## The Loser's Bonus: Political Geography and Minority Party Representation

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#### Abstract

In a majoritarian system where support for two parties is geographically clustered, the minority party is better off with a system of smaller winner-take-all districts than with a polity-wide winner-take-all system. We use automated districting simulations of U.S. states to measure the magnitude of this "loser's bonus" in each state. We demonstrate that deep patterns of U.S. political geography with origins in the 19th century can explain the fact that Republicans benefit from the loser's bonus in much of the Northeast and West Coast, while the Democrats benefit elsewhere. On balance, the losers bonus is beneficial to the Republicans, and the size of U.S. Congressional districts relative to urban clusters of Democrats is ideal for the representation of Republicans in Congress. Our results have implications not only for policy debates and patterns of representation in the United States, but also in other industrialized federations with two tiers of representation.

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### Introduction

Legislative representation is shaped in fundamental ways by the process through which individuals are partitioned into geographic districts. This is especially true in vast former British colonies like the United States, Canada, Australia, India, and Nigeria, where individuals are partitioned first into a tier of asymmetrically sized regional entities—states or provinces that are then further partitioned into winner-take-all legislative districts. When partisan competition is organized around a conflict between groups that are geographically clustered, these different partitioning schemes can facilitate different sets of winners and losers.

The rapid industrialization of the late 19th and early 20th centuries generated exactly such a pattern of geographic segmentation that has lasted to the current day in advanced industrial democracies. Left mobilization took place in dense areas where unionized workers were employed in factories, warehouses, ports, and natural resource extraction points. In many industrialized countries, the current-day map of support for left parties is very similar to a map of 19th century industrialization (Rodden 2016), while support for parties of the right is scattered through newer suburban residential areas and rural areas.

This pattern of geographic clustering has important implications for representation when interacted with legislative partitioning schemes. First, the party or parties of the left often have a long-term advantage in the early industrializing states or provinces, and the parties of the right have a long-term advantage in the agricultural hinterland and late industrializing units. Second, within these first-tier partitions, voters for left parties are often far more geographically concentrated than voters for parties of the right.

This paper examines the interaction of this industrial geography with the two-tiered leg-

islative partitioning scheme used in the United States. We develop and measure a concept we call the loser's bonus. In early-industrializing states where Democrats can expect victories in statewide winner-take-all elections, Republicans can nevertheless expect to pick up a substantial number of suburban and rural seats in the House of Representatives. Likewise, in the less industrialized states where Republicans can expect easy statewide victories, Democrats can nevertheless pick up House seats wherever the 19th century manufacturing clusters are sufficiently large relative to the size of Congressional districts. Both effects are driven by the extent to which industrialization in the 19th century—and hence the presence of Democrats today—are geographically concentrated.

In short, long-term differences in the political representation of each state across the two chambers of the legislature can be predicted purely from patterns of political geography. The goal of this paper is to leave aside such factors as incumbency bias and gerrymandering and measure the size of the "loser's bonus" in each state that can be attributable purely to the act of carving up its political geography into winner-take-all partitions. We achieve this by conducting repeated districting simulations of each state using a nationwide geo-referenced precinct-level data set. We show that both Democrats and Republicans benefit from the loser's bonus in the states where they are long-term minorities, and that this effect is largest in states where the relative geographic concentration of Democrats is most pronounced. Summing over states, we discover a striking asymmetry: Republicans gain far more from the loser's bonus than Democrats.

In other words, relative to the representation scheme of the U.S. Senate, the partitioning of the U.S. House of Representatives into winner-take-all districts of roughly 700,000 people is the ideal scenario for electing Republican representatives. As American political parties have become nationalized in the recent era of polarization, a striking bias in favor of the right has become apparent in the U.S. Congress. We demonstrate that the combination of political geography and partitioning alone can explain why the Democrats are at a substantial disadvantage in the House relative to the Senate, even in spite of the malapportioment of the latter in favor of Republicans.

Finally, we ask whether this substantial right bias is driven by the fact that the partitions used in the United States are extremely large—almost ten times the size of those used in other advanced industrial democracies like the UK, Canada, Australia, and France. We explore the more general hypothesis that the loser's bonus should shrink as partitions become smaller. Using simulations with decreasing partition sizes, we demonstrate that this is indeed the case. If the United States used partitions more similar in size to those of other former British colonies, the seat bonus in favor of the Republicans in the House would be cut in half, but it would not disappear.

### Economic and partisan geography in the United States

The period of rapid industrialization in the late 19th and early 20th centuries inexorably altered both human geography and the nature of party competition in the United States. Migrants from rural areas and abroad flocked to major urban centers and smaller industrial enclaves along coasts, canals, and railroads as well as far-flung mining communities. As economic geographers have described, much of this activity was initially quite concentrated in the original manufacturing core of the Northeast, which reached from Maine to Washington, D.C, and as far West as St. Louis, and then later in a secondary manufacturing core that emerged on the West Coast (Perloff 1960, Krugman 1991). As the Democratic Party forged coalitions with labor leaders and courted the votes of industrial workers, these two coastal manufacturing cores became its core constituency in national elections.



Figure 1: Historical Manufacturing Employment and Contemporary Voting Behavior

While labor unions and in many cases factories are long gone, the political legacy of early industrialization lives on in voting behavior. Figure ?? plots the state-level Republican vote share in the 2008 presidential election against manufacturing as a share of employment in the 1880 census, with data markers corresponding to the size of the state. It demonstrates that Democrats are dominant in the states that industrialized early. These urban, earlyindustrializing states have secularized more rapidly than the rest of the country, and this correlation has only increased since the politicization of religion and moral values in the 1980s.

The relationship between contemporary voting behavior and historical manufacturing activity is also very strong below the level of states. Nineteenth century manufacturing activity was associated with the construction of dense working-class housing that subsequently attracted what have become the core constituencies of the Democrats: poor migrants and minorities in most cities, as well as the secular, cosmopolitan creative class in a select few knowledge economy cities.

These manufacturing enclaves were not evenly distributed in space, and nor are Democratic voters today. To measure this contemporary geographic clustering of Democrats, we have assembled a nationwide geo-referenced precinct-level data set from the 2008 presidential election. We assume that voters are evenly distributed within precincts, and draw a large number of random pairs of Republicans and random pairs of Democrats in each state, and calculate the percent of these partisan pairs that live within 10 miles of one another.

In Panel A of Figure ??, we plot the percent of randomly selected pairs of Republicans living within 10 miles of one another on the horizontal axis, and the percent of randomly selected pairs of Democrats living within 10 miles of one another on the vertical axis. In Panel B we display the states according to the ratio of the y-axis to the x-axis in the first panel.

5



(a) Democrats and Republican clustering

![](_page_6_Figure_2.jpeg)

(b) Relative Democratic clustering

Figure 2: The relative geographic clustering of Democrats by state

Figure ?? reveals that only in New Hampshire and Hawaii are Republicans more likely than Democrats to live in close proximity to one another. In every other state, Democrats are more geographically concentrated, often in the states main metro area. Next, we plot this measure of the relative concentration of Democrats against an index of the county-level geographic concentration of manufacturing employment, again from the 1880 census. Figure ?? shows a striking relationship spanning over a century: in states where early industrial activity was more concentrated, Democrats are more geographically concentrated today.

![](_page_7_Figure_1.jpeg)

Figure 3: Historical geographic concentration of manufacturing and contemporary clustering of Democrats

Next, Figure ?? provides a contemporary snapshot of this pattern of political geography. We have calculated the distance between the center of New York City (defined as Central Park) and the centroid of every precinct in the continental United States (except Oregon, where precinct-level data no longer exist due to voting by mail). We plot this distance on the horizontal axis, such that the far right of the graph corresponds to New York and the far left corresponds to California and Washington. The vertical axis represents the Republican share of the two-party vote in the 2008 presidential election. Each "stalactite" is a city. The top, thick part of each stalactite is a relatively Republican exurb, and as the stalactite narrows, one traverses the middle and inner suburbs and finally the city center, where Obama's vote share reaches 100 percent at the tip of the stalactite. The band of dots at the top of the graph above the stalactites captures the Republican vote share in each states rural periphery.

![](_page_8_Figure_1.jpeg)

Figure 4: Distance from New York and Republican Presidential vote share, 2008

As one moves from East to West in Figure ??, one sees that the mean Republican vote share is relatively low in the original Northeastern manufacturing core—even in exurban and rural areas—though it still surpasses the national average (46%) in many suburban and

rural precincts. As one moves outside the manufacturing core into the South and Midwest and eventually the Mountain West, the mean Republican vote share increases substantially, but this is driven mainly by suburban and rural voters: the stalactites associated with more isolated industrial centers like Birmingham, Memphis, Kansas City, and Denver are just as pronounced as in the original manufacturing core. Finally, when one reaches the West Coast manufacturing core, the East Coast pattern is seen once again: heterogeneous but Republican-leaning suburbs surround large and overwhelmingly Democratic cities.

Together, these graphs communicate that the geographic concentration of historical manufacturing (and Democratic voters today) is not limited to the states of the original manufacturing core like New York or Pennsylvania. Even in states that were less industrialized overall in the late 19th century, like Kentucky, Kansas, or even Utah, there were significant early concentrations of industrial activity (e.g. in Louisville, Kansas City, and Salt Lake City) that have also emerged as present-day urban Democratic strongholds. Thus the contemporary geographic concentration of Democrats can be seen in both Democratic and Republican states alike.

It is also true that the geography of Figure ?? is partitioned into states in a way that generates heterogeneity in levels of concentration across both the states of the core and the periphery. Some of the earliest industrializers, for instance, were small New England states that experienced a more dispersed form of industrialization including smaller waterpowered agglomerations (mill towns). Figures ?? through ?? show that Democrats today are relatively dispersed throughout these highly Democratic states. While Democrats today are quite concentrated in the old industrial agglomerations of most Republican-leaning states, there are also a handful of Southern states (e.g. South Carolina an Mississippi) where as a legacy of slavery, there is a large rural African American population that generates a relatively less concentrated distribution of Democrats today.

### Political geography and the loser's bonus

When this political geography is partitioned into winner-take-all states, and then again into smaller winner-take-all Congressional districts, we should expect to see substantial and systematic differences in representation associated with these two schemes, especially within states where support for Democrats is most geographically concentrated. Specifically, the relative geographic concentration of Democrats allows the minority party—even one with very little chance of statewide victory—to win local majorities. We refer to this phenomenon as the "loser's bonus."

To demonstrate how this works, Figure ?? zooms in on two states from Figure ??. On the left, New York is an example of a state with a high overall level of support for the Democrats in elections for federal office, and this support is highly concentrated in 19th century industrial agglomerations. On the right, Tennessee is an example of a state with low overall support for Democrats, but where the existing support for Democrats is also highly concentratedabove all in Memphis (on the far left) and Nashville (in the middle), with smaller concentrations in Knoxville and Chattanooga. In each graph, the black line corresponds to John McCains overall national vote share.

![](_page_11_Figure_0.jpeg)

![](_page_11_Figure_1.jpeg)

(a) Example of a Democratic state

![](_page_11_Figure_3.jpeg)

![](_page_11_Figure_4.jpeg)

(b) Example of a Republican state

Figure 5: States where Democrats are relatively concentrated

Although Figure ?? is simplistic in its presentation of all precincts on a simple array representing a one-dimensional linear notion of distance, it allows a useful heuristic for thinking about the partitioning problem. The process of drawing partitions into districts of

roughly 700,000 individuals is a process akin to drawing a series of vertical lines in Figure ?? that produce similar numbers of dots in each partition.

It is immediately clear that it is simply not possible to draw such lines in New York City without creating overwhelmingly Democratic districts in the urban core. However, as one moves to the left, one enters parts of Westchester County, Long Island, and other surrounding suburbs where more urban Democratic precincts are slightly outnumbered by surrounding suburban Republican precincts, and bare-majority-Republican districts begin to take shape. Between 20 and 100 miles from the city center, in the heart of the suburbs and exurbs, most of the dots are above the black line, and partitioning tends to produce Republican districts. Moving into upstate New York, Democrats, while still constituting a healthy majority of the voters, are highly concentrated in the smaller 19th century manufacturing cities like Binghamton, Utica, Rochester, Syracuse, and Buffalo. All of these cities are quite small, however, relative to the size of a U.S. Congressional district. Buffalo, the largest among them, has a population of only around 250,000. Thus 700,000-person partitions can easily generate districts where Democratic cities are swamped by their suburban and rural Republican peripheries.

The urban stalactites in the Tennessee graph on the right are very similar to those in New York, but the suburban and rural periphery are far more Republican, which creates a large Republican statewide advantage. Memphis and Nashville each have a population of around 650,000, however, which means that Congressional partitioning will likely provide Democrats with two of nine districts, even though they have little hope of statewide victory.

In short, asymmetric Democratic clustering can facilitate a substantial loser's bonus whether the majority party is the Democrats or the Republicans. The loser's bonus disappears, however, in states where the historical political geography created a relatively dispersed group of Democrats.

![](_page_13_Figure_1.jpeg)

Connecticut

(a) Example of a Democratic state

![](_page_13_Figure_4.jpeg)

South Carolina

(b) Example of a Republican state

Figure 6: States where Democrats are less concentrated

Figure ?? zooms in on one Democratic state (Connecticut) and one Republican state (South Carolina) where Democrats are relatively dispersed. No matter how one imagines

drawing 5 vertical partitions in Connecticut or 7 in South Carolina, the minority party does not have sufficient localized clusters to help it carve out a seat. Thus a statewide or Congressional partitioning scheme would yield similar results.

### Measuring the loser's bonus

The goal of our empirical analysis is to estimate the loser's bonus arising purely from the imposition of partitions on a state's partisan geography. That is, we wish to avoid drawing inferences from implemented districting plans that may have been colored by efforts to favor the incumbent party or comply with the Voting Rights Act. In order to do so, we generate our own partitions using a districting simulation algorithm that generates compact, contiguous, equal-population districts in each state. The simulation algorithm is described in detail in the Appendix.

Next, we need a way of estimating the mapping of presidential votes to seats associated with these simulated districts. In the examples above, we used a rule of thumb that Republican House victories were more likely when the McCain vote share was above the national average. Here, we take a more rigorous approach and estimate a district-level logit model for each Congressional election from the 110th to the 113th Congress, where actual Republican House victories are a function of presidential votes. We then use this logit model to estimate predicted Republican win probabilities based on the district-level McCain vote share for each simulated district in each simulated plan. We can then calculate the predicted Republican seat share associated with each plan. We simulated hundreds of plans for each state, and we plot the average Republican seat shares across simulations for each state with red markers in figure ??, against the statewide McCain vote share on the horizontal axis.

![](_page_15_Figure_1.jpeg)

Figure 7: The Loser's Bonus

The red markers represent estimates of Republican win probabilities from the simulations, and are sized to correspond to the number of districts in the state. The blue line represents the estimated probability of Republican victory in a statewide election. The black dotted line represents proportionality.

The blue line corresponds to the predicted probability of victory—estimated from the logit model of Congressional districts—associated with a specific McCain vote share. By plotting the predicted probability of victory for a Republican candidate in a generic state with a specific McCain vote share, we mean to capture the expected outcome of an at-large statewide district.

For each state in Figure ??, the loser's bonus is the vertical distance between the middle of the red marker and the blue line. According to the simulations, in one group of states the Republicans can expect to do much better under Congressional partitioning than under statewide districts. These include some of the largest early industrializing states, including New York, Maryland, Illinois, California, Washington, and Michigan. These are states with striking urban-rural divides where partitioning schemes create overwhelming victories for Democrats in cities, while Republicans string together exurban and rural victories, often overwhelming non-metro clusters of Democrats that are too small to form their own districts.

However, as we move into the solidly Republican states, we see that the loser's bonus begins to consistently favor the Democrats, sometimes quite substantially. In states like Georgia, Texas, Tennessee, Nebraska, Kansas, Louisiana, and Utah, the Democrats can expect better outcomes under single-member Congressional districts than under at-large districts. This is because their vastly outnumbered supporters are efficiently distributed in cities, and unlike the upper Midwest and Northeast, rather few of them are wasted in Republican-leaning rural hinterlands. The simulations produce frequent Democratic victories in Atlanta, Houston, Dallas, Austin, Memphis, Omaha, New Orleans, and Salt Lake City, and occasional victories in places like Kansas City, Louisville, KY, and Birmingham, AL that make Congressional districts—even without the benefit of the Voting Rights Act—a better bet for Democrats than statewide districts.

The states that are on or very close to the blue line are small, single-district states and larger states with geographically dispersed Democrats. To show this more clearly, Figure ?? plots the absolute magnitude of the losers bonus in each state against our measure of asymmetric Democratic clustering. It shows that the extent to which the minority party can expect to do better under Congressional partitioning than under statewide elections is a function of the extent to which Democrats are geographically clustered.

![](_page_17_Figure_1.jpeg)

(a) Contemporary asymmetric Democratic clustering

![](_page_17_Figure_3.jpeg)

(b) Geographic concentration of 1880 manufacturing

Figure 8: Geographic concentration and the loser's bonus

As demonstrated in Figure ??, there are several large states whose political geography generates a large losers bonus in favor of the Republicans. There are only two relatively large Republican states with a substantial loser's bonus: Georgia and Texas. Thus on balance, the losers bonus favors Republicans. If we multiply each state's Congressional delegation size by the logit-predicted probability that a Republican wins a statewide race and then sum over all states, we can interpret this as a hypothetical scenario in which a states Congressional seats are filled by a statewide at-large election rather than through geographic districts. In this scenario, our logit model predicts that Republicans would win only 46 percent of the seats. Aggregating over all states, our districting simulations produce a roughly even divide between predicted Democratic and Republican seats.

In other words, the simulations suggest that even in a world without partisan gerrymandering and the Voting Rights Act, Republicans have a geographic advantage that would make them much better off under a districted system than with winner-take-all states. The U.S. Senate, of course, is based on a partitioning scheme that over-represents the late-industrializing periphery. When we weight our statewide Republican win probabilities equally for each state and sum them, the estimated Republican seat share jumps from 46 percent to 54 percent. This analysis sheds light on the importance of Senate malapportionment in bolstering Republican representation, and suggests that with equal apportionment, the Senate's partitioning scheme would be more favorable for Democrats than that of the House of Representatives. Furthermore, it suggests that even if gerrymandering were abolished, a switch to the use of Congressional districts rather than states to allocate electoral votes in presidential elections would generate a striking imbalance in favor of Republicans.

# The Loser's Bonus in Action: Recent Congressional Elections

By combining districting simulations and a simple empirical model linking Congressional victories and presidential voting, thus far we have held constant such factors as incumbency, term limits, racial representation, and partisan gerrymandering. We now ask whether our basic insights about the loser's bonus hold up in the messier world of observed Senate and Congressional elections with long-standing incumbents and gerrymandered districts. Republican candidates won around 51 percent of all House seats contested from 1994 to the present, and almost 52 percent of all Senate seats contested during that period. If we weight these Republican Senate victories by the size of the states Congressional delegation, however, the Republican seat share drops all the way to 46 percent—an almost identical result to that from the simulations.

As in the simulations based on 2008 presidential data, Republicans appear to have a significant long-term advantage in Congressional vis--vis Senate elections. To demonstrate the role of the loser's bonus in producing this effect, Figure ?? is analogous to Figure ?? above. The horizontal axis represents the average vote share of Republican candidates across all Senate elections in a state since 1994. The blue line represents the share of all Senate seats won by Republican candidates during the same period. The red markers capture the share of all House seats in the state won by Republican candidates during the same period. The red markers capture the share of all House seats in the state won by Republican candidates during this period, and once again, the size of the marker corresponds to the number of Congressional districts in the state. The dotted black line indicates a benchmark of proportionality.

![](_page_20_Figure_0.jpeg)

Figure 9: The Loser's Bonus in Congressional elections, 1994-2014

The red markers capture the share of all House seats in the state won by Republicans from 1994 to 2014, and are sized to correspond to the number of districts in the state. The blue line represents the share of all Senate seats won by Republican candidates from 1994 to 2014. The black dotted line represents proportionality.

The real world is a bit messier than the simulations, but the same story emerges. Most of the large, early-industrializing states are well above the blue line, indicating that the Republicans make up a far larger share of these states' Congressional delegations than their Senate delegations. As we move into the Republican-leaning states, most are below the blue line, indicating that Democrats have larger House delegations than Senate delegations. Note that many of the outliers on this graph are single-district states where any differences between House and Senate delegations cannot be attributed to partitioning.

This figure reveals a partian asymmetry. As in the simulations, the states experiencing a significant Republican loser's bonus are relatively large, as is the size of the bonus. The bonus is smaller in the states where it favors Democrats, and with the exception of Texas, these are smaller states with relatively few Congressional districts. Moreover, in several states where Republicans have received more votes on average than Democrats in Senate elections over the last two decades, the red markers are actually above the blue line, indicating that Republican Congressional delegations are larger than Senate delegations even when the state leans Republican in Senate elections. Among several others, notable examples include Louisiana, Colorado, and Florida. There are no Democratic-leaning states with more than two districts where Democrats over-perform in the House except Oregon, where the difference is quite small.

### On the Size of Districts

It is possible that the disadvantage for the Democratic Party in both the simulated and enacted Congressional districts is due to the size of the districts. Once the size of partitions get sufficiently small relative to the size of geographic clusters of partisans, the magnitude of the losers bonus should increase as partitions get smaller and smaller, allowing additional clusters of minority party voters to form winning districts, until at the limit, proportionality with the vote share is achieved when every voter forms his or her own district. Perhaps the partition size of 700,000 used in U.S. Congressional districts is somewhere near the optimal size for Republican representation, since this district size is sufficiently large as to generate copious surplus votes for Democrats in major cities while insuring that smaller concentrations of Democrats in the minor industrial agglomerations along 19th century mining and transportation corridors are swamped by the Republican periphery.

To test this possibility, we have conducted simulations using a variety of different partition sizes. The next draft will include an appendix that plots, separately for each state, the average simulated Republican seat share against the size of districts used for each set of independent simulations. These graphs show that while the shape of the function varies from state to state when going from one statewide district to a small number of very large districts, once we reach partitions of around 700,000, the losers bonus increases in a secular fashion as the number of districts increases. That is, the anticipated Republican seat share associated with winner-take-call districts approaches, but never quite reaches, proportionality.

What would this mean for representation of Democrats and Republicans if the United States House of Representatives used smaller districts on the order of other advanced democracies? In order to answer this question, we have conducted a full set of simulations for all states using partitions of 100,000 rather than 700,000. The result is displayed in Figure ??.

This approach is useful because it allows for insights into political geography and the loser's bonus in states with only one or two Congressional districts that were on or very close to the blue line in the graph above by construction. Many of these states have now moved away from the blue line when smaller partitions are used. This is more pronounced in Republican than Democratic states. In particular, the Democratic dominance of New England states is so complete, and Republicans are so dispersed, that smaller districts still do not help string together enough Republicans to form victories. In Republican states, the difference is more noticeable. Small cites with populations a little above 100,000, like Sioux Falls, South Dakota and Fargo, North Dakota are now more likely to produce majority-Democratic districts.

![](_page_23_Figure_1.jpeg)

Figure 10: The Loser's bonus in simulations using districts with population 100,000

The red markers represent estimates of Republican win probabilities from the simulations, and are sized to correspond to the number of districts in the state. The blue line represents the estimated probability of Republican victory in a statewide election. The black dotted line represents proportionality.

This has an overall impact on the extent to which the losers bonus favors Republicans. Recall from above that our model predicted a difference of almost four percentage points between the anticipated seat share of Republicans under statewide and Congressional partitioning schemes. With these much smaller partitions, the gap has fallen to 1.5 percentage points. Thus with much smaller districts, it appears that the advantage of Republicans would be diminished but still present.

### Conclusion

This paper has provided a new approach to classic questions linking political geography, winner-take-all districts, and representationone that is particularly well suited to federal systems in industrialized societies. Unlike most of the existing literature, we make no assumptions about what a fair or just vote-seat curve looks like, and we avoid the common practice of simulating tied or reversed elections in order to capture the notion of asymmetric electoral bias. It is difficult to know what a normatively acceptable vote-seat curve should look like in a state where one party is as dominant as the Massachusetts Democrats or the Alabama Republicans, and hypothetical tied Congressional elections are very difficult to imagine in these contexts.

Instead, we ask a related but distinct question: given their underlying geographic support bases, which representation scheme—statewide winner-take-all districts or Congressional districts—is more advantageous for which party? We use automated redistricting simulations to empirically evaluate the notion of the loser's bonus. As long as the parties are not perfectly geographically dispersed, the minority party can hope for a larger seat share under a districted system than under a statewide system. We show that the magnitude of this bonus is a function of the extent to which the parties' support bases are geographically concentrated.

In the United States, as in many other advanced industrial democracies, cross-region and within-region variation in geographic concentration of partisanship is largely a function of patterns of urbanization that took hold during industrialization. Democrats are dominant in early industrializing states. In many of these states, however, their support is highly concentrated in industrial centers in such a way that allows suburban and rural Republicans to win large numbers of seats in the House of Representatives. In late industrializing states, Republicans are dominant in statewide elections, but Democrats are able to pick up seats when Democrats are sufficiently concentrated (when cities are sufficiently large). Aggregating across all states, the absolute size of the former effect is larger than the latter, and the Republicans are unambiguously better off with a system of winner-take-all districts. We have also shown that this effect would dissipate but not disappear with smaller Congressional districts.

These findings have implications for the policy debates in the United States: the Republicans would be worse off with either smaller Congressional districts or statewide at-large districts, and they would be substantially helped by reform proposals that would allocate electoral votes via Congressional districts rather than states.

This paper also sets up questions for further analysis in American and comparative politics. First, it would be worthwhile to extend our analysis beyond partisanship and look at questions of ideology and representation. Our analysis suggests that the roll-call voting and ideology of Senate delegations should be to the left of the House delegation in the Democratic states with high levels of geographic concentration, and the opposite should be true in Republican states with high levels of concentration. Second, this logic might also extend to state elections, in which case we might expect to see systematic partisan and ideological differences between governors and legislators.

Finally, the patterns of industrial geography described in this paper are reminiscent of other advanced industrial federations with two-tiered systems of representation. In both Canada and Australia, left parties are more successful in the long run in regions of early industrialization, and in all regions, left voters are highly concentrated in 19th and early 20th century urban agglomerations while right voters are more geographically dispersed in suburbs and rural areas.

### References

To be added

### Appendix: The districting algorithm

For each state, we determine the target population of each district in order to produce the required numer of Congressional districts, n. Each precinct is treated as a building block, and our goal is to create n districts with equal population. We do so as follows:

- To begin the simulation procedure, each of the precinct building blocks represents a single district. Hence, there are thousands of districts in each state, each containing only one building block at the outset.
- 2. Randomly select one of these districts and denote it as district i.
- 3. Among the neighboring districts that border district *i*, select the one whose centroid is geographically closest to the centroid of *i*, and denote it as district *j*.
- 4. Merge district i together with district j in order to form a single new district.

Steps 2 through 4 are repeated over and over again until there are n districts. At this point in the procedure, these districts are geographically contiguous and highly compact due to the nearest distance criterion employed in step 3. However, the districts are not guaranteed to be equally populated. Hence, repeated iterations of steps 5 through 8 are designed to achieve an equitable distribution of population across the simulated districts. These steps iteratively reassign precincts to different districts until equally populated districts are achieved.

5. Among all pairs of districts that border one another, identify the pair with the greatest disparity in district population. Within this pair, let us denote the more populated

district as m and the less populated district as l.

- 6. Identify the set of all precincts currently within district m that could be reassigned to district l without violating the geographic contiguity of either district.
- 7. For each precinct p satisfying the criterion in step 6, define Dp as precinct textitp's geographic distance to the centroid of district textitm minus its distance to the centroid of district l.
- 8. Among the set of precincts that satisfy the criteria in Step 6, select the precinct with the highest value of Dp and reassign it from district m to district l.

Steps 5 through 8 are repeated until each of the districts has a population within 1 percent of the ideal district population. We conduct this procedure 100 times for each state.