

Chapter 3

How Interstate Highways Created Republican Suburbs

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Abstract

Policies that change space can change politics, and one way they do so is by facilitating *geographic partisan sorting*, the tendency for Americans to live in enclaves of like-minded citizens. Standard models attribute the pattern of such changes almost entirely to the aggregate effect of individual citizens' homophily: the natural tendency of citizens to be drawn to and cluster with similar individuals. I present an alternative account that suggests that government policies that influence mobility also can influence citizens' personal calculus of residential location. Using historical geographic data to estimate geographic outcomes consistent with this hypothesis, I examine the effects of Interstate Highway System on the political development of suburban communities. Combining construction data from the Interstate Highway System with county-level presidential election data for the years 1948-2008, I show that suburban communities with Interstate highways became as much as five points more Republican than they would have been in the absence of freeway construction—a large enough effect to change a swing district to a landslide district. A metropolitan case study based on Wisconsin precinct-level data and a multi-election national analysis of county-level data shows that such political effects emerge quickly after freeway construction, especially in previously undeveloped areas. These findings demonstrate that federal policies can change politics not only by directly influencing individual welfare, but also by influencing residential choice and the spatial relationships among citizens.

Policies that change geographic space can change politics. Even as scholarship on the influence of social policy on politics has taken root in political science (e.g., Pierson 1993; Campbell 2003), we still know remarkably little about the political impacts of one of the oldest forms of social policy: the construction of roads and highways. Highways can change politics not only by providing distributive benefits to selected groups in the geographies where they are located, but also by increasing mobility and remaking the political map. Though treated primarily as mere “pork-barrel” distributive goods in much of the recent political science literature, highways pervasively influence the communities in which they are built. In rural areas, highways make land more attractive to residential development, increasing the growth of politically homogeneous, single-family residential subdivisions more likely to house Republican voters. As a de facto subsidy to suburban home construction, highways appear to have indirectly promoted the growth of voters more likely to be sympathetic to policies and politics that support suburban development.¹

The substantial localized impact of highways makes them a social policy—one that happens to provide mobility to different groups of citizens and indirectly affects communities by redistributing the benefits of mobility to different groups. Considerable research in fields from economics to urban planning has demonstrated the social and economic effects of highway construction. Highways stimulate economic development in rural communities (Chandra and Thompson, 2000), have uprooted and destroyed neighborhoods inside cities (Mohl, 2004), and appear to have accelerated suburbanization (Baum-Snow, 2007). Scholars of urban planning, sociology and geography have shown that highways and other major roads split up neighborhoods, producing different development patterns and street behavior patterns after they are built (Grannis, 1998; Noonan, 2005).

In this chapter, I posit that one consequence of highway construction is *geographic partisan sort-*

¹As Gans (1991) writes, “Housing for affluent whites is subsidized by F.H.A., by tax deductions for home ownership, by federal grants for highway programs that take the suburbanite to and from his downtown job, and by urban renewal...” (349). The role of highways and other transportation in housing affordability has been well developed in the literature since the 1960s. See Meyer, Kain and Wohl (1971) for a classic study on the relationship of housing development to transportation system design.

ing, the settlement of like-minded partisans in the same communities.² Over the last half century, the periphery of cities have become increasingly Republican relative to their cores, with middle- and upper-class conservatives relocating into suburban and exurban communities and deserting urban centers.³ This trend has coincided with the population collapse of most major city cores in the United States and the general economic expansion of the suburbs. Though the process of suburbanization has been ongoing since the early 20th century, the increasing importance of highways and federal support for the automobile have made possible more rapid sorting of residents across space, an especially important influence on American political geography in the postwar period (Gimpel, 1999). Starting with the exodus of white urban residents to suburbs in the 1950s and 1960s, as well as the growth of new Sun Belt suburbs arising from external migration, highways facilitated the channeling of different types of suburbanites into the suburbs, and, more importantly, opened the path to development of *particular* suburbs. The effects that I hypothesize can be expected to take different forms over time. As formerly homogeneous outer suburbs of the 1950s and 1960s have become economically and racially heterogeneous inner suburbs, highways have served as conduits for more affluent residents to form even more remote Republican exurbs, continuing the process of geographic partisan sorting (Berube et al., 2006).

I demonstrate that highways have facilitated the localized growth of Republican suburbs, helping make rural towns into Republican suburbs and rural counties into more Republican suburban counties. The chapter begins by explaining the significance of geographic sorting as an outcome of interest to political scientists, and why the most popular models of sorting do not account for highways' unique influence on residential political segregation. I then turn to a diverse range of evidence demonstrating highways' influence over geographic partisan sorting. Extracting the limited available information from historical survey data, I find that a partisan gap in residential choice existed as early as the 1970s, with urban Republicans more likely to favor suburbs and small towns over big cities. However, knowledge of the individual-level political correlates of residential preference—the sort of data that would underpin

²I use the term “geographic partisan sorting” to distinguish this quantity from the sorting of partisans along issue lines (Levendusky, 2009).

³The divide between core and periphery is developed in Chapter 4.

most agent-based sorting models—is insufficient to explain why partisan sorting has been geographically heterogeneous. Even if voters express preferences for certain types of rural and suburban communities, some suburban communities follow their previous partisan trends, while other outlying areas rapidly became (usually Republican) landslide areas.

Integrating geographic information systems (GIS) with diverse methods of causal inference, I analyze municipal-level and county-level data sources on suburban political development from the 1950s to the present. With an original data set of sixty years of precinct-level data from the Milwaukee area, I conclude that highways enabled substantial Republican population growth in fledgling suburban communities along major highways. The patterns of localized growth identified in the Milwaukee case study appear to be equally strong at the national level. By using GIS to merge highway construction data with historical election data covering the 1952 to 2008 presidential elections, I demonstrate that the construction of highways caused suburban counties to become substantially more Republican, though the same mobility that contributed to this partisan growth appears to have contributed to the decline of community heterogeneity over time. Estimates obtained using regression and matching, calculated with respect to region, demonstrate that highways made suburban counties in which they were built up to four points more Republican during the study period, a substantial shift large enough to move a county from “swing” status to landslide. These results are robust even after accounting for alternative political explanations and varied modeling assumptions.

1 The Significance of Geographic Partisan Sorting

The importance of partisan sorting as an outcome of interest to political scientists derives from two factors: sorting can generate additional political conflict by increasing the alignment between place and political ideology, and it can make citizens who live in a homogeneous environment more politically extreme than they would have been in the absence of sorting (i.e., through contextual effects).

The sorting of voters into Democratic and Republican enclaves can change the way that *ex ante* preferences are aggregated and expressed. The concentration of Democrats in high-density Democratic urban areas and Republicans’ dominance of low-density rural and suburban areas may hurt Democrats by

biasing redistricting plans against them (Chen and Rodden, 2009). Under the court-mandated “compactness” standard in *Shaw v. Reno*, redistricting authorities must attempt to avoid constructing convoluted districts. But this standard naturally increases the difficulty of distributing urban Democratic votes into more Republican districts to create political balance across districts. When Republican voters live in low-density suburban and rural areas and Democratic voters are in denser urban areas, a compactness-optimizing redistricting plan will generally be unable to create balanced representation. The grouping of voters into homogeneous communities also creates “communities of interest” that must be respected by redistricting authorities, further limiting redistricting options (Forest, 2004). Beyond decennial redistricting, geographic partisan sorting carries over into the drawing of partisan divides between local governments. As voters sort into homogeneous communities, the communities increasingly represent the political extremity of their local populations, converting disputes among residents into disputes among jurisdictions (Oliver, 2001), potentially inducing conflict among local governments.

Geographic sorting can also change voters’ political preferences, making them more politically extreme than they would have been in the absence of sorting. Regardless of the selection mechanism that draws voters into new residential contexts, concentrating individuals with similar interests and ideologies in the same place can activate solidarity tied to neighborhood and community. Gould (1995), for instance, shows that urban renewal projects in Paris in the 1850s helped create stronger class identities among workers by forming new, neighborhood based social movements among workers relocated into suburban housing developments. Gould argues that this relocation contributed to the 1871 Paris Commune’s relative success by creating common geographic identity, especially in comparison to an 1848 uprising during which workers lived in separate, artisan-based communities with few shared identities. Conversely, the absence of geographic concentration of residents can undermine political solidarity. Fenton (1966) suggests that one reason for the Republican Party’s unexpectedly strong performance in Ohio was the geographic dispersal of unionized industrial workers across the state. Not only did this residential dispersal reduce the tendency of workers to form identities around the labor movement, it also reduced the ability of union organizations and parties to organize workers. Individual-level behavioral research also suggests that behavior may change in response to social context, with voters in more homogeneous

discussion networks more likely to adopt extreme positions (Mutz, 2006).

More recently, the “new suburban history” has shown how postwar suburbanization in the United States stimulated the formation of suburb-based class identities. McGirr (2001) demonstrates that the conservative movement in Orange County in the 1950s and 1960s linked national political concerns, including anti-communism, the secularization of public education, and desegregation efforts to the autonomy of local communities. Lassiter (2006) describes how suburbanization transformed Southern conservatism by moderating racial animus and focusing the attention of suburban Southern homeowners on economic issues, a finding that suggests a geographic aspect to the “end of Southern exceptionalism” described in Shafer and Johnston (2006).⁴

2 Accounting for the Role of Transportation in Geographic Partisan Sorting

My account of the origins of partisan sorting relies on a synthesis of two of the dominant accounts of American residential sorting and its origins. Contemporary accounts of geographic partisan sorting— notably the well-researched journalistic account in Bishop (2008)—argue that geographic sorting, like other segregation processes, are an emergent property of individual residential choice, stimulated by individual responses to the character of their current and potential neighborhoods (Tiebout, 1956; Schelling, 1971, 1978). At the opposite extreme, critics of the “micromotives, macrobehavior” model suggest that discriminatory public policies have historically been responsible for de facto segregation, especially of the racial variety: housing discrimination, redlining, and exclusionary zoning practices simply exclude some citizens from choosing to live in some places (Massey and Denton, 1993). Without denying the utility of both approaches, my account suggests a third reason that Republicans and Democrats ultimately settle in different communities: government policies that reduce the cost of living in a homogeneous

⁴For additional research on Southern suburbanization, also see Kruse (2005). Curiously, none of the major new suburban histories engage seriously with Gans (1982), who suggests that suburban life was more economically and politically diverse than critics at the time suggested. However, one respect in which they agree is that modern suburbia was the locus of active participatory politics.

community by increasing mobility, shrinking space in metropolitan areas, and acting as a catalyst for the self-selection process.

The Tiebout sorting model considers how different local areas present different baskets of public goods to citizens acting as consumers of public goods. However, public goods that the federal government distributes above the local level can be a catalyst for these individual choices. In the classic Tiebout model, local communities are the primary agents aiming to attract citizens with a particular basket of public goods. However, other factors, including the accessibility and mobility provided at higher governmental levels—notably the federally planned and financed highway system—may be more important to potential residents than the services under local jurisdiction.⁵ For example, a small town situated far from freeways may have a strong public school system, low crime, affordable land, and other goods that are attractive to potential residents, including those seeking to leave diversifying cities and inner suburbs. Without access to a major freeway or other transportation granting access to outside labor markets, a small town is unlikely to attract substantial development. However, if a major state or federal highway were built near a town, the town would attract residents whose political interest was in line with their demand for certain types of public goods (Campbell and Hubbard, 2009). Households' residential choice would not be due merely to a locality's competition with other communities for residents, but would result from federal and state public policies tipping of the scale in favor of communities accessible by major transportation networks.

Highways change sorting decisions by reducing travel times and opening up previously undeveloped “greenfield” land to development, catalyzing existing sorting processes. Existing correlations between residential preference and partisanship—with Republicans and conservatives desiring to move to suburbs and rural areas at a higher rate than Democrats—translate into actual sorting as highways speed the development of new communities. As highways catalyze the development of more homogeneous communities, they can indirectly change how voters' *ex ante* preferences are aggregated and expressed. Though many suburban communities are economically and culturally diverse (Gans, 1991), the con-

⁵Indeed, postwar Levittowns were distinguished by their lack of public services. Many early suburbs lacked sanitary sewers and other amenities of urban life (Hayden, 2003).

struction of new communities permits motivated developers to utilize development to create additional homogeneous communities of interest, employing tools as diverse as restrictive covenants and exclusionary zoning (Levine, 2006). Among other consequences, the conflicts among local governments in these jurisdictions may increasingly represent their politically extreme local populations, converting disputes among residents into disputes among jurisdictions (Oliver, 2001), introducing more inter-municipal conflict than would exist otherwise.

While highways facilitate geographic partisan segregation—essentially, political segregation—the mechanism by which they do so may be less overtly discriminatory even while working hand-in-hand with discriminatory policies that forced residential sorting. Critics of the Schelling sorting model insist that discriminatory policies are responsible for a substantial portion of residential segregation. Housing discrimination, real estate blockbusting, and urban renewal programs restricted residential choice for black residents, while whites could settle freely in suburbs with exclusionary zoning and restrictive covenants (Massey and Denton, 1993). The enhanced mobility provided by freeways may have been responsible for increasing the impact of these discriminatory policies where they existed, while also enhancing the sorting described in the Schelling model.

No matter which of the two prevailing theories of residential sorting is more accurate, without complete individual-level panel data on partisanship and sorting behavior, as well as access to increased mobility, we are left to rely on formal models or agent-based models based on parameters generated in formal models, to attempt to explain sorting using highly simplified assumptions about behavior. An alternative that I adopt in this chapter is to examine the realized consequences of sorting. The outcomes of interest are changes to the politics of geographic units, which I take as a suitable measure of the effects of unobserved and unmeasured sorting processes. Though partisanship is not a fixed quantity, it is sufficiently stable that changes to a place over a short period of time can allow reasonable inference that a party's voters have moved to the location or otherwise entered its voting population.

3 Individual Residential Preference As a Correlate of Partisanship

At the root of the sorting processes defined in this chapter is the relationship between political partisanship and preference for suburbia versus big city life. Without establishing a meaningful partisan divide in residential preference, much of the residential sorting described in this chapter could be regarded only as a second-order condition of income and racial differences between the two parties. Survey data from 1976—just after the peak period of freeway construction—indicate a meaningful partisan split in residential preference, with Republicans expressing stronger preference than Democrats for moving to suburban and small towns.

Surprisingly, despite the considerable contemporaneous interest in the causes of migration from urban to suburban areas during the period of white flight, relatively few publicly available survey questions attempt to measure the residential preferences of urban residents, much less link residential preference to partisanship. As Gimpel (1999) notes, to establish how individual residential preferences are tied to changes in particular places—the point of this study—we would need to collect a survey much larger than the typical national random survey.⁶ But we would ideally like to know how much partisans prefer moving into communities with other partisans.

With no data on this question, we are left to consider preferences for community size using the limited available survey data. Public opinion surveys offer limited information on the relationship between partisanship and residential preference, and the available information is limited to Roper surveys on consumer and political behavior conducted during the 1970s. A 1976 Roper survey asked respondents to describe the community in which they lived on a six-item list of communities ranging in size and density from “large city” to “rural or farm area,” then asked respondents, “If you had a choice of living anywhere you wanted to, in which of those types of places would you rather live?” (Roper Organization, 1976).⁷ Answers to such a question are, of course, “cheap talk”: though responses may be constrained by the respondent’s self-perceptions, a respondent could give any answer. However, for the purpose of assess-

⁶For example, the General Social Survey asks questions about current residence and willingness to move to seek employment, but not about preference for type of community (e.g., urban, suburban, or rural), or migration history.

⁷The face-to-face survey reached $n=2,003$ respondents.

ing personal preferences, such survey data suitably captures the residential aspirations of respondents, even if those aspirations could not feasibly be realized in the short term. Juxtaposed with self-reported partisanship, the response provides one measure of partisan biases in residential *preference*, if not actual sorting.

Were voters who preferred to move to suburbs and small towns more likely to be Republican? Figure 1 provides a clear “yes.” Even before issue polarization had fully taken hold in the two parties, voters who identified as a member of either major party expressed a difference in preference for small-town and suburban housing. After adjusting for self-reported income bracket, urban Republicans in 1976 were 10.1 percentage points more likely than urban Democrats to prefer residence in a small town (95% confidence interval: [-0.02, 0.24]) and 7.5 points more likely to prefer suburban residence over their existing urban residences (95% confidence interval: [-0.01, 0.22]). (See Figure 1.)

4 A Metro-Level Case Study on the Municipal-Level Impacts of Highways on Geographic Partisan Sorting

While only scattered survey data exist to link individuals’ residential and political preferences and their actual migration behavior, we can examine changes in local political geography over time. While municipal-level data are not available for most states prior to recent elections, states with a tradition of municipal-level recordkeeping offer substantial data to examine these patterns. Wisconsin, a state with decentralized election administration in which election results are reported and handled by city clerks, is a particularly useful setting for these studies. I examine the relationship between highways and local political development in the Milwaukee metropolitan area over the years 1944-2008. The Milwaukee area is a suitable proxy for other major industrial Rust Belt cities, entering the postwar period with a strong industrial base and dense urban population, and, like many of its regional counterparts, losing population to surrounding areas over the next 60 years. Construction of freeways between the 1950s and 1970s appears to have sped the decline by subsidizing the growth of suburban residential communities in radial spokes extending from the urban core. Many of these areas became critical to subsequent

Two-Party Difference in Residential Preference, Large-City Residents

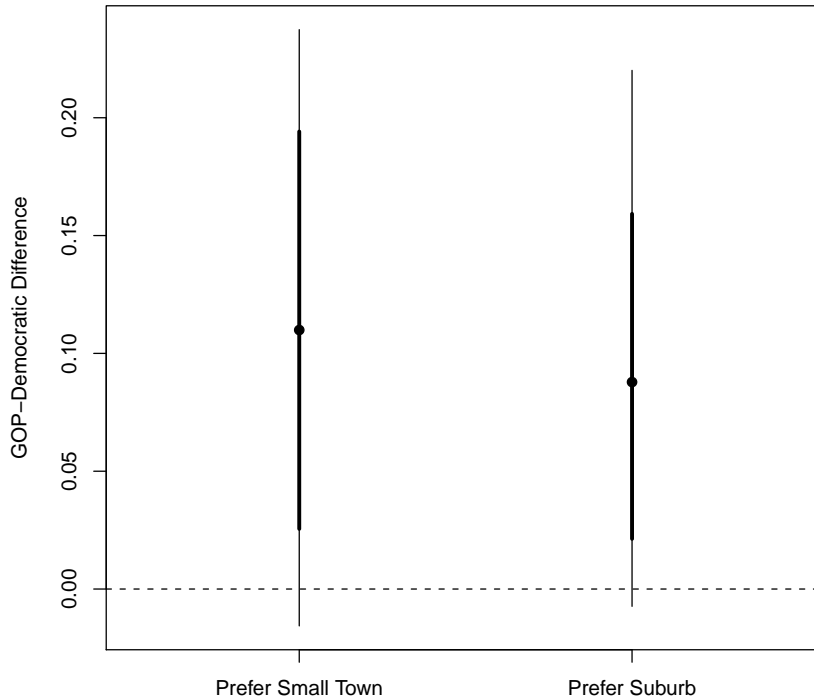


Figure 1: The partisan gap in residential preference, 1976. The vertical axis displays the difference in means between self-identified Democrats and Republicans living in large cities, adjusting for income. Question: “If you had a choice of living anywhere you wanted to, in which of those types of places would you rather live?” Source: *Roper Reports Poll 1976-02*.

Republican dominance of the suburban Milwaukee metro area.

As in other metropolitan areas, Milwaukee’s central city underwent a major decline in population while suburban development favored the ascendancy of new Republican base areas in the suburbs. Comparing the two largest counties in southeast Wisconsin reveals the wrenching political changes brought about by suburbanization during the second half of the twentieth century. While Milwaukee County’s population remained approximately stable across the second half of the twentieth century—failing to keep pace with the state’s overall population growth—neighboring Waukesha County, long a Republican stronghold, grew relentlessly. So-called “greenfield” development caused the Waukesha County population to grow by 386% between 1940 and 2000, the fastest rate in Wisconsin, while maintaining its

Republican partisanship.⁸

The growth of increasingly affluent and Republican suburbs in Waukesha and other suburban Milwaukee counties can be related to the counties' freeway connections. To examine the role of freeway construction in the Milwaukee area, a bubble-plot map (Figure 2) captures the growth of Republican suburbs around Milwaukee freeways between 1952 and 2000. Each point represents a municipality, its diameter the total number of votes cast. The familiar red-blue coding scheme captures areas won in which Republicans (red) or Democrats (blue) won a majority of the two-party vote. The major freeways that existed in each year, extracted from historical maps and the Federal Highway Administration's database of highway construction (Baum-Snow, 2007), appear as dotted lines. In 1952, lightly populated rural areas were primarily Republican, but many of the Republican votes were in the inner suburbs near the City of Milwaukee (represented by a large black dot on the maps). By 1980, the region's portion of the Interstate Highway System had been completed for nearly a decade, and Interstate-94, the major east-west route between Madison and Milwaukee, had made possible substantial and sustained growth in an east-west highway corridor extending across a thirty-mile stretch of Waukesha County. Other suburban counties, including Ozaukee County and Washington County, underwent substantial Republican growth as well. In the meantime, the previously suburban communities in Milwaukee County had become inner suburbs and transformed from Republican bastions into swing areas, or from swing districts to Democratic strongholds.

⁸In 1952, Eisenhower captured 65.6% of Waukesha County's 46,111 votes, accounting for only 10% of his Milwaukee-area vote total. Eisenhower's main reservoir of votes was in Milwaukee County, where he won 51% of the county's 426,000 votes, nearly seven times as many votes as he obtained in Waukesha County (and more than twice as many votes as he obtained in all four outlying counties combined). By the 2000 presidential election, the urban-suburban divide was well established and the Republican center of gravity had shifted to Waukesha and other suburbs. Governor George W. Bush won 65.3% of the Waukesha County vote, nearly identical to Eisenhower's vote share. But these votes accounted for 32.2% of his overall vote total in the five-county metro area. Bush's 37.7% share of the Milwaukee County vote accounted for only 39.9% of his Milwaukee-area vote total. These changes dramatically changed the targeting behavior of the two political parties.

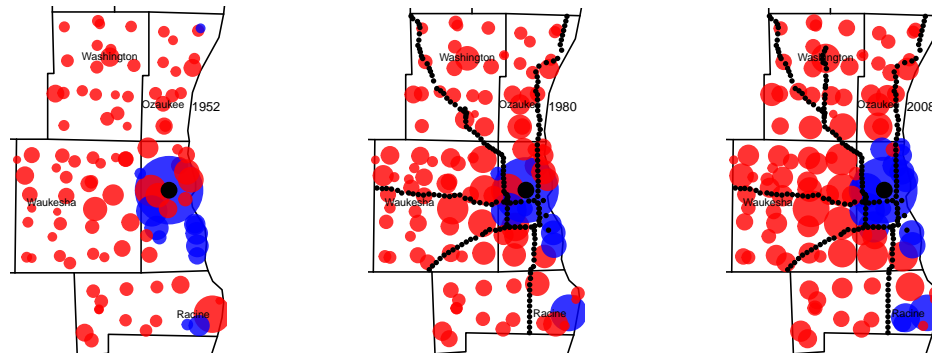


Figure 2: Municipal-level presidential election returns in the Milwaukee area, 1952, 1980, and 2008. The size of each bubble is proportional to the total presidential vote in the municipality. Areas in red were won by Republicans and areas in blue were won by Democrats. Highway segments built as of each election year appear as dotted lines. (Source: *Wisconsin Blue Book*, 1944-2008.)

4.1 Learning from the Freeway-Driven Political Development in Two Towns

While the absence of municipal-level covariates across the study period prevents use of regression or matching analyses for causal inference, observing the time trend of cities near freeways suggests that freeways influenced local political development. Two cities from suburban areas of the Milwaukee metropolitan area demonstrate the phenomenon of freeway-driven political change. Both examples were, as of the early 1950s, relatively small communities with no role as commercial centers. In both cases, given that major divided highways were built primarily with intercity and interregional transportation needs in mind, construction of a freeway near a city can be considered a form of exogenous shock. The selected examples are from two periods. The City of Brookfield, a current affluent suburb, lies along I-94 in Waukesha County. The Town of Farmington, in Washington County, was a rural farm community until the construction of a new four-lane segment of US Highway between Milwaukee County and Washington County in 1990 stimulated the growth of large single family homes and a sudden spike in the town’s Republican population.

The sudden change in the Republican vote resulting from freeway construction appears in Figure 3. The red and blue points in the figure represent, respectively, the raw Republican and Democratic vote totals in the two towns in each presidential election. The set of dashed lines represents the linear fit to the data points from the years before and after the year of highway construction. Adopting the admittedly strong assumption that the linear trend line would have remained unchanged before and after the chosen breakpoint in the absence of treatment, we can reasonably infer that construction of the local Interstate produced a large surge in Republican growth that would not have occurred had the freeway not been built. In both towns, the growth of Democratic votes appears roughly linear before and after freeway construction.

Brookfield, the second-largest city in Waukesha County, appears to owe its existence as an affluent Republican stronghold to the construction of I-94 in Waukesha County during the early 1960s. Existing as an insignificant agricultural community during the postwar suburban boom, the city did not incorporate until 1954. But as early as the mid-1950s it had become attractive to Milwaukeeans escaping the city to build single-family housing. Located only twelve miles from the Milwaukee central business district, the city offered many advantages to white residents seeking housing during the postwar construction boom, and it resided in a county with lower taxes and fewer social problems than Milwaukee County. With more than 17.5 miles of land area, most of it open agricultural land suitable for residential development, the city was already attracting new residents and businesses in the early 1950s. However, the largest boom in the city's voting-age population occurred only after the completion of Interstate-94 on the city's southern boundary in 1964. Between 1964 and 1968, the number of Republican votes cast in Brookfield nearly *doubled*, while the Democratic vote total held roughly constant. (See Figure 3, Panel A.)

Highways' influence on suburban political development is not limited only to the 1960s, laying to rest the notion that white flight or white response to urban unrest were solely responsible for the suburban Republican growth observed in places like Brookfield. In the 1980s, the rural Republican town of Farmington in Washington County was reliably Republican but had grown at a much slower pace than the highway-connected "boomburbs" of Waukesha County. Through the 1980s, Farmington had

grown at a modest, linear pace. However, after the expansion of the nearby US Highway 45 to full free-way standards in 1990, the town experienced a major growth boom consisting almost entirely of new Republicans, taking place almost entirely in the form of new exurban housing tracts (Figure 3, Panel B.)

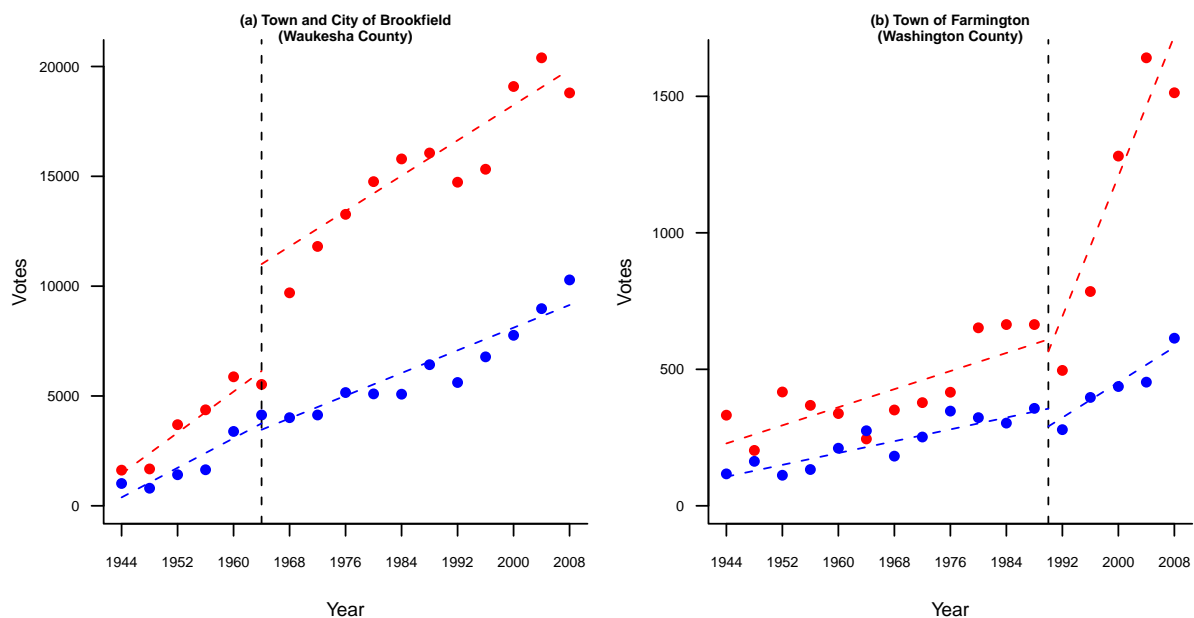


Figure 3: Total votes cast for each major party in (a) the Town and City of Brookfield, Wisconsin and (b) the Town of Farmington, Washington County, Wisconsin before and after construction of the nearest freeway (represented by a vertical dashed line). Red and blue lines indicate the total number of votes cast for the Republican and Democratic presidential candidate, respectively. The vertical dashed line indicates the year of freeway construction. Broken, dashed red and blue lines indicate the linear trend line fitted to election results before and after construction of the freeway. (Source: *Wisconsin Blue Book*, 1944-2008.)

4.2 Municipal-Level Effects in the Full Metro Sample

How much did the findings for these two archetypal freeway communities replicate throughout the Milwaukee metropolitan area? Applying the same logic to the population of municipalities in the Milwaukee metropolitan area as a whole that was applied to the study of the two towns above, we can observe impacts of highway construction on all communities at least 15 kilometers from the Milwaukee central business district. For all suburban communities in the sample, the election results for 1944 to 2000 are centered on the year of construction of the nearest major freeway. Did the relative Republican strength of

communities vary, on average, after freeway construction? Figure 4 presents the results of this analysis. The vertical axis plots the difference in the Democratic share of the two-party presidential vote between each locality and the City of Milwaukee, measured in each available election year. A locally weighted regression curve is fitted across the freeway construction year. This curve shows that monotonic growth for the Democrats reverses in the period after freeway construction that converted to a steady decline in the Democratic vote in suburban communities, relative to the City of Milwaukee, after freeway construction. Though a strong assumption is required to establish the change in partisan polarization as a causal effect, these results provide additional descriptive evidence that even if suburbanization was already underway in the period before freeway construction, both the pace and partisan aspects of suburbanization shifted dramatically after freeway construction. Within 30 years of freeway construction, included communities had become, on average, thirty points less Democratic than the City of Milwaukee.

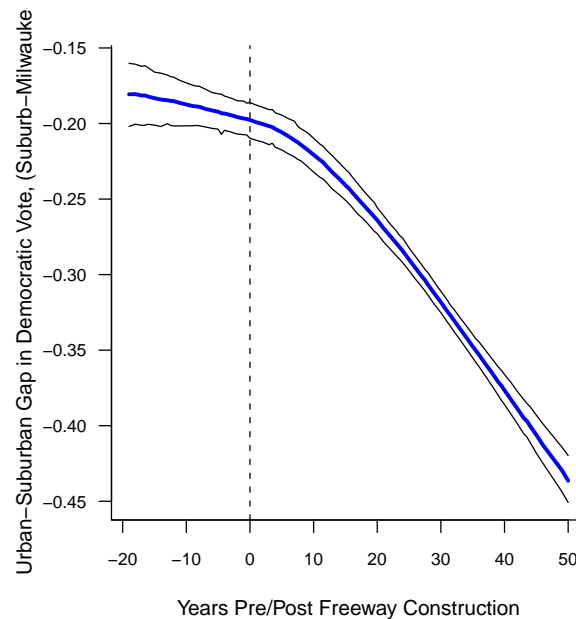


Figure 4: The difference between the suburban municipal Democratic presidential vote and the City of Milwaukee Democratic presidential vote, centered on the year of construction of the nearest freeway. A lowess curve with 80% and 95% confidence envelopes is fitted to the points. Source: *Wisconsin Blue Book*, 1944-2008.)

Another way to measure highways’ impact on sorting using the case study data is by estimating communities’ propensity to deliver a “landslide” in a presidential election—that is, casting a two-party vote

more than 10 points ahead of or behind the average in the complete metropolitan area. A locally weighted regression curve is again used, in this case to estimate the proportion of communities that qualified as “landslide” communities before and after local freeway construction. As expected, highways not only appear to make the municipalities near which they are built more Republican, but also make them more politically homogeneous, as measured by their landslide status. By stimulating the construction of new places, highways also appear to have generated local political homogeneity, with a sudden turnaround in the proportion of landslide communities immediately after major freeways were built locally (Figure 5).

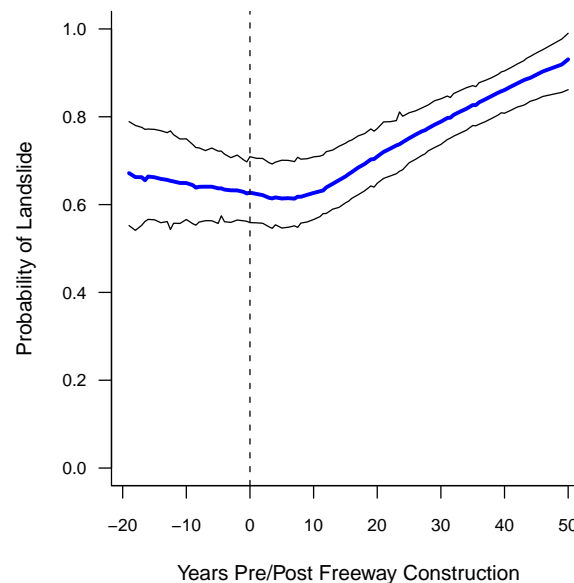


Figure 5: Locally weighted probability that a suburban community is a “landslide” community, delivering a Democratic presidential vote more than ten points ahead of or behind the regional average presidential vote in the presidential election. All municipal-level time series are centered on the year of construction of the nearest freeway. Source: *Wisconsin Blue Book*, 1944-2008.)

5 The Impact of Highways on the Partisan Sorting of Suburbia: A National Study

Freeways’ localized impact could be expected to appear in a national sample of localities as well. Unfortunately, the absence of municipal-level voting data in many states to this date, let alone historical

municipal-level data, prevents extension of the above analysis to a large national sample.⁹ County-level data provide a reasonable alternative to municipal- or precinct-level analysis. Though they can vary substantially in area across states, most counties can appropriately be analyzed as the zone of influence of freeways.¹⁰

As at the municipal level, interstate highway construction at the county level can be expected to contribute to pattern of homogeneous political development, with highways fostering the creation of “boomburbs” favoring the Republican Party. I examine these effects in a set of suburban counties, broadly defined to encompass counties in the immediate area of influence of major US cities. To estimate the effects of highway construction, I consider construction of Interstate highways in a county as a binary treatment under a range of coding assumptions. Drawing on data from 13 presidential elections, I demonstrate that highways created a large Republican swing in the counties in which they were built.

5.1 Data and Methods

Highways’ effects on suburban counties are estimated using a sample defined by a simple coding rule. I define suburban counties as those with centroids more than 20 and fewer than 100 kilometers from the center of a major city.¹¹ Under this rule, the national sample contains $n = 939$ counties, which appear in the map in Figure 6.¹² Counties in which John McCain won the 2008 two-party vote appear in red, while those in which Barack Obama won appear in blue.

Treatment: For each election year t and county i , a binary treatment variable Z_{it} indicates whether an Interstate highway passed through county i by year $t - 4$, constructed from the Federal Highway Administration PR-511 database. The difference in the county-level Democratic vote share between

⁹A notable exception, the Record of American Democracy data, provide the equivalent of municipal-level data for the landslide 1984 and 1988 election years, but only for states that roughly fall in the northeast quadrant of the country.

¹⁰Other analyses, primarily in economics, have employed county data to evaluate highways’ local impacts. See, e.g., Chandra and Thompson 2000.

¹¹This is an arbitrary coding assumption, but model-based estimates remain robust for counties with centroids within an outer urban radius ranging from 60 to 100 kilometers.

¹²To exclude heavily populated areas that may have fallen within the catchment area of other large cities (e.g., Kings County, New York), I exclude from the suburban sample any county with a 1950 population greater than 300,000.

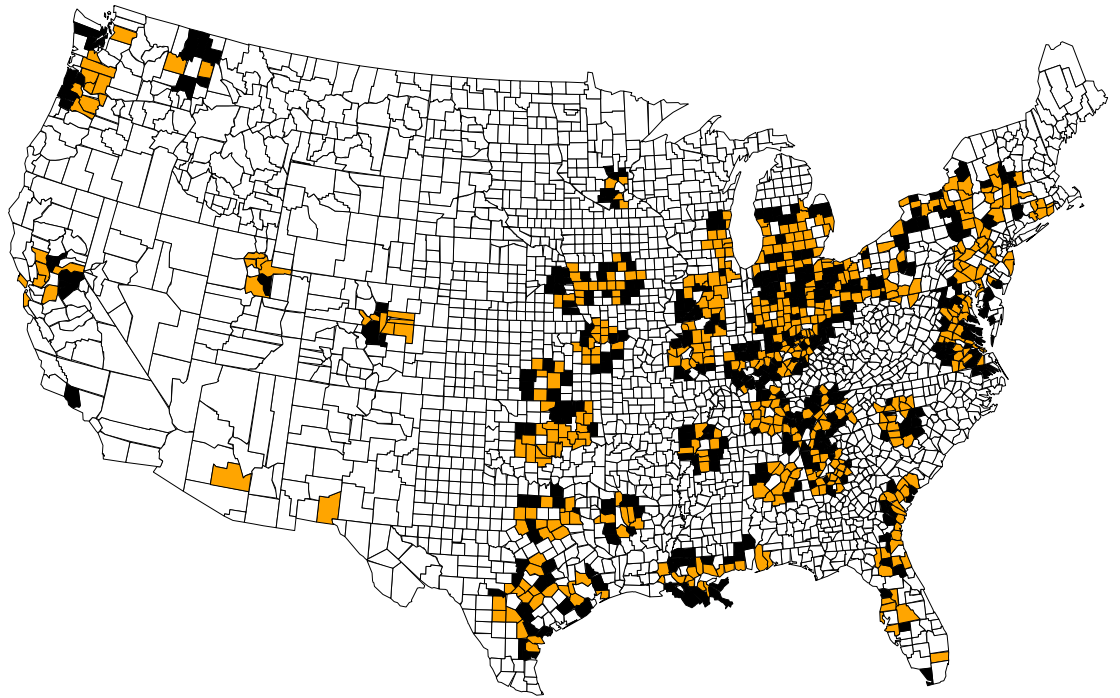


Figure 6: Map of the suburban county sample. Counties that contained an Interstate highway at any point appear in orange, while counties without Interstate highways appear in black.

1952 and election year t , $t \in 1960, 1964, \dots, 2008$ is the outcome of interest.¹³¹⁴

¹³The PR-511 data constitute the only rigorous year-to-year record of the construction of interstate highways and the incorporation of existing freeways into the system (Baum-Snow, 2007; Michaels, 2008; Chandra and Thompson, 2000).

¹⁴The Stable Unit Treatment Value Assumption (Rubin, 1986) is relevant to these coding decisions. The estimation of the treatment effect depends on the assumption that a county that has had an Interstate highway in place for 4 years receives the same “dose” of treatment as a county in which an Interstate was built as long as two decades earlier. With a few exceptions, this assumption is reasonable, as most of the Interstate system was built in a narrow 14-year window between 1956 and 1970. In addition, I assume that a county traversed by multiple interstate highways received the same treatment “dosage” as a county with only one highway. An additional assumption, which is adopted in much of political science research, is that no interference occurs between units, so that the realized treatment of unit i has no bearing on the outcomes in unit j . Of course, this is a strong assumption for any analysis that uses adjacent geographic units in causal inference (Sobel, 2006).

Covariates: Unlike analyses on suburban politics that use present-day covariates in cross-sectional analyses (Williamson, 2008; Gainsborough, 2001), this analysis uses only pre-treatment covariates from the period *before* passage of the Federal-Aid Highway Act of 1956 (widely known as the Interstate Highway Act) to avoid introduction of post-treatment bias. I include a range of pretreatment political and 1950 Census variables in the county-level regressions.¹⁵ Census-derived variables include the proportion of the county that reported a race other than white and the proportion that lived in urban areas. Other indicators of the population growth trends and county urbanicity include population density, the number of small farms (an indicator capturing low-income rural residents), the county’s percentage urban (expressed as a decile), and crop value per capita (an indicator of farm productivity and availability of the type of land most suitable for residential development). To account for pre-existing suburban mobility trends, the regressions include the percentage of households in the county in 1950 that were not residents of the county in 1949. Three additional, highly predictive controls are the lagged two-party presidential vote in the years 1948, 1952, and 1956. Results from these three elections capture much of the variation in subsequent county-level aggregate vote choice, including the Civil Rights Era realignments.

Outcomes: For each presidential election year t , the outcome of interest is the $Y_t - Y_{1952}$, the difference in the Democratic proportion of the presidential vote between year t and 1952. Outcomes are generated for all election years, 1956 to 2008. Using this outcome allows difference-in-difference estimation throughout the paper, allowing more robust estimation of causal effects.

Estimation: The following difference-in-difference model is assumed, estimated by ordinary least squares regression independently for each year t :

$$\mathbf{Y}_t - \mathbf{Y}_{1952} = \beta_{0t} + \beta_{z_t} \mathbf{z}_t + \beta_{1t} \mathbf{x}_1 + \dots + \beta_{kt} \mathbf{x}_k + \epsilon \quad (1)$$

where z_t is the vector of treatment indicators calculated for each election year. We assume the linear model correctly captures the relationship among the variables. For β_{z_t} to capture the causal effect of the treatment of interest, this assumes that the units in the treatment group undergo the same average

¹⁵Variables from the 1950 Census were obtained from the National Historical Geographic Information System database (Fitch and Ruggles, 2003).

Variable	Mean	SD	Min.	Max.
Treatment Variables				
Opening of Earliest Interstate Highway, If Applicable (Year)	1970	6.713	1940	1990
Interstate Highway Built At Any Time	0.547	0.498	0	1
Covariates				
Republican Presidential Vote, 1948	0.407	0.192	0.006	0.841
Republican Presidential Vote, 1952	0.543	0.152	0.081	0.930
Republican Presidential Vote, 1956	0.551	0.153	0.095	0.865
Proportion Non-White, 1950	0.114	0.167	0	0.818
Farms Under 10 Acres, 1950	174	176.3	0	1777
Log(Persons Per Square Mile, 1950)	-2.57	0.845	-6.61	0.06
Proportion in Urban Residence, 1950 (National Decile)	2.54	2.207	0	9
Crop Value Per Capita, 1950	112	133	0	1619
Proportion Non-Resident One Year Earlier, 1950	0.013	0.13	0.001	0.192
Region=South	0.435	0.496	0	1

Table 1: Summary statistics for suburban county sample ($n = 939$).

potential changes over time as units in the control group, conditional on the included covariates. If this condition holds, this difference-in-difference estimate is a robust approach to causal inference. Each of the point estimates is bootstrapped for each year and lowess-smoothed to account for the statistical dependence of estimates from proximate elections.

5.2 Results

Least-squares regression results demonstrate that a meaningful share of Republican suburbanization can be explained by Interstate highway construction, with especially large Republican shifts occurring in the South. Bootstrapped and lowess-smoothed estimates for each election year from 1956 to 2008 are presented in Figure 7. In the overall sample, the presence of an Interstate highway in a county reduced the Democratic vote by between 1 and 2 points over a 24-year period from 1976 to 2000, with effects substantially attenuated by the remainder of the 2000s.

However, this overall effect varied by region, with a larger effect in the South than outside the South. In suburban counties in the South, construction of an Interstate highway at least four years before an election produced a stable 2.5 to 3 percentage point drop in the Democratic presidential vote between the years 1976 and 2004, with the non-smoothed estimates reaching a maximum effect of approximately 4 points. It is also possible that earlier construction of freeways and other forms of metropolitan transit in non-Southern counties, especially in the Northeast, produced residential segregation at an earlier stage than in the Southern sample. In non-Southern counties, the largest effect estimated was during the mid-1980s, when 95% confidence intervals excluded zero and the smoothed estimate of freeways' effect on the suburban Democratic vote was about 1.5 points. The earlier construction of freeways in these states and the more extensive settlement of counties in the suburban catchment area may explain the relatively smaller effects observed in the study period.

5.3 Robustness Checks

I verify the robustness of these model-driven results using multiple checks, including placebo tests, application of additional matching algorithms to the data, and models with more flexible functional

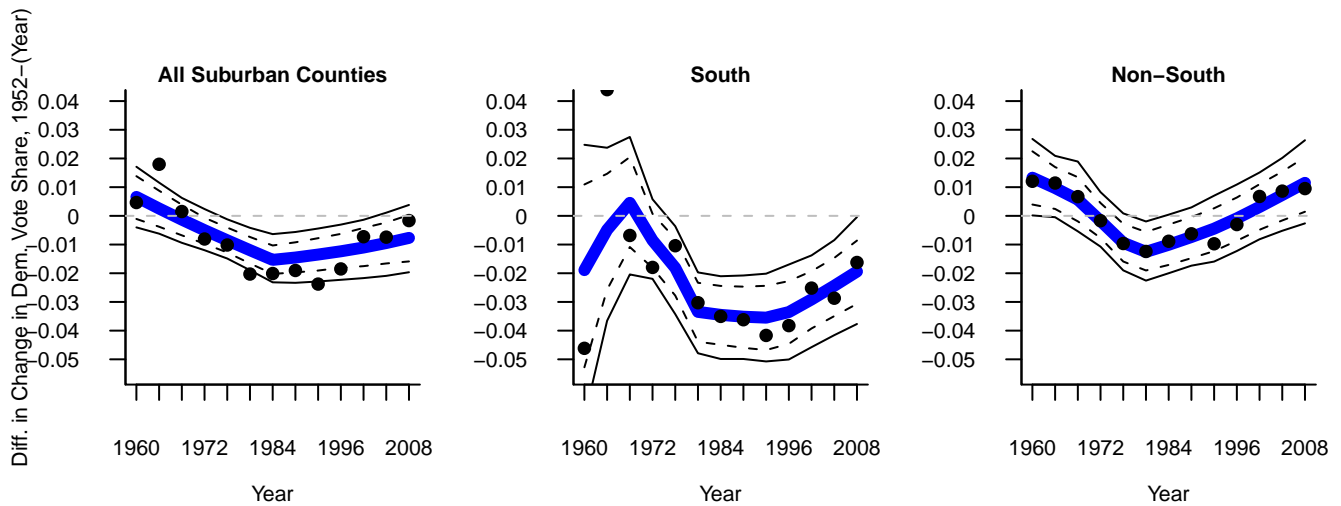


Figure 7: Lowess-smoothed, bootstrapped OLS estimates of the effect of construction of a Interstate highway in a county by year $t-4$ on the difference in the Democratic vote between 1952 and year t . From left to right, results apply to all suburban counties, suburban counties in the South, and suburban counties outside the South. 95% (solid line) and 80% (dashed line) confidence envelopes are generated from the lowess-smoothed curves (blue) to incorporate information from proximate observations. Unsmoothed bootstrapped estimates appear as points.

forms.

Non-Time-Dependent Treatment: As a primary robustness check, I redefine the treatment variable to indicate whether an Interstate highway was built in the county at any point through the study period. This step essentially coarsens the treatment variable to ignore the year in which treatment occurred, a step justified by the relatively short build-out period of the Interstate Highway System. Among the 1,327 counties in which an Interstate highway was built, 79 percent experienced treatment between 1956 and 1972. In only five percent of counties did states build freeways before passage of the Federal-Aid Highway Act of 1956—mostly Northeastern states that built toll-funded turnpikes that were later “grandfathered” into the Interstate Highway System. The coefficient estimate for election years 1960 to

the present estimates the treatment effect associated with this coarsened treatment variable. The results (Figure 8) largely coincide with the findings obtained using the time-varying treatment. On average, if highways had not been constructed in the suburban counties in the full sample, those counties would have been about 1 to 2 points more Democratic during a period ranging from 1968 to the early 2000s. In Southern states, Interstate highways made suburban counties 2.5 to 3 percentage points less Democratic. They had a small effect on suburban counties outside the South only distinguishable from zero during a brief period in the 1980s. The absence of statistically significant effects during the pre-treatment period, especially provides support for the unbiasedness of the findings.

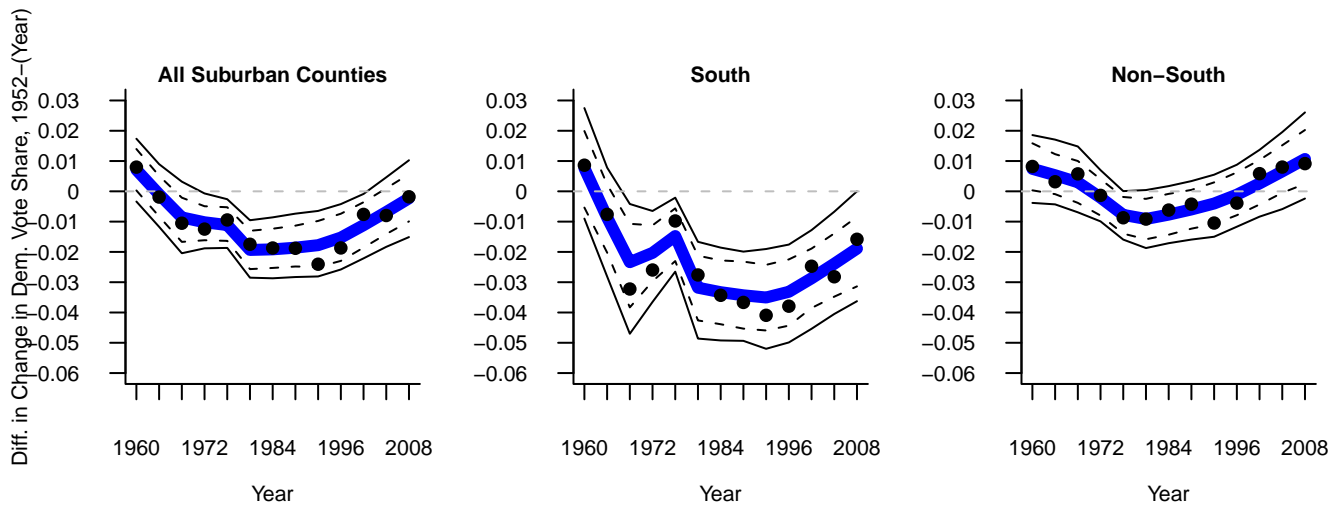


Figure 8: Lowess-smoothed, bootstrapped OLS estimates of the effect of construction of an Interstate highway in a county on the difference in the Democratic vote between 1952 and year t , coding the treatment variable, $Z = 1$ if an Interstate highway was built in the county at any point. From left to right, results apply to all counties, counties in the South, and counties outside the South. 95% (solid line) and 80% (dashed line) confidence envelopes appear around the smoothed point estimates (blue). Non-smoothed, bootstrapped estimates appear as points.

Matching and Regression: I also perform linear regression on the suburban county sample after

first generating a more balanced sample using coarsened exact matching (CEM) (Iacus, King and Porro, 2009; Ho et al., 2007). This matching method places covariates in multidimensional bins, then assembles a sample from the matched and control observations that appear in the same bin. CEM permits matching data that are not ellipsoidally symmetric (i.e., that are not distributed multivariate t or normal) while bounding the imbalance (Rubin, 1976). The default procedure in CEM is to discard both treated and untreated observations, possibly generating a more balanced sample when covariate overlap is minimal than methods that only discard unmatched control-group units.¹⁶ For almost all of the covariates, which are matched with respect to the time-varying treatment, coarsened exact matching removes almost all of the imbalance. The standardized imbalance for the treated and untreated groups—the difference in means for each variable between the treated and control groups, divided by the standard deviation of each variable in the treated group—appears in Figure 9.

Reestimating the difference-in-difference regressions on the matched sample largely confirms the estimates obtained without matching, yielding larger estimates of effect sizes on the new sample. Interstate highways made suburban counties in the South up to 4 points less Democratic than they would have been in the absence of freeways between the years 1970 to 1990, attenuating slightly to only 2 percentage points by 2008. In the full national sample, effect sizes between the mid 1970s and mid-1990s were about two percentage points, declining to zero by the 2000s. Estimates in non-Southern counties were generally indistinguishable from zero during periods in which other regions observed effects.

Functional Form: An additional robustness check, not displayed here, shows that results are not dependent on the linearity assumption of least squares regression. Generalized additive models (Hastie and Tibshirani, 1990; Cranmer, 2007) apply a flexible surface to the data, and yield point estimates nearly identical to those obtained under the linear model.

¹⁶This decision to produce internally valid estimates comes at the cost of losing the ability to estimate the treatment effect on the treated (ATT).

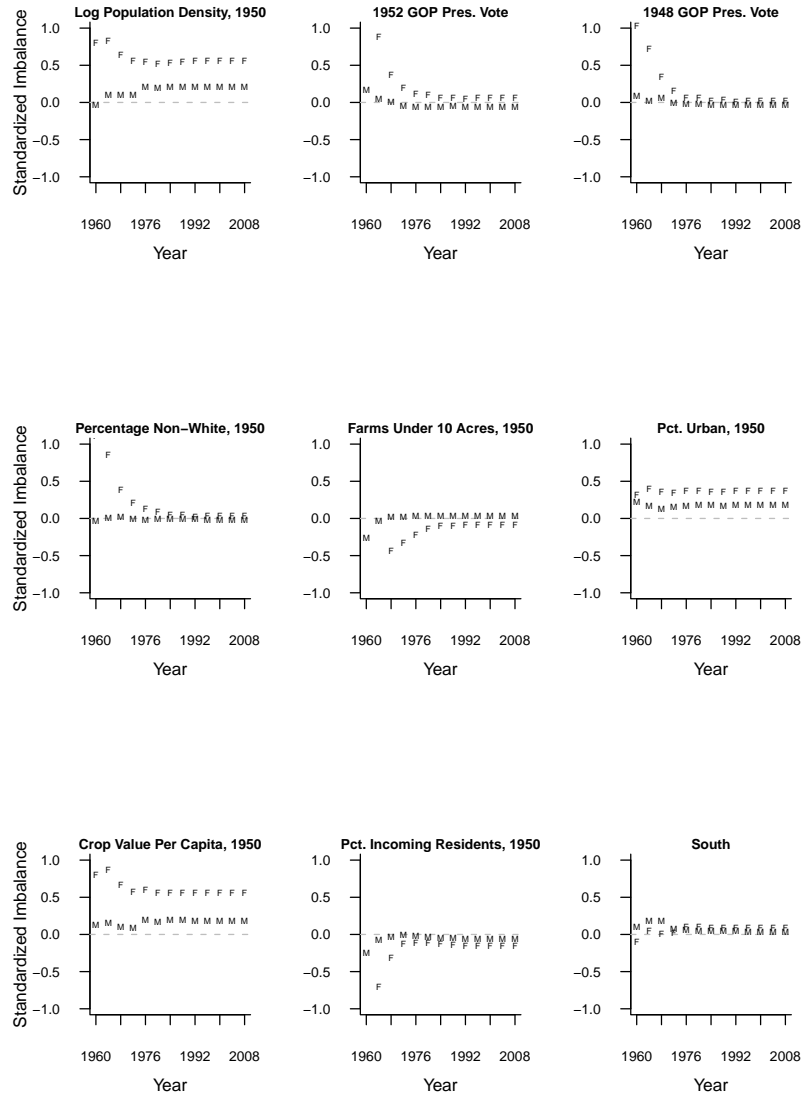


Figure 9: Standardized imbalance of included covariates (difference in means between the treated and control group, divided by the standard deviation in the original treated group) under coarsened exact matching for each year using the time-varying version of the Interstate highway treatment variable and coarsened exact matching with four histogram bins per variable. The standardized imbalance in the [M]atched and [F]ull (original) sample are presented for the matched sample for each election year, 1960-2008.

6 Discussion

Of the effects observed in the county-level analysis, the large effects observed in the South are of greatest interest. These results are consistent with past research on the South's dependence on outside investment

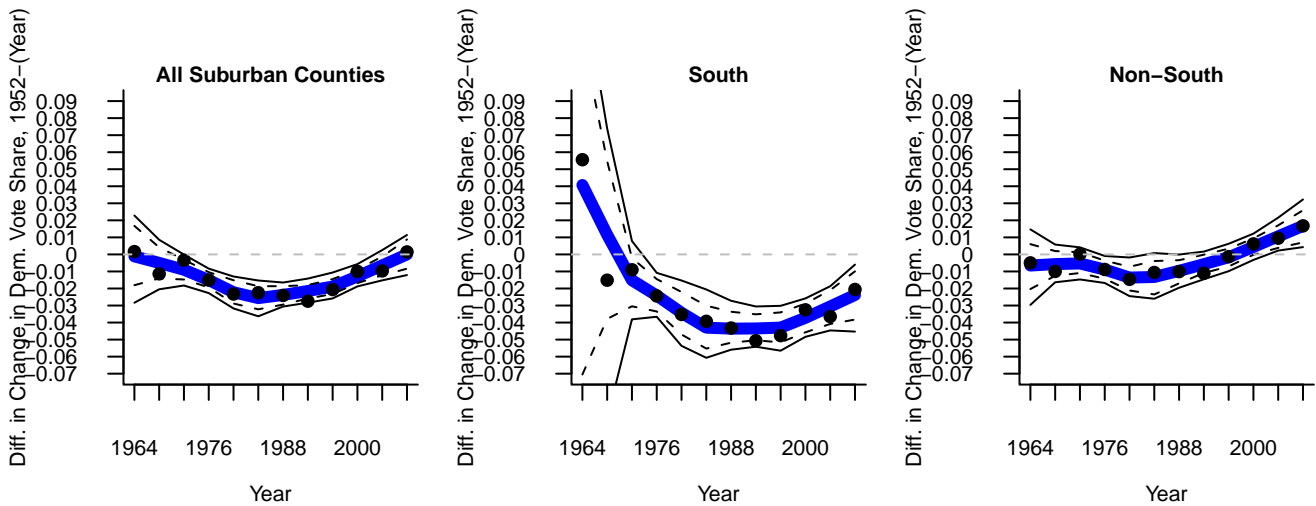


Figure 10: Lowess-smoothed, bootstrapped OLS estimates of the effect of construction of a Interstate highway in a county by year $t - 4$ on the difference in the Democratic vote between 1952 and year t , applied to CEM-matched sample. From left to right, results apply to all suburban counties, suburban counties in the South, and suburban counties outside the South. 95% (solid line) and 80% (dashed line) confidence envelopes are generated from the lowess-smoothed curves (blue) to incorporate information from proximate observations. Unsmoothed bootstrapped estimates appear as points. Displayed results exclude early-adopter states (those whose Interstate segments were built before 1956).

for its postwar development. The overall poverty of rural areas and the low cost of farmland in the South increased the appeal of these areas for residential development. As highways connected a poor rural labor force to the outside labor market, Interstate highway crossroads became suburban and exurban boomtowns that supported the Republican Party (Schulman, 1994, 116). The growth of white flight in the South also fed more rapid growth of suburban Republicanism in these areas, as white voters fled urban school districts and cities with politically empowered black populations (Kruse, 2005).

The apparent attenuation of highways' effects on the suburban Democratic vote in recent years does not undermine the argument that highways acted as a catalyst for ongoing sorting. Though the available evidence does not permit inferences about the precise sorting mechanisms at work, highways may have

contributed to the growth of more conservative suburban neighborhoods during the peak period of white flight in part by facilitating ongoing racial segregation. Highways thus may have increased the impact of exclusionary zoning and other restrictions on open housing. As open housing practices took hold in suburban areas, and as the housing stock in suburbs aged and became more attractive to lower-income groups, highways may have proved to be the cure for sorting, providing the means for new groups, including ethnic and racial minorities, to move into previously homogeneous communities.

Any observational study such as this one that is not based on a true “natural experiment” may be vulnerable to some degree of omitted variable bias. While the combination of difference-in-difference, regression, and matching techniques is robust for causal estimation, one necessary shortcoming of this study is that the variables used in the analysis do not fully capture the “assignment mechanism,” behind highway construction (Rubin, 1991). Though the Bureau of Public Roads (later the Federal Highway Administration) exercised final authority over highway placement, assignment decisions were a result of an interplay of state highway departments and federal authorities. Unfortunately, this highway assignment process was not sufficiently documented to permit effective measurement of these outcomes. This project has used available demographic and political outcome data to account for the important differences in the political outcomes of interest.

Among other potential challenges in correctly incorporating the assignment mechanism into these analyses, critics may point to the increasing local and regional influence in highway planning as a source of omitted variable bias. However, this increasing role for regional planning authorities is a fairly recent development that arose relatively late in the freeway construction process. While the Federal-Aid Highway Act of 1962 required state governments to provide comprehensive planning in the building of freeways, regional planning organizations’ involvement in highway construction decisions was largely *pro forma* until the Federal-Aid Highway Act of 1973 granted regional authorities a formal role in transportation planning (Gerber and Gibson, 2008). Most of the highways accounted for in this study were built before the turn-of-the-decade freeway revolts around 1970s, and pre-dated the peak urban-suburban disputes over transportation funding in the context of regional governance. Such developments could be also be considered endogenous (i.e. “post-treatment”) to earlier freeway construction.

Another potential objection to this study is that Congress has historically interfered in transportation planning, making analyses of highway construction dependent on Contrary to historical trends in infrastructure planning, after passage of the original implementing legislation, the Congressional role was minimal. Contemporary research on highway spending suggests that it functions either primarily as a form of distributive good, or as pork delivered to districts. While such planning has often been the case for federal-highway spending, the Interstate Highway System was different, since both the overall system map and a dedicated revenue stream were passed at the outset of the program, and the system was built with minimal Congressional intervention after the system's initial approval. Far from using the Interstate Highway System as a distributive program with collections-small projects (Weingast and Wallis, 2005), the overall contour of the system was locked in from the beginning. Congress delegated to the BPR substantial control over the Interstate designation process, and until later years did little to intervene in the course of highway construction. Thus, the primary avenue for parochial constituencies to exercise influence with highway builders was not through Congress, but through the state governments and state highway departments. To the extent that highways were built in response to political demands, such decisions were made by executive branch officials overriding the proposals of highway engineers, not by members of Congress passing earmarks (Mertz, 2010, 78). Indeed, the Bureau of Public Roads archives are replete with correspondence between members of Congress and the Bureau of Public Roads asking for designation of additional highways as Interstate routes. The inevitable boilerplate response from BPR officials indicated that such designations, which fell within the authority of the Bureau of Public Roads, could not be made without additional authorization of Interstate mileage from Congress.

7 Conclusion

As one of the largest spatial interventions in American history, the Interstate Highway System revolutionized where citizens live, where they work, and how they travel. In the process, it also dramatically changed where partisans live. Opening swaths of rural land to suburban development, federally financed freeways account for a meaningful increase in the Republican vote in the outskirts of urban areas. Though these effects were more pronounced in the South than in the remainder of the country, they were suf-

ficiently large to tilt a toss-up election to one side or the other. In the South, the five-percentage-point drop in the Democratic vote in the matched sample would have been enough to change a county from a swing district to a core Republican area. For non-Southern areas, the metropolitan case study presented in this chapter suggests that effects on sorting were occurring below the county-level, even if they were not measurable in the national sample of suburban counties.

The regional variation in effects is consistent with the hypothesis that freeways stimulate residential sorting by opening undeveloped areas to residential development. The particularly large effects in the South confirm the particular importance of federal spatial policy in that region.¹⁷ The well documented diversification of suburbs in the 1990s and 2000s may have contributed to these shifts, even as highways provided affluent and relatively affluent conservatives access to even newer and more homogeneous housing stock in “exurban” communities.¹⁸ These regionally specific findings are corroborated by historical research on the importance of federal investment in the development of the modern South (Schulman, 1994). The effect of infrastructure on suburban political development appears to be yet another instance of Southern exceptionalism (see, e.g., Spilerman (1973)).

An overriding implication of this chapter is that the Interstate Highway System’s effects on a range of political outcomes, measured at multiple levels and with different data sources, call into question studies that explain macro-scale changes in metropolitan developments primarily in terms of agent-based models of individual behavior, but fail to take into account how government policies changed available choices. Highways were not a response to suburban demand for more transportation, but were causally prior to citizens’ choice to live among fellow partisans. Highways influenced the cost-benefit calculus of households, balancing the costs of commuting against the higher costs of urban housing. By exploring policies’ effects on political geography, rather than attempting to estimate the contextual effects of suburbanization on individual behavior once individuals are already in place, we can ascertain how federal policies influenced individual mobility to produce the the homogeneous partisan communities that have

¹⁷Indeed, highway construction may constitute an additional policy that favored whites and brought Southern racial conservatives into the enacting coalition.

¹⁸See, e.g., Berube et al. 2006.

come to define American political geography.

References

- Baum-Snow, Nathaniel. 2007. "Did Highways Cause Suburbanization?" *The Quarterly Journal of Economics* 122(2):775–805.
- Berube, Alan, Audrey Singer, Jill H. Wilson and William H. Frey. 2006. Finding Exurbia: America's Fast-Growing Communities and the Metropolitan Fringe. Technical report Brookings Institution Washington, DC: .
- Bishop, Bill. 2008. *The Big Sort: Why the Clustering of Like-Minded America is Tearing Us Apart*. Houghton Mifflin.
- Campbell, Andrea L. 2003. *How Policies Make Citizens: Senior Political Activism and the American Welfare State*. Princeton: Princeton University Press.
- Campbell, Jeffrey R. and Thomas N. Hubbard. 2009. "The Economics of 'Radiator Springs': Industry Demands, Sunk Costs, and Spatial Demand Shifts." *Federal Reserve Bank of Chicago Working Paper* (2009-24).
- Chandra, Amitabh and Eric Thompson. 2000. "Does Public Infrastructure Affect Economic Activity? Evidence from the Rural Interstate Highway System." *Regional Science and Urban Economics* 30(4):457–490.
- Chen, Jowei and Jonathan Rodden. 2009. "Tobler's Law, Urbanization, and Electoral Bias." *.
- Cranmer, Skyler J. 2007. normal.gam: Generalized Additive Model for Continuous Variables. In *Zelig: Everyone's Statistical Software*, ed. Kosuke Imai, Gary King and Olivia Lau.
- Fenton, John H. 1966. *Midwest Politics*. New York: Holt, Rinehart and Winston.
- Fitch, Catherine A. and Steven Ruggles. 2003. "Building the National Historical Geographic Information System." *Historical Methods* 36(1):41–51.

- Forest, Benjamin. 2004. "Information Sovereignty and GIS: The Evolution of 'Communities of Interest' in Political Redistricting." *Political Geography* 23(4):425–451.
- Gainsborough, Juliet F. 2001. *Fenced Off: The Suburbanization of American Politics*. Washington, DC: Georgetown.
- Gans, Herbert. 1991. *People and Plans*. New York: Basic.
- Gans, Herbert J. 1982. *The Levittowners: Ways of Life and Politics in a New Suburban Community*. New York: Columbia.
- Gerber, Elisabeth and Clark Gibson. 2008. "Balancing Regionalism and Localism: Regional Governance in American Transportation Policy." Presented at the University of Chicago Harris School of Public Policy.
- Gimpel, James G. 1999. *Separate Destinations: Migration, Immigration, and the Politics of Place*. Ann Arbor: Michigan.
- Gould, Roger V. 1995. *Insurgent Identities: Class, Community, and Protest in Paris from 1848 to the Commune*. Chicago: Chicago.
- Grannis, Rick. 1998. "The Importance of Trivial Streets: Residential Streets and Residential Segregation." *American Journal of Sociology* 103(6):1530–1564.
- Hastie, Trevor J. and Robert Tibshirani. 1990. *Generalized Additive Models*. London: Chapman Hall.
- Hayden, Dolores. 2003. *Building Suburbia: Green Fields and Urban Growth, 1820-2000*. New York: Pantheon.
- Ho, Daniel, Kosuke Imai, Gary King and Elizabeth Stuart. 2007. "Matching as Nonparametric Preprocessing for Reducing Model Dependence in Parametric Causal Inference." *Political Analysis* 15:199–236.

- Iacus, Stefano, Gary King and Giuseppe Porro. 2009. "CEM: Software for Coarsened Exact Matching." *Journal of Statistical Software* 30(9).
- Kruse, Kevin M. 2005. *White Flight: Atlanta and the Making of Modern Conservatism*. Princeton, NJ: Princeton University Press.
- Lassiter, Matthew D. 2006. *The Silent Majority: Suburban Politics in the Sunbelt South*. Princeton, NJ: Princeton University Press.
- Levendusky, Matthew. 2009. *The Partisan Sort: How Liberals Became Democrats and Conservatives Became Republicans*. Chicago: Chicago.
- Levine, Jonathan. 2006. *Zoned Out: Regulation, Markets, and Choices in Transportation and Metropolitan Land-Use*. Washington, D.C.: Resources for the Future Press.
- Massey, Douglas and Nancy Denton. 1993. *American Apartheid: Segregation and the Making of the American Underclass*. Cambridge, MA: Harvard University Press.
- McGirr, Lisa. 2001. *Suburban Warriors: The Origins of the New American Right*. Princeton, NJ: Princeton University Press.
- Mertz, Lee. 2010. "The Bragdon Committee." Research notes for an unpublished book on the Interstate Highway System.
URL: <http://www.fhwa.dot.gov/infrastructure/bragdon.cfm>
- Meyer, J.R., J.F. Kain and M. Wohl. 1971. *The Urban Transportation Problem*. 4th ed. Cambridge, MA: Harvard University Press.
- Michaels, Guy. 2008. "The Effect of Trade on the Demand for Skill: Evidence from the Interstate Highway System." *The Review of Economics and Statistics* 90(4):683–701.
- Mohl, R.A. 2004. "Stop the Road: Freeway Revolts in American Cities." *Journal of Urban History* 30(5):674.

- Mutz, Diana C. 2006. *Hearing the Other Side: Deliberative Versus Participatory Democracy*. Cambridge University Press.
- Noonan, Douglas S. 2005. "Neighbors, Barriers and Urban Environments: Are Things 'Different on the Other Side of the Tracks'?" *Urban Studies* 42(10):1817.
- Oliver, J. Eric. 2001. *Democracy in Suburbia*. Princeton University Press.
- Pierson, Paul. 1993. "When effect becomes cause: Policy feedback and political change." *World Politics* pp. 595–628.
- Roper Organization. 1976. "Roper Reports Poll # 1976-02." Roper Center for Public Opinion Research.
- Rubin, Donald. 1976. "Inference and Missing Data." *Biometrika* 63:581–592.
- Rubin, Donald B. 1986. "Comment: Which If's Have Causal Answers." *Journal of the American Statistical Association* 81(396):961–962.
- Rubin, Donald B. 1991. "Practical implications of modes of statistical inference for causal effects and the critical role of the assignment mechanism." *Biometrics* 47(4):1213–1234.
- Schelling, Thomas. 1971. "On the Ecology of Micromotives." *The Public Interest* 25:61–98.
- Schelling, Thomas. 1978. *Micromotives and Macrobehavior*. New York: Norton.
- Schulman, Bruce J. 1994. *From Cotton Belt to Sunbelt: Federal Policy, Economic Development, and the Transformation of the South, 1938-1980*. Durham, NC: Duke.
- Shafer, Byron E. and Richard Johnston. 2006. *The End of Southern Exceptionalism: Class, Race and Partisan Change in the Postwar South*. Cambridge, MA: .
- Sobel, Michael E. 2006. "What Do Randomized Studies of Housing Mobility Demonstrate?" *Journal of the American Statistical Association* 101(476):1398–1407.

Spilerman, Seymour. 1973. "Strategic Considerations in Analyzing the Distribution of Racial Disturbances." *American Sociological Review* 38(493-499).

Tiebout, Charles M. 1956. "A Pure Theory of Local Expenditures." *The Journal of Political Economy* 64(5):416.

Weingast, Barry and John Joseph Wallis. 2005. "Equilibrium Impotence: Why States and Not the National Government Financed Highway Construction in the Antebellum Era."

URL: <http://www.nber.org/papers/w11397>

Williamson, Thad. 2008. "Sprawl, Spatial Location, and Politics: How Ideological Identification Tracks the Built Environment." *American Politics Research* 36(6):903.