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Racial Representation and U.S. Senate Apportionment*

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Objectives. This research note explores whether the system of assigning each state equal representation in the U.S. Senate adversely affects racial minorities, groups that often have common political interests. We also project changes in minority representation over the next 20 years using Census data. Methods. We develop a new method of assessing racial bias due to apportionment, which calculates the number of seats lost by groups due to equal representation, a more substantively meaningful statistic than correlational measures. Results. We find that both African Americans and Hispanics are substantially underrepresented due to their greater presence in high-population states as compared to in low-population states. Whereas bias against African Americans appears to be falling, the demographic patterns of Hispanics will make them even more underrepresented in coming years. Conclusions. These findings are especially consequential considering that malapportionment has important public policy implications, including greater per-capita distributive benefits for smaller states. Further, given that the Senate serves as a major veto point in U.S. politics, racial bias due to equal apportionment may have a significant impact on current and future political debates relevant to minority groups.

The U.S. Senate is malapportioned by design. As part of the Great Compromise during the Constitutional Convention in 1787, the framers agreed that the lower house of the national legislature would have population representation, whereas the upper house would be designed to protect small states from the tyranny of the majority. However, given the composition of the electorate at the time of the country’s founding, the framers likely never considered the impact of equal apportionment on the representation of racial minorities. Much recent work by both political scientists and popular commentators has analyzed whether the Republican Party benefits from the inherent malapportionment of the Senate and how the level of partisan bias has changed over time (Lee and Oppenheimer, 1997; Mattei, 2001; Grofman, Koetzle, and Brunell, 1997; Brunell, 1999).

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Studies have also shown that apportionment has important policy consequences, particularly on distributional issues (Lee, 1998, 2000).

Although the literature has increasingly recognized the importance of Senate apportionment, scant attention has been paid to its effect on groups other than political parties. Equal apportionment adversely affects groups that hold common, politically relevant interests but are concentrated in larger states. This analysis focuses on racial minorities, groups that are especially significant in light of the long struggle to obtain voting rights. If African-American electoral influence were undercut by Senate apportionment, the hard-won victories of the civil rights battles would be at least partially mitigated. This would be a particularly cruel irony in light of the long use of the filibuster rule in the Senate to thwart passage of civil rights legislation.

Senate representation of minority groups is also of substantive interest because existing studies show that malapportionment has real policy consequences. Lee (1998) argues that minimum legislative coalitions are built most cheaply with the support of small-state senators. Controlling for state need, overrepresented states receive greater per-capita federal fund allocations for nondiscretionary distributive programs in which Congress sets the formula. If racial minorities tend to reside in larger states on average, then they may not be receiving their fair share of pork. Similarly, they may receive less funding per capita from myriad programs in education, homeland security, and transportation that set funding formulas guaranteeing each state a minimum funding level regardless of population.1

The question of whether equal apportionment affects racial representation in the Senate is rooted in the larger theoretical and empirical literature on political equality. Studies of political equality (e.g., Verba, Schlozman, and Brady, 1995) analyze whether citizen votes are equally counted. Senate apportionment, which grants the same number of senators to 500,000 Wyoming citizens as to 35 million Californians, clearly violates equality in the strictest sense. Dahl (1956) first noted the potential for equal apportionment to overrepresent small-state interests. Dahl only briefly analyzed the impact of apportionment on minority representation, finding that African Americans were more likely to live in large and underrepresented states. Since Dahl, a substantial literature has analyzed the impact of electoral rules on minority representation in legislatures while neglecting Senate apportionment (Cannon, 1999). Studies have examined the impact of highly gerrymandered or malapportioned legislative districts (Grofman, Handley, and Niemi, 1992), multimember versus at-large districts (Welch, 1990; Moncrief and Thompson, 1992; Handley and Grofman, 1994),

1Homeland security funding provides one recent example of the policy implications of malapportionment. Alaska received $92 per citizen, while California received $22 and Texas and Florida only $21 per person. This discrepancy allowed small communities relatively unthreatened by terrorism to purchase substantial amounts of equipment. For instance, the Northwest Arctic Borough, which has only 7,300 people, purchased $233,000 worth of gear such as headlamps, radio equipment, and night vision goggles (Murphy, 2004).
cumulative voting (Guinier, 1991), and run-off elections (Bullock and Smith, 1990; Bullock and Johnson, 1992), among other topics.

Only a handful of studies have directly addressed the relationship between Senate apportionment and racial population distribution. Many have casually noted the correlation between state population size and the percentages of a state comprised of racial minorities (e.g., Baker and Dinkin, 1997; Lee and Oppenheimer, 1999:22–23; Ross, 1996). In a more in-depth analysis, Griffin (2006) finds a negative correlation between the African-American and Hispanic population in a state and the natural log of that state’s voting weight in the Senate (i.e., the degree to which a state is over- or underrepresented). In particular, he finds this relationship to be strongest in nonsouthern states. Although all these studies have advanced our understanding of this issue, these correlational measures do not inform us how many seats (in substantive terms) racial minorities have been losing (or gaining) as a consequence of equal representation. Moreover, as discussed below, in some cases these measures lead to faulty inferences regarding the relationship between Senate apportionment and racial representation. In this article, we develop a new, more valid measure that allows us to better substantively assess how various groups are affected by malapportionment. Moreover, no study has examined how racial representation may change in the future. We use Census Bureau projections to analyze whether demographic trends will ameliorate or exaggerate representational differences among ethnic groups in the Senate.

As noted above, common group interest and uneven spatial distribution are the two conditions under which malapportionment affects representation. Strong evidence exists that African Americans and Hispanics are politically relevant groups in that group members hold a set of shared interests (Tate, 1993; Dawson, 1994; Alvarez and Bedolla, 2003). Moreover, we casually observe that African Americans tend to live in the small to mid-sized southern states as well as in the larger urban areas of the East and Midwest. Some of these states are large whereas others are relatively small. Similarly, Hispanics also are concentrated in both high-population states and smaller western states that have absorbed recent immigrants. The impact of equal apportionment is therefore not obvious and requires additional analysis. Further, this question lies at the intersection of several disciplines within the social sciences (political science, sociology, demographics, geography) and has important consequences for public policies related to minority and civil rights.

This research note proceeds as follows. The first section presents the methodology used to ascertain the degree of racial (under) representation in the Senate due to equal apportionment. The second section presents the results of the analysis. The final section concludes by discussing the findings and their implications.

\[ \ln \left( \frac{1}{\sum_{i=1}^{50} s_i} \right), \] where \( s_i \) is the population of state \( i \) (out of the 50 states).
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Data and Method

Racial Bias Due to Apportionment (RBA)

To assess the level of racial bias due to the equal apportionment of the Senate, we must answer the question: How many seats do African Americans and Hispanics have representing them in the Senate and how many would they have if the Senate were apportioned like the House, based on population? Mathematically, we calculate racial bias due to apportionment (RBA) by comparing the population proportions of African Americans and Hispanics in individual states to their overall percentages of the U.S. population. If ethnic groups are disproportionately located in high-population states, then they will not receive representation commensurate with their populations. Building on expressions for partisan bias in the Senate developed by Grofman, Koetzle, and Brunell (1997) and Brunell (1999), the formula for computing RBA for ethnic group j in a given year is:

\[ RBA = 2 \sum_{i=1}^{n} p_{ij} - 2n \sum_{i=1}^{n} p_{ij}s_i, \]  

(1)

where \( p_{ij} \) represents the population of ethnic group \( j \) in state \( i \) (out of \( n \) states) divided by the state population and \( s_i \) represents the population of state \( i \) divided by the U.S. population. Positive values of RBA indicate bias in favor of a racial group, whereas negative values indicate bias against a group. All population statistics were obtained from the U.S. Census Bureau (U.S. Census Bureau, 2005a). We also can predict RBA for 2015 and 2025 using the Census Bureau’s population projections, which no previous studies have done (U.S. Census Bureau, 2005b).³

The intuition of the RBA formula is straightforward. The first term simply sums the population proportions of African Americans/Hispanics for all states and then multiplies that sum by the number of Senate seats per state, indicating the number of seats the ethnic group has representing it in the chamber. For example, if African Americans constituted about 26 percent of Alabama’s population in 2004, then they had a share of about 0.52 (0.26 × 2) of Alabama’s two Senate seats. Even if the senator does not share the race of the group, he or she still must respond to constituent interests (Nye and Bullock, 1992; Bullock and Brady, 1983). The second term is simply the population proportion of African Americans/Hispanics in the entire U.S. population, multiplied by the total number of seats in the Senate (i.e., two times the number of states). This expression informs us of how many seats an ethnic group would receive if Senate seats were apportioned based on state population. Therefore, if African Americans or

³Ideally, we would like to calculate confidence intervals on our estimates due to error in the U.S. Census Bureau’s population estimates and projections. Unfortunately, these data are not publicly available.
Hispanics were disproportionately located in large states, the second term would be much larger than the first, resulting in bias against the ethnic group.

**Comparison to Existing Measures**

Existing studies have generally assessed the relationship between Senate apportionment and racial representation by examining the correlation between total state population and the percentage of state residents comprised of various minority groups. For example, Griffin (2006) correlates the log of state voting weight with the percentage African American and Hispanic in the state. As discussed earlier, the RBA measure is preferable because it allows us to substantively calculate the number of seats lost due to equal apportionment. To accurately capture the political power of minority groups, we need to evaluate the most important metric of representation—the number of votes available for and against pieces of legislation, which directly corresponds to the share of the seats a group has representing it in the chamber. In other words, we know that the loss of one seat can affect the outcome of a roll-call vote, a sign of decreased political power. There is no corresponding meaning of a drop in the correlation between state voting weight and population share from \( r = -0.25 \) to \( r = -0.35 \). Because correlational measures do not have substantive analogues, we simply do not know the extent to which they are tapping this construct of representation.

Perhaps even more important, simple correlations may lead to faulty inferences. We performed simulations to compare the RBA measure to Griffin's approach. We created 10,000 versions of the 50 states, with population shares drawn from the Dirichlet distribution with the parameter vector \( s = s_1, \ldots, s_{50} = (1, \ldots, 1) \). The Dirichlet is the most appropriate distribution from which to draw population shares since its support is all combinations of shares, subject to the constraint that they sum to one. For each state, we then drew population shares of African-American residents from the standard uniform distribution. We then calculated RBA and Griffin's measure for each of the 10,000 versions of the United States. The correlation between RBA and Griffin's measure is \( r = 0.80 \). Although that appears high, it means that only 64 percent of the variance in RBA is explained by the Griffin measure, suggesting that the two statistics are capturing different constructs. Perhaps more importantly, in 20.3 percent of the simulated cases, the Griffin measure found that African Americans were over/underrepresented in the Senate whereas the RBA measure found that...
African Americans were under/overrepresented in the Senate. Our simulation results also imply that simple correlations may lead to incorrect inferences regarding differences in racial representation between minority groups or points in time. Hence, using a correlational approach may give us the wrong answer to the question of how equal representation in the Senate undercounts various subgroups with respect to the number of seats (and potential votes) in the chamber.

Results

We first plot $RBA$ across the entire time series of Census data for African Americans and Hispanics in Figure 1. According to the 2004 population estimates, African Americans are underrepresented by 2.44 seats in the Senate, whereas Hispanics are underrepresented doubly, by 5.26 seats. These effects are substantively significant, encompassing between 2.4 and 5.3 percent of the seats in the full chamber, nearly sufficient to shift the balance of power given the narrow partisan division in the Senate.

The magnitude of these results stems from the fact that these ethnic groups are mainly concentrated in high-population states, whereas low-population states in the Mountain West and Northeast are predominantly white. Hence, whites are substantially overrepresented in the Senate due to their fortuitous spatial distribution. Hispanics are much more adversely

![Figure 1: Racial Bias Due to Appportionment ($RBA$): 1870–2025.](image-url)
affected by racial bias because they tend to reside in the highest population states such as California, Texas, New York, and Florida, which have traditionally absorbed larger numbers of immigrants from Spanish-speaking countries. Although African Americans also constitute substantial proportions of these states, they represent larger proportions of the populations in southern states, which have average population sizes. This mitigates the level of representational bias against African Americans.

Additionally, it is striking that African Americans and Hispanics have always been underrepresented for every single available Census. However, RBA has fluctuated for African Americans since 1870. Between 1880 and 1920, African Americans became increasingly represented in the Senate, mainly due to disproportionate population growth in nonsouthern states. However, equal apportionment then steadily led to increased bias against African Americans until 1970, where it has leveled off until the present. These trends are mainly the consequence of African-American relocation to populous northern states, popularly termed the “field to factory” migration, and post-World War II population growth in southern states (Henri, 1975). Conversely, Hispanics suffered nearly the same amount of bias as African Americans in 1980, but have become rapidly underrepresented over the past few decades. Again, this is mainly the result of the Hispanic population burgeoning in high-population, fast-growing states along the Sun Belt.

Further, we can compare our results to those from analyses using correlational measures (e.g., Griffin 2006:Fig. 4) to demonstrate that using a more valid and substantively meaningful measure produces different results. First, the correlations do not capture the inverse U-shaped trend of RBA between 1880–1970 associated with the “field to factory” movement and the growth of the South. Instead, correlational measures show a generally steady worsening of African-American representation over time. Moreover, correlational measures inaccurately illustrate the comparative underrepresentation of African Americans to Hispanics. For instance, the RBA measure finds Hispanics to have less representation in the Senate compared to African Americans, whereas the correlation between state voting weight and population share is less negative for Hispanics. Moreover, the difference in correlations for Hispanics between 1980 and 2000 is much less than the range of correlations for African Americans across the entire time series. Yet, we find that the approximately three-seat loss for Hispanics between 1980 and 2000 is greater than the range of RBA for African Americans between 1870 and 2000.

Using Census Bureau data to examine future trends in racial representation due to malapportionment, we find that bias against African Americans is projected to decrease whereas bias against Hispanics should

5Additionally, the large African-American population in the District of Columbia, which receives no representation in the Senate, has contributed to racial bias. Whereas only 0.09 percent of all U.S. whites lived in the District in 2004, 0.85 percent of all African Americans did. Thus, a large percentage of the African-American population is not represented at all in the Senate.
grow. As seen in Figure 1 past the vertical dotted line, African Americans are projected to be underrepresented by only 1.49 seats in 2015 and 1.23 seats in 2025. The industrial states in which African Americans have a large presence (e.g., Illinois, Michigan, and New York) have been and will continue to hemorrhage their relative population share, thereby reducing racial bias. Conversely, Hispanics will be shorted 5.73 and 6.60 seats in 2015 and 2025, respectively, as a result of equal Senate apportionment. This is again due to the projected increased population of Hispanics in fast-growing states in the West and Southwest, such as California, Nevada, Arizona, and Texas.

The level of change in RBA over time is substantively significant as well. The range of underrepresented seats presented in Figure 1 is 2.23 for African Americans and 4.44 for Hispanics. As explained above, the parties have often been at parity in the Senate; between 1871 and 2007, the difference between Republican- and Democratic-held seats was four or less for 15 Congresses. Even if partisan control is not at stake, individual senators hold a number of well-known powers, including the right to place holds on pending bills, openly filibuster legislation, and influence the selection of judicial nominees. These powers and informal norms allow individual junior senators to exert “informal policy leadership” in the chamber, influencing a full range of political outcomes (Smith, 1990). For instance, senators may play an important role in shaping legislation considered by committees of which they are not members. Thus, adding minority representation to the Senate during this period is more important than the differences in the absolute number of seats initially suggests.

**Discussion**

In this research note, we explored whether the system of assigning each state equal representation in the Senate adversely affects racial minorities, groups that often have common political interests. We found that both African Americans and Hispanics are substantially underrepresented due to their greater presence in high-population states as compared to in low-population states. Whereas bias against African Americans appears to be falling, the demographic patterns of Hispanics will make them even more underrepresented in coming years. Why do these findings matter? As mentioned above, there is strong evidence that overrepresented states receive greater per-capita benefits due to their bargaining positions. However, because racial minorities tend to reside in underrepresented states, they do not receive the same distributive benefits as white Americans. Similarly, programs that distribute funds by formula often provide greater per-capita benefits to small-state residents. Further, the Senate serves as a major veto point in U.S. politics; racial bias due to equal apportionment, which results in whites having more senators representing them on a per-capita basis, may
have a significant impact on future civil rights legislation (as it has in the past) or other issues particularly relevant to African Americans or Hispanics.

Unequal representation may become especially important for Hispanics, as generational conflict over retirement benefits will be one of the most salient political issues of the next 30 years. The Hispanic proportion of the population is projected to grow substantially through 2050 (Hendley and Bilimoria, 1999). As the white population ages, a substantially greater share of Hispanic workers will be funding Social Security and Medicare benefits for a predominantly white group of retirees (U.S. Census Bureau, 2005b). Proposals to curb retiree pension and health benefits to reduce the tax burden on workers may stall in the Senate due to the projected overrepresentation of white voters.

Future work on this subject may focus on the consequences of racial bias in the Senate. We have used previous findings to argue that African Americans and Hispanics do not receive distributive benefits commensurate with their populations. However, there is more to politics than pork. A more detailed study of the degree to which malapportionment shifted the pivotal senator on a series of votes important to minority groups would increase our understanding of the impact of malapportionment. As Madison argued in *Federalist 62*, equal Senate apportionment was designed to check majorities in large states from dominating small states (Madison, 1961). Yet, in a classic example of unintended consequences, malapportionment now serves to weaken the influence of minority groups.

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