrants who registered as one of the two major parties.

Neither plot shows evidence of declining numbers of competitive districts. In fact, the pattern is just the opposite, displaying a clear trend of convergence towards partisan balance. The most heavily Democratic districts become less Democratic, and similarly the most heavily Republican districts become less Republican. Competitive districts remain competitive throughout.

This result indicates that, although Figure 1 demonstrated the existence of a pattern of selection into politically compatible neighborhoods, the magnitude of this politically motivated sorting is too small to drive aggregate trends at the level of Congressional districts. Sorting on political attributes is swamped

by sorting on other nonpolitical neighborhood characteristics as well as idiosyncratic individual reasons, leading to a pattern of partisan mixing and increasing homogeneity across districts. In the absence of other factors such as gerrymandering, incumbency advantages, changes in candidate recruitment, and so on, residential sorting alone does not produce a decline in competitiveness. In fact, the net effect of residential mobility appears to be a force that *increases* the competitiveness of the typical congressional district.

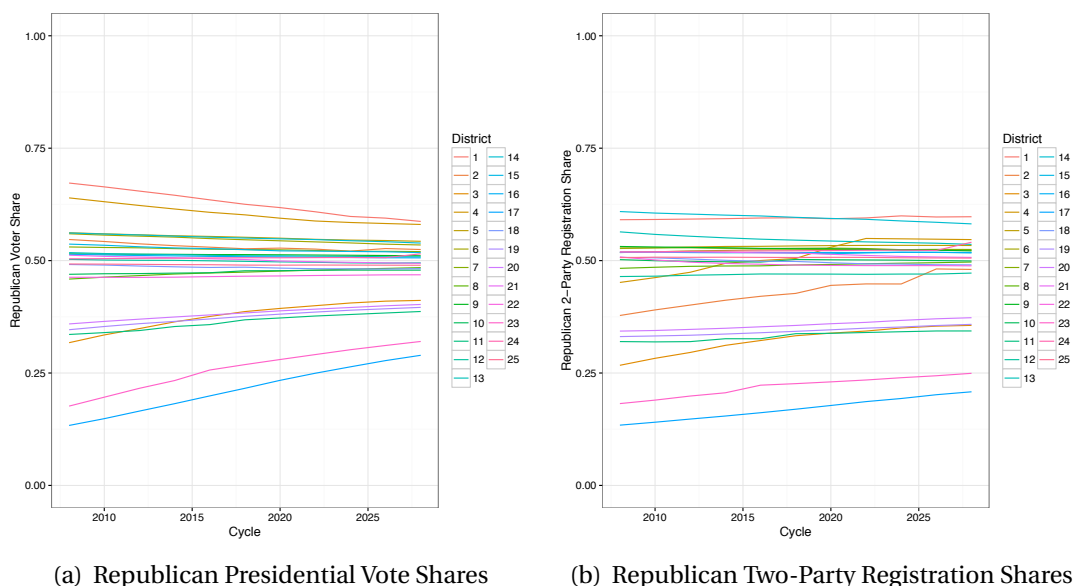


Figure 2: The result of 10 cycles of simulated moving among registered voters in Florida on the partisan composition of Florida's 25 Congressional districts. The left panel shows the fraction of voters in each district with simulated Republican presidential votes in 2008. The right panel shows the fraction of Republican registrants in each district, among the district's registrants who registered as one of the two major parties.

Malapportionment We next examine the effects of sorting on the correlation of partisanship with residential density, and the resulting malapportionment of Congressional and state legislative seats relative to the partisan shares in the state-wide population. Figure 3 plots the correlation of tract-level log population density with Republican presidential votes, and with Republican and Democratic parti-

san registration. The result is that there is, as expected given the results of the sorting model of Table 4, a movement of registered Democrats (Republicans) into more (less) dense areas. However, partisan registration is not predictive enough of presidential vote choices¹⁹ for this trend to be apparent in the correlation of Republican vote with population density. The latter quantity actually moves towards zero, though not dramatically, over the 10-cycle course of the simulation. Again, while there are measurable partisan influences on choice of neighborhood density, these forces are smaller than the effects of non-partisan observables and individual unobservables. As a result, sorting on its own cannot sustain the observed correlation between vote choice and density.

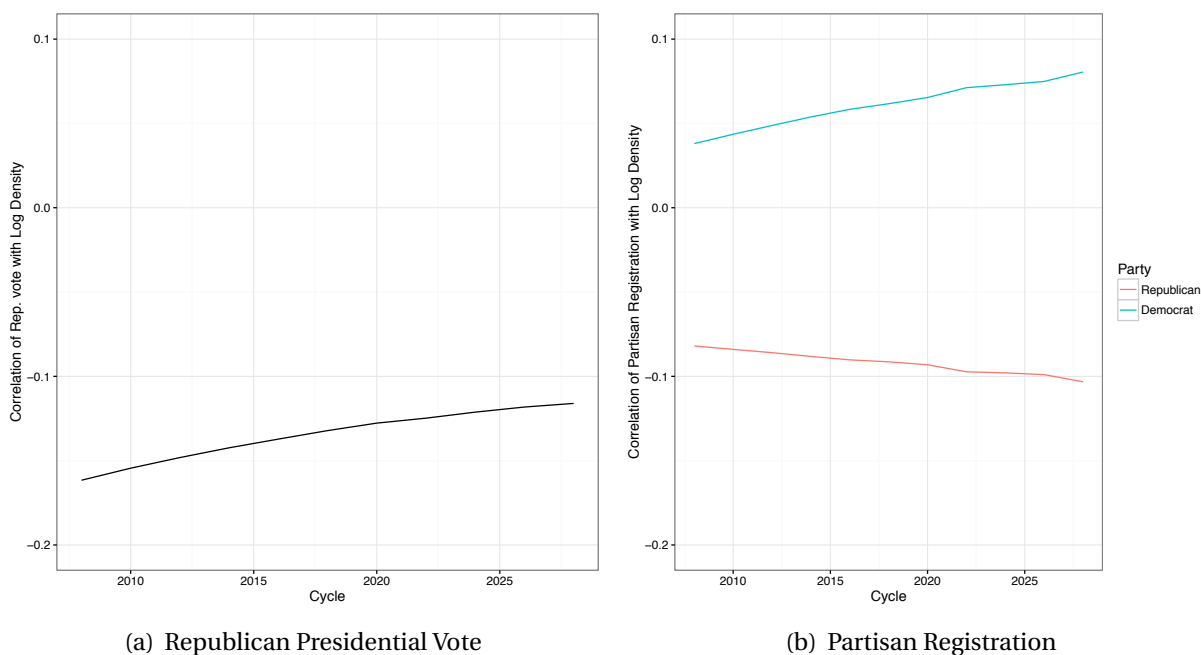


Figure 3: The result of 10 cycles of simulated moving among registered voters in Florida on the correlation of presidential vote choices and partisan registration choices with population density. The left panel shows the correlation of tract-level log population density with simulated Republican presidential votes over time. The right panel shows the correlation of tract-level log population density with registration for each party.

Perhaps not surprisingly, then, the effects of residential mobility on the apportionment of legislative

¹⁹See Table 10 for estimates connecting the two quantities.

seats are benign. Figure 4 shows the fractions of legislative seats (in Congress, the Florida state senate, and the Florida house of representatives) with a majority of registered voters who either were simulated to vote Republican in the 2008 presidential election or were registered Republicans in 2008. The dashed lines in the figures show the corresponding state-wide population fractions, e.g., the fraction of 2008 Republican presidential voters in Florida as a whole. A consequence of Democrats' propensity to live in denser areas is that the initial apportionment has a majority of majority-Republican districts in Congress and the Florida state senate, despite the fact that Democrats make up a majority of the state-wide population.²⁰

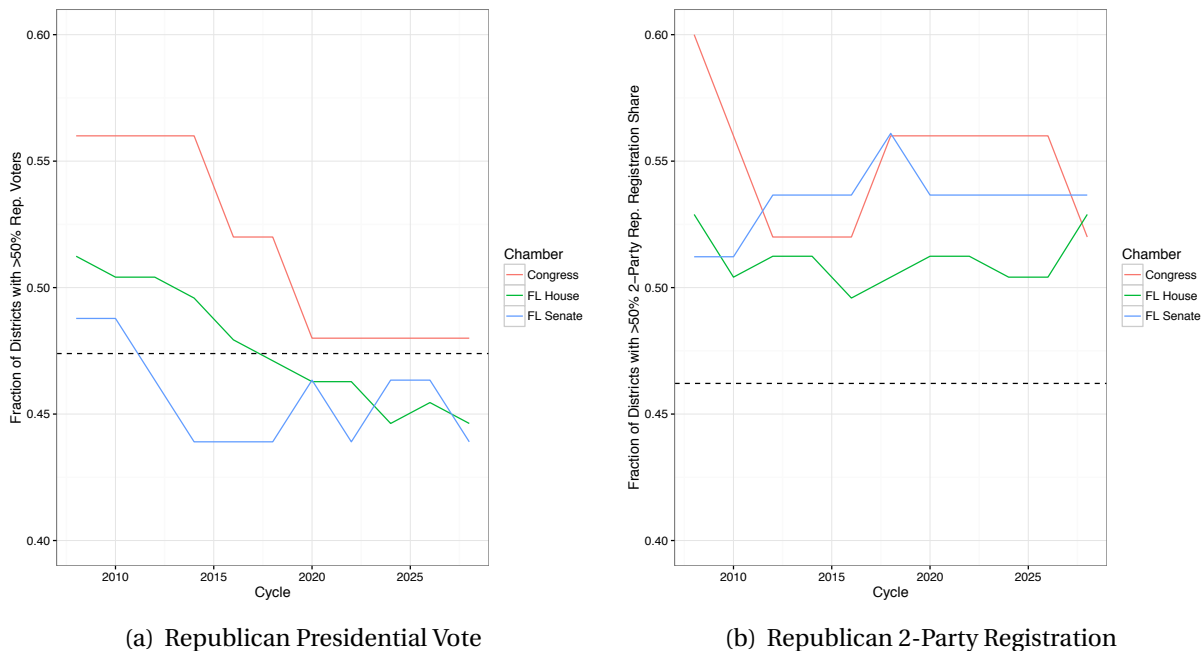


Figure 4: The result of 10 cycles of simulated moving among registered voters in Florida on the apportionment of legislative seats in Florida. The left panel shows the fraction of districts in each chamber with simulated Republican presidential vote shares greater than 50%. The right panel shows the fraction of districts in each chamber with Republican two-party registration shares greater than 50%.

Over time, however, this divergence between legislative seats and population shares *declines* as a

²⁰This is the “unintentional gerrymandering” effect described by Chen and Rodden (2013).

result of residential sorting. Both presidential vote and registration share measures show movement towards the state-wide benchmark, though the decline is larger in vote-share terms. Once again, sorting on its own cannot sustain the existing malapportionment of legislative seats, and in fact in isolation would reduce the level of such malapportionment due to correlation of partisanship with density.

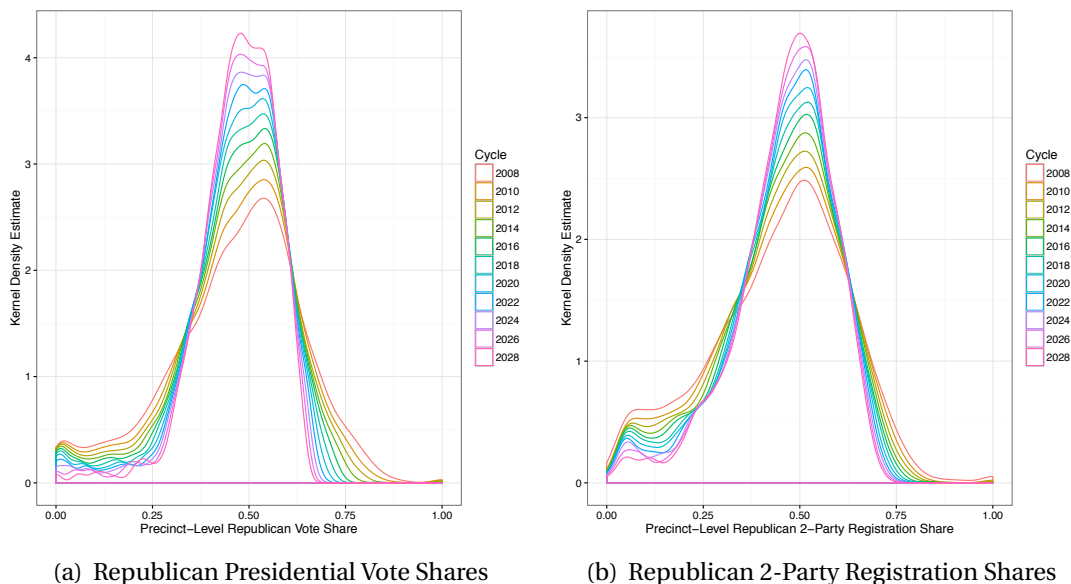


Figure 5: The result of 10 cycles of simulated moving among registered voters in Florida on the precinct-level distributions of votes and registrations. The left panel shows the distribution of simulated 2008 Republican presidential vote share at the precinct level in each of the 10 simulation cycles. The right panel shows the distribution of two-party Republican registration share at the precinct level in each of the 10 simulation cycles.

Geographic polarization Finally, we examine the effects of residential sorting on local partisan homogeneity. We plot in Figure 5 the distribution of precinct-level Republican vote and registration shares. If residential sorting were a polarizing force, this exercise should produce an increasingly bimodal distribution over time, as somewhat Republican precincts become heavily Republican, and vice versa on the Democratic side. The actual pattern is the opposite: the mass of approximately evenly split precincts grows steadily, and mass of extreme precincts falls.

A related measure, shown in Figure 9 in the Appendix, is the fraction of partisans living in precincts where the great majority of their neighbors vote or register for the same party. Sociologists and education scholars use an analogue of this measure to study neighborhood and school segregation on racial or class lines. Unsurprisingly given the results in Figure 5, this measure of local partisan segregation steadily declines over repeated cycles of the simulation.

In sum, Floridians' residential mobility appears to be, on net, a force for greater electoral competitiveness, apportionment of legislative seats in line with population shares, and local integration across party lines. This overall pattern emerges *in spite of* the fact that partisans are more likely to select politically-similar neighborhoods. The reason for this seeming disconnect is that the partisan influence on moving patterns is very small in comparison with nonpartisan influences on moving patterns. In the aggregate over many election cycles, these other forces dominate.

Changes in Partisanship

The results of the previous section show that partisan geographic sorting, in isolation, has a homogenizing - rather than polarizing - effect on the distribution of political preferences. What, then, explains the apparently stable degree of polarization in the current observed distribution of preferences? Why do we not see reversion to the mean among outlier precincts over time, as occurs in our simulation, as new residents move in?

One possibility is that individuals' political preferences are influenced by their social and physical environment. When a rural voter moves to an urban location or vice versa, his or her political preferences may change to fall in line with those of his or her new peers and neighbors, just as other cultural and lifestyle preferences are likely to change following such a move. Our simulation exercise explicitly rules this possibility out: individuals' political preferences are assumed to be completely fixed. Our simulation results show that, under this assumption of fixed preferences, residential mobility tends to produce

politically homogeneous rather than segregated geographic distributions. The fact that we do not observe such a homogeneous pattern, then, suggests that the reverse causal channel (location changing preferences, rather than preferences changing location) has some bite.

In order to examine this possibility, we examine changes in individual voters' partisan registration over time. Specifically, we ask if voters who moved to new locations that were very different than their old locations on politically salient dimensions subsequently changed their registration status in a direction matching the change in their environment. The model we estimate is:

$$\Delta p_i = \alpha \Delta c_i + \beta_D D_{i,2008} + \beta_R R_{i,2008} + \gamma_1 X_{i,2008}^1 + \gamma_2 X_{i,2008}^2 + \delta' Z_{i,2008} + \epsilon_i \quad (4)$$

Where the dependent variable Δp_i is a trichotomous measure of change in party registration ranging from -1 to 1. This variable is coded as a zero if there was no change in an individual's party registration after moving from one location to another; if an individual moves in a more liberal direction (i.e., she moves from Republican to Independent or if she moves from Republican *or* Independent to Democrat) the variable is coded as -1; finally, if an individual moves in a more conservative direction (i.e., she moves from Democrat to Independent or if she moves from Democrat *or* Independent to Republican) the variable is coded as 1. The main independent variable of interest Δc_i is the pre- to post-move change in the voter's precinct characteristics of interest: Δc_i may be the difference in either the log population density, walk score, or 2008 Republican presidential vote share between voter i 's pre- and post-move precincts of residence. We also include dummies for individuals' initial (pre-move) partisan affiliations to control for the fact that the value of Δp_i must be non-negative for initially Democratic registrants and non-positive for initially Republican registrants.

The results are presented in Figure 6 for both the Florida and Catalist datasets. Results are also in tabular form in the Appendix, Tables 11 - 13 for the Florida data and 14 - 16 for the Catalist sample respectively. Changes in all three independent variables are statistically significantly associated with

changes in registration status in both datasets, in the direction that would be predicted if voters' preferences updated to match their new surroundings. For instance, moving to a census tract with one standard deviation higher Walk Score is associated with an approximately 0.2 percentage point increase in the differential likelihood of a former independent registering as a Democrat versus registering as a Republican. A standard deviation increase in log density produces about a 0.4 percentage point increase in this same differential. Given that less than 8% of Florida movers changed their partisan registration status in any direction between 2008 and 2010, these are fairly substantial shifts.

The results for the Catalist sample show the identical pattern of directionality and statistical significance, but with substantially larger magnitudes. This is a result of the much higher baseline rate of party of registration change in the Catalist data: 31.4% of voters in the Catalist sample changed their partisan registration status after their move, compared to 7.6% of within-Florida movers.²¹ Florida allows voters who move within the state to update only their address without re-filling the entire registration application, whereas cross-state movers must fill out a new registration form and actively choose a party affiliation. This lack of a default, no-change option for cross-state movers likely explains the much higher rate of party changes (and larger coefficients on the change in location attribute regressors) in the Catalist data.

Of course, the results in Figure 6 are not definitive evidence of social influence; it is possible that voters who change their party affiliation upon moving are already (unobservably, given that we have data only on party registration) less strongly attached to their pre-move party than the average voter. The necessity of re-registering after a move may provide these voters an opportunity to bring their formal party affiliation more closely in line with their voting preferences. However, note that magnitudes of the coefficients on pre- to post-move location change all *increase* substantially when additional individual- and tract-level controls are added. This pattern implies that such political-preference unobservables would have to be *negatively* correlated with the observable factors in our control set, such as the racial,

²¹See section , Tables 3 and 1 for a breakdown of the patterns of party affiliation change in both datasets.

income, and housing makeup of the individual's origin location.

Discussion

The American electorate is geographically divided. Partisan affiliations correlate with tastes for housing characteristics, with Democrats clustered in urban cores and Republicans spread out across suburban and rural areas. This pattern has some negative consequences for the functioning of elections as both preference aggregation and accountability mechanisms: urban Democrats' delegations in Congress and state legislatures are under-sized relative to their share of the population, and they are represented by incumbents who face weak challengers, or no challengers at all, from the opposing party.

There are several plausible theories for the emergence and persistence of this pattern. In one, the correlation between urban-ness and preference for Democrats is a historical artifact²² that has been sustained over time by individuals' desire to live near others who share their political views. In a second, preferences for housing attributes correlate with political preferences, and the observed political pattern is a side effect of selection on nonpolitical housing attributes. Finally, a third theory reverses the direction of causation, positing that political preferences are influenced by an individual's physical and social environment.

A critical distinction between the first two theories and the third is that the first two require the existence of a partisan bias in moving decisions: when partisans move from one location to another, they must preferentially select into areas containing more of their own co-partisans and/or more of the attributes associated with their party ID. Given that Americans as a whole are quite mobile - in our Florida sample, more than 10% of voters registered in both 2008 and 2010 moved to a different precinct in that two-year window - this partisan bias must be fairly strong in order to preserve the existing geographic

²²Due to, for example, the relative strength of the labor movement in urban areas during the industrial revolution (Rodden, 2010) or the racial politics of post-war urban renewal and interstate highway construction (Nall, 2015).

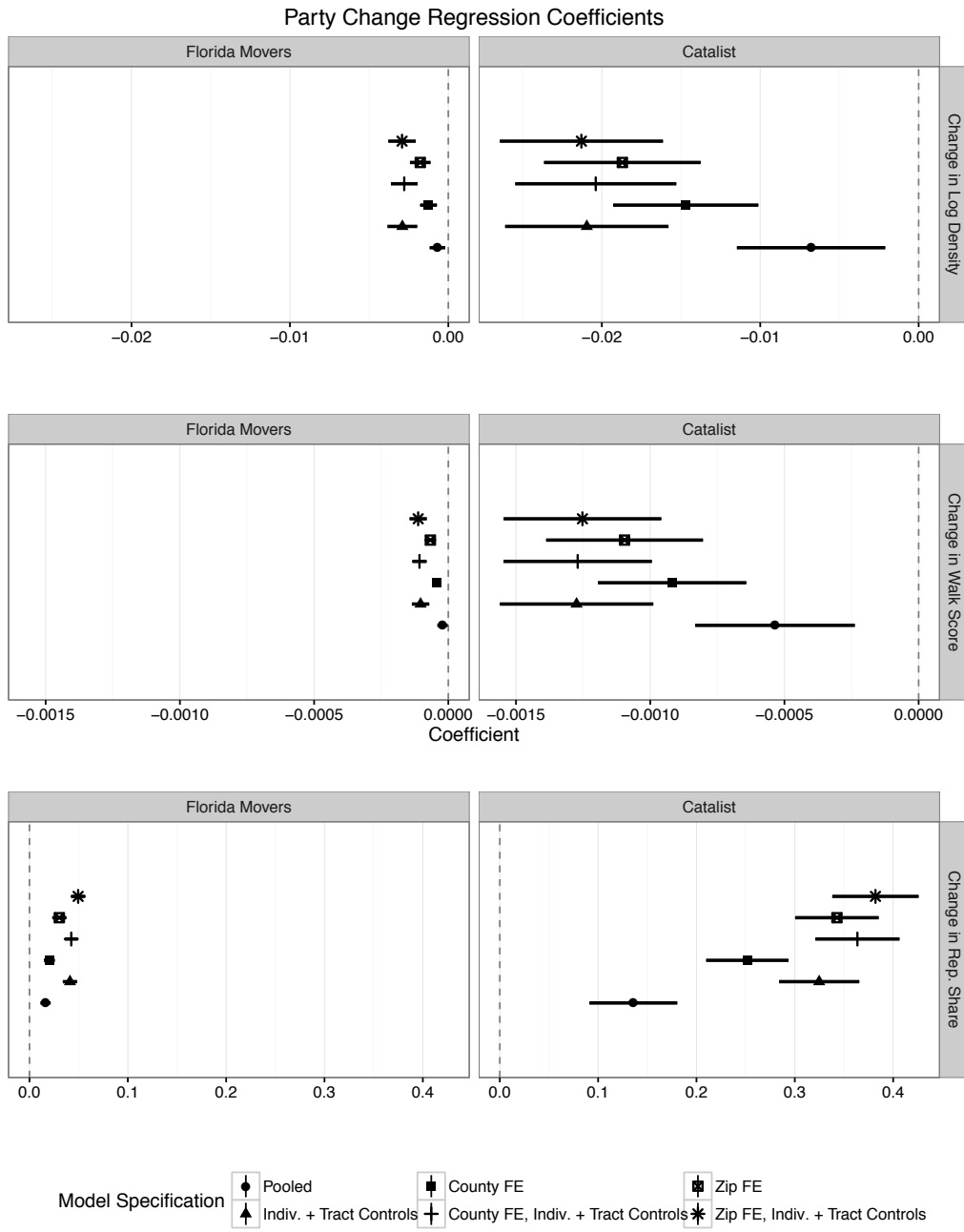


Figure 6: Coefficient estimates of three independent variables for the change in party of registration DV.

pattern and prevent it from disappearing as the population shuffles around.

This paper directly measures the relative strength of this partisan bias in moving decisions. We find strong evidence for the existence of partisan sorting in two independent, large-scale datasets. Registered Democrats (Republicans) sort into areas that are more (less) dense, walkable, and Democratic-leaning in presidential elections. We find that the bias towards selecting politically congruent areas largely disappears once attributes of the destination's housing stock and population characteristics are accounted for. This distinction implies that partisans simply have correlated tastes for residence locations and are not selecting politically congruent neighborhoods *per se*.

However, the large sample sizes we have available allow us to precisely measure the magnitude and not just the direction of these effects. These magnitudes are, across the board, quite small. In other words, although partisans' *tastes* for politically salient attributes are correlated, they are not willing to *act* on those tastes if it means sacrificing proximity to jobs, school quality, housing affordability, or the myriad other idiosyncratic and non-partisan factors that influence voters' residential choices.

Our simulation analysis shows that this nonzero but small partisan bias is not sufficient to sustain a geographically polarized distribution of preferences. Because Americans move frequently, and the vast majority of the variation in moving decisions is non-partisan in nature, residential mobility on its own fairly quickly brings areas with concentrations of voters of one party or the other back towards the population mean. As a result, in spite of the existence of partisan bias in moving decisions, the net effect of residential sorting alone is to improve the competitiveness of typical Congressional and state legislative elections, to reduce the malapportionment of legislative seats due to the concentration of Democrats in high-density areas, and to reduce the fraction of voters living in very politically homogeneous neighborhoods.

If residential sorting alone would quickly generate a geographically homogeneous distribution of political preferences, then the fact that a very non-homogeneous pattern persists suggests that something else must be going on. Namely, the preferences of in-migrants must be adapting to match the modal

preferences of their new neighborhoods. We show that this is in fact occurring, as voters who move to neighborhoods that are different from their previous residence on politically salient dimensions are much more likely to change their party affiliation to match that of their new neighbors.

Nonetheless, much work remains to be done to understand the mechanism by which this preference change occurs. Is there social pressure, or a desire to not stand out, that leads voters to adopt the affiliation of their new neighbors, whatever that may be? Or is there, as Lipset and Rokkan (1967) suggested, something inherent in urban life that encourages the adoption of a liberal ideology? We leave these questions for future work.

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