A Number Most Convenient? The Representational Consequences of Legislative Size[†]

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Abstract

This paper makes the case that the size of democratic legislatures has political representational consequences. We first emphasize the substantial variation in size exhibited by democratic legislatures at the national and sub-national levels, especially relative to their populations. We then specifically focus on descriptive representation, arguing that this is facilitated by relatively larger legislatures, especially when the electoral system is majoritarian. We provide support for this hypothesis using an empirical analysis of the descriptive representation of several traditionally underrepresented racial and ethnic groups and women in U.S. state legislatures, findings that we largely triangulate with a cross-national analysis of women's representation.

The size of the U.S. House of Representatives has increased almost two-fold between 1860 and the early 2000s---specifically, from 237 to 453 seats. Simultaneously, the U.S. population has increased almost ten-fold, while the number of people eligible to vote has increased by an even more spectacular twenty-seven-fold. As a result, legislators have come to represent more than fifteen times as many people over this period[1] --- a fact recently bemoaned in a number of both popular and scholarly articles, including a 2018 piece from the New York Times Editorial Board (e.g., Conley and Stevens 2011; Harden 2011-2012; Chokshi 2013; Bartlett 2014; Bump 2015; Ellenberg 2017; Editorial Board 2018).

Likewise, democratic legislatures worldwide exhibit great variation from country to country and over time in absolute size and, more importantly, in size relative to either the populations or electorates being represented. This is also the case at the sub-national level within countries that are either federal or decentralized.

This observed variation in the size of democratic legislatures begs the question of: what are the representational consequences? With notable exceptions, most prominently the body of work of Taagepera and Shugart that links legislative size to party system size via its effect on electoral disproportionality (e.g., Taagepera and Shugart 1989; Taagepera 2007; Shugart and Taagepera 2017), legislative size has been eclipsed in many national-level studies of electoral and party systems by a focus on the restrictiveness of the electoral system. Similarly, scholars of democratic representation have

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[1] While one congressperson represented about 33,000 eligible voters in 1860, by 2006, one congressperson was representing about 500,000.

instead focused upon other electoral institutions, such as the existence of quota systems, in securing descriptive representational outcomes (e.g., Krook 2009). Perhaps the most robust focus on legislative size is found in the American politics literature, especially at the state level (e.g., Squire and Hamm 2005; Squire and Moncrief 2020) --- yet these are studies with which comparativists do not significantly engage.

In this paper, we attempt to remedy this neglect and focus upon one key democratic representational consequence of legislative size, descriptive representation. Specifically, we argue that relatively larger legislatures should deliver better descriptive representational outcomes, and that this is especially the case in countries employing majoritarian electoral systems. Our empirical strategy is multi-pronged. First, we conduct a within-case analysis of the representation of both traditionally underrepresented racial/ethnic groups and women in state legislatures in the U.S. We find the strongest support for our hypothesis with respect to descriptive representation for African Americans and women, where relative legislative size has both a statistically and substantively significant effect. For the other groups analyzed, with the exception of Native Americans, the findings are largely echoed over a shorter time frame, triangulating our findings. Second, we briefly triangulate these results with a cross-national analysis of women's representation in minimally democratic countries, which also provides support for our hypotheses.

Variation in Legislative Size

Democratic legislatures exhibit stunning variation in size across space and time. At the national level, in the minimally democratic states identified by Bormann and Golder (2013) from 1946 through 2011, legislative size in a country's only or lower legislative chamber varies from a minimum of 11 seats in St. Kitts and Nevis to a maximum of 650 in the United Kingdom since 1983, with the median falling at 150.[2] Change over time is also common, with Figure 1 exhibiting examples of the typical patterns, which range from no change (e.g., Finland) to increases (e.g., Australia, most common) to decreases (e.g., Belgium) to combinations of the two (e.g., France).

[Figure 1 about here]

What is perhaps less appreciated is the great spatial and temporal variation at the sub-national level in politically decentralized or federal countries. Taking the U.S. states as an example, the number of seats in the only or lower chamber of state legislatures from 1860 through 2006 ranges from 21 (Delaware, 1860-1899) to 443 (New Hampshire, 1943-1945), with a median size of 100. Turning to temporal variation, the black lines in Figure 2 show a similar pattern for state legislatures in the U.S. to that observed at the national level, with data for four states that collectively exhibit the four possible patterns observed at the national level drawn from Stoll (2013) with some modifications (discussed below).

[Figure 2 about here]

The (Representational) Consequences of Legislative Size?

This striking variation that we observe in the size of legislatures across political units and over time begs questions about the consequences.

Studies link national legislative size to a variety of non-representational outcomes, such as the size of government, electoral competitiveness, internal legislative organizational structures and rules, and legislator behavior (e.g., Petterssen-Lidbom 2011; Chen 2012; Taylor 2006; Jacobs and Otjes 2015). In the American politics literature, Squire and Hamm (2005, 49) argue that "much more systematic work on the importance of membership size needs to be conducted." While we hope future work will take up

[2] While Germany in 1994 technically has 672 seats, this is due to the presence of "overhang" seats. The baseline seat total was actually 630.

this comprehensive challenge and systematically explore the impact of legislative size, in this paper, we more narrowly ask: what are the *representational* consequences of legislative size?

The literature that identifies the size of the population as an explanation of the size of the legislature (e.g., Taagepera 1972; Taagepera and Shugart 1989; Taagepera 2007) suggests the existence of representational consequences. Consider the number of persons per legislative seat---that is, how many members of a polity's population (electorate) each legislator can be thought of as representing. At the national level for contemporary minimally democratic countries, looking at the most recent election in Borman and Golder (2013), the voting age person-to-seat ratio ranges from a minimum of 301 in Nauru in 2010 to a maximum of 1,360,541 in India in 2009. We see even more variation when considering the relative size of legislatures than when looking just at legislative seats. Turning to the sub-national, state level of the U.S., the grey line in Figure 2 shows the persons-per-seat ratio, calculated for the theoretical electorate of the four states at the time of each election.[3] This figure also shows even more variation across states and time in how many people are represented by a state legislator, relative to the number of seats alone. For example, in 2006, for just the four states considered in Figure 2, this figure ranges from a maximum of about 30,000 in Maryland to a minimum of 3,200 in Vermont. Surely we expect a legislator accountable to hundreds of constituents to have a different relationship with those constituents, both on the campaign trail and in government, than one accountable to thousands or millions. We might also expect different kinds of legislators to be elected in these different scenarios.

Indeed, scholars have argued that there are representational consequences. The largest extant literature indirectly links legislative size to party system size via its effect on disproportionality, viewing legislative size as one dimension of the electoral system (e.g., Rae 1967; Lijphart 1994; Farrell 2011; Lundell 2012; Kjaer and Elklit 2014). Most notably, Shugart and Taagepera (2017), building upon their earlier work (such as Taagepera 2007), argue that legislative size is one of the components of what they label the "seat-product" model, which can be used to predict the size a state's party system. However, many studies of electoral systems and party systems from the late 1990s onwards instead focus upon the district magnitude and electoral formulae (e.g., Cox 1997; Clark and Golder 2006; Hicken and Stoll 2013; Kedar, Harsgor, and Scheinerman 2016), in which legislative size features only indirectly. And in later work, Lijphart (2012) argued that for legislatures of over 100 members, legislative size becomes relatively unimportant as a variable of interest.

A smaller body of work turns away from this "inter-party" representational dimension. Most of these studies have argued that larger legislatures have a positive representational impact.[4] Dahl and Tufte (1973, 84) classically make the case that "the greater the number of constituents per representative… representatives will become 'less representative' in several senses of the term." Relatedly, advocates of a larger U.S. House have argued that legislatures larger relative to the population offer myriad benefits, although only Frederick (2008) provides an empirical test of the argument.[5] More specifically, Kjaer and Elklit (2014) hypothesize that larger assemblies will yield better representation of historically under-represented social groups such as women and young people.

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[3] Our measure of the electorate in U.S. states is what Stoll (2013) calls the "theoretical electorate": all those eligible to vote (based on factors such as sex, age, and race) at the time of a given election. This can be contrasted to the subset of the latter individuals who have actually registered to vote. Our data makes several improvements to Stoll's (2013). See the supplemental paper for details.

[4] One of the few examples of a negative effect is provided by Blais and Carty (1990), who find that the log of the number of seats has a small, statistically significant negative impact on voter turnout.

[5] Using ANES data, Frederick (2008) finds that an increase in House district population size reduces the accessibility of House members to their constituents. See also Frederick (2010) and Harden (2011-2012) for general arguments about the representational benefits of a larger House, as well as Jacobs and Otjes (2015) for a review of other intra-party, patronage-related effects of assembly size, such as the influence that an individual representative can wield.

However, using simulations that varied the number of seats in Danish municipalities and municipal election results from 2009, they find only limited support for this hypothesis. More positively, Oakes and Almquist (1993) found that the size of the legislature has a substantively weak if statistically significant impact on the representation of women.

Yet overall, when representation is conceptualized as something other than disproportionality and party system size, this is a small literature. It is additionally worth noting that although there is a burgeoning literature exploring how electoral institutions such as reserved seats and quota systems shape the democratic representation enjoyed by the traditionally underrepresented (e.g., Rule and Zimmerman 1994; Phillips 1995; Htun 2004; Dahlerup 2005; Tripp and Kang 2008; Jones 2009; Bird 2014), these studies do not explore legislative size as an explanatory factor, aside from brief remarks.[6]

Bringing Legislative Size Back In: Legislative Size and Descriptive Representation

We accordingly suggest a renewed focus on how the size of democratic legislatures directly shapes representational outcomes. Specifically, drawing upon the existing literature discussed earlier, we hypothesize that *larger legislatures relative to their electorates should generally lead to better descriptive representational outcomes for traditionally underrepresented groups, all else being equal (H1)*. While descriptive representation is obviously only one facet of democratic representation, it is important for the reasons identified by scholars ranging from Pitkin (1967) to Phillips (1995). Although we are not the first to make this argument, it has received only limited empirical attention to date.

The overarching logic behind this hypothesis is straightforward. Consider a polity with a reasonable amount of social diversity, which generates demands for representation from different social groups. At the extreme, in a single-seat legislature, the seat will almost invariably go to the largest group, shutting out others. As seats are added, either by adding more seats to the existing district or adding new districts, the number of votes needed to secure a seat decreases. This allows smaller groups a greater chance to elect a member.

But now consider different systems for electing the legislature. In proportional representation systems, holding constant the size of the population (electorate), the more legislative seats there are in absolute terms, the larger the legislature relative to the population and the more proportional the votes-to-seats translation will be, as per Lijphart's (1994) and Kjare and Elklit's (2014) arguments. Accordingly, relatively larger legislatures elected using proportional representation should mechanically deliver better women's and minority representation.

What about the mechanisms in more restrictive, majoritarian electoral systems? Under most such systems (such as single member district plurality), a larger legislature with more seats will have more districts (holding constant population). These districts will necessarily be smaller in terms of population and geography. Geographically concentrated groups are therefore more likely to command a larger share of the electorate in at least some districts, facilitating their representation. But for both geographically and (importantly) non-geographically concentrated groups, such as women, such an environment should additionally produce lower stakes elections, requiring less campaign infrastructure and financing by enabling more local level and direct candidate-to-constituent interactions.[7] Similar mechanisms (and hence effects) will result from the number of legislative seats remaining the same, but the size of the electorate changing (with the details of the effect depending on the relative changes in

[6] See, for example, some of the concluding remarks in Stoll (2013), as well as posts by Matthew Shugart on his "Fruits and Votes" blog (https://fruitsandvotes.wordpress.com).

[7] A classic study of women's political underrepresentation in the U.S. finds women's reluctance to put themselves forward as candidates to be rooted in factors such as a dislike of routine campaign activities and the perception that high stakes political environments (which require greater levels of campaign activities such as fundraising) are biased against them (Lawless and Fox 2005).

group sizes). These less mechanical, more transformative mechanisms at play under majoritarian electoral systems lead us to hypothesize that relative legislative size may have its greatest effect on the descriptive representation of minorities and women in countries employing such electoral systems.[8] That is: *the more restrictive the electoral system used to elect the legislature, the greater the positive impact of relative legislative size on descriptive representation* (H2).

Empirical Analysis: Evidence from the United States

To empirically explore the effects of legislative size relative to the electorate on descriptive representation, we first study the representation of two of the most prominent types of traditionally underrepresented social groups, racial/ethnic minorities and women, in state legislatures in the United States. Employing a within-case analysis enables us to hold many potentially confounding cultural and institutional factors constant, while allowing the size of the legislature to vary.[9] It also enables us to exploit the substantial variation in the relative size of the legislature in U.S. states (from state to state and over time), our independent variable, as well as in minority and women's representation, our dependent variables. Further, in light of H2, the states of the United States provide a good test of our hypothesis due to their widespread use of majoritarian electoral systems (especially the maximally restrictive single member district plurality), enabling us to test the less mechanical mechanisms of legislative size. Moreover, the analysis of women's representation enables us to triangulate the results of the racial/ethnic minorities analysis: if we find similar effects for women, our confidence is increased that legislative size (such as through the low-high stakes mechanism) is doing some work, as opposed to our findings being an artifice of the United States's relatively unique system of electoral districting.

Minority Representation

For the first part of our empirical analysis, we analyze African American descriptive representation in U.S. state legislatures over time. We then triangulate this analysis with a brief, cross-sectional analysis of the descriptive representation of three other minorities in the U.S.: Latinos, Asians, and Native Americans.

Variables and Data

Our primary dependent variable is the percentage of African American state representatives. To calculate this variable, we collected data from both primary and secondary sources on the number of African Americans elected to seats in the lower or only chamber of state legislatures.[10] We then divided this number by the number of seats in the lower or only chamber of state legislatures, data for which is taken from Dubin (2007). The resulting percentage ranges from 0 (which is also the first quartile and the median of the observed data, although the mean is 2.1 percent) to a maximum of 65 percent in South Carolina following the 1872 election.

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[8] Moreover, for proportional electoral systems, common measures of electoral system restrictiveness such as the average district magnitude will pick up changes in legislative size, washing out the latter's independent effect when including both variables in a statistical model. However, this will not be the case for the most restrictive systems (such as those with single member districts), where a change in legislative size will have no effect on the measure of restrictiveness.

[9] This is similar to the strategy employed by Kjaer and Elkit (2014).

[10] Our primary sources included publications of state legislatures themselves, such as class photos and membership rosters; publications by other state agencies, such as the Texas State Library and Archives Commission; and publications of state legislative black caucuses. Secondary sources include publications by the Joint Center for Political Economic Studies, such as the National Roster of Black Elected Officials; the National Conference of State Legislatures; and scholarly studies. See Stoll (2013), who used the same sources to collect related data, for more details.

Our key independent variable is the relative (to the electorate) size of the lower or only chamber of the state legislature. A natural measure of this concept is to divide the total number of seats in the only or lower legislative chamber by the state's theoretical electorate at the time of the election.[11] We call the resulting statistic the seats-to-persons ratio.[12] For example, a 10 seat legislature in a state with 100 people has a seats-to-persons ratio of 10:100, or 1:10 = 0.10. It is important to use the legislature's relative size, rather than its absolute size, because it is only the relative size that captures how large a legislator's constituency is, and hence taps into the theoretical insight that there may be a relationship between how many people a legislator represents and representational outcomes. We expect this variable to be positively related to African American descriptive representation, given our hypothesis that larger legislatures will provide better descriptive representation. Data on the number of legislative seats is again taken from Dubin (2007), while data on the theoretical electorate builds upon that in Stoll (2013; see footnote 5).

We incorporate five additional variables in our models. First, the larger the African American share of the population eligible to vote (based on sex, race, and age) at the time of a given election, the more African Americans should be elected to the state legislature.[13] We therefore control for the African American share of the theoretical electorate. Data is again based upon that in Stoll (2013).

Second, African American representation has generally (although not always) increased over time. Emancipation, enfranchisement following the Civil War, re-enfranchisement following the Civil Rights Movement, and the accompanying socioeconomic gains have all led to higher levels of political engagement among African Americans with the passage of time, periods of disenfranchisement largely notwithstanding. We accordingly control for election year, expecting this variable will be positively related to African American descriptive representation[14]

Third, while most states have used single-member electoral districts during the period studied, multi-member districts have sometimes been used. In the U.S., multi-member districts are viewed as unfavorable for geographically concentrated groups such as African Americans and Latinos (Segura and Bowler 2005). Accordingly, we contrast those states using exclusively single-member districts in a given election with those using at least one multi-member district by including a dummy variable for the exclusive use of single-member districts. We expect our dummy variable for single-member districts to be positively associated with African American descriptive representation.

Fourth, in both models, we also include a dummy variable for states and elections that are subject to the Voting Rights Act (VRA). For example, Alabama was under VRA jurisdiction from 1966 through the end of our study in 2006. Because the VRA provides a variety of mechanisms to protect against vote suppression and dilution, we expect that state elections held under its jurisdiction will be positively associated with the descriptive representation of African Americans.

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[11] See footnote 3 for more information on the theoretical electorate. Using the total population instead of the theoretical electorate as the numerator yields even stronger (more statistically and substantively significant) results. However, given our focus upon descriptive representation, focusing upon the persons who are actually eligible to vote seems the most defensible choice.

[12] We use the seats-to-persons ratio instead of the perhaps more easily interpreted persons-to-seat ratio because a scatterplot suggests that the persons-to-seat ratio has a non-linear (specifically, exponential) relationship with the dependent variable. The seats-to-persons ratio, its reciprocal, is the linearizing transformation suggested by Tukey's (1977) ladder of powers.

[13] Controlling for the African American share of the population, instead of the African American share of the theoretical electorate, yields similar results.

[14] The alternative approach of including time (year) fixed effects yields similar conclusions for all variables except the single-member district dummy, which retains its positive sign but loses statistical significance.

Finally, to account for unmeasured and relatively stable features of states that might shape African American descriptive representation such as political culture, we include fixed effects for states in all models. This is supported by F-tests for the nested models.[15]

The resulting model, which we label Model 1, is as follows, omitting state fixed effects for simplicity:

$$[\text{Percent Representatives}]_{i,t} = \beta_0 + \beta_1[\text{Seats-Persons Ratio}]_{i,t} + \beta_2[\text{Percent Electorate}]_{i,t} + \beta_3[\text{Year}]_i + \beta_4[\text{Single-member Districts}]_{i,t} + \beta_5[\text{Voting Rights Act}]_{i,t} + \varepsilon_{i,t} \quad (1)$$

The cases used to estimate this model are all state legislative sessions of the only or lower chamber resulting from elections between 1860 and 2006. For the 50 states, there are 3492 such sessions. All variables are fully observed.

However, one might alternatively argue that the effect of an increase in the relative legislative size on African American descriptive representation will depend upon the African American share of the electorate. Specifically, relative legislative size should have a greater impact where and when African Americans constitute a larger share of the electorate. This suggests that an interactive instead of an additive specification is needed, and that the interaction term should be positively signed. Because we expect the relative size of the legislature to facilitate African American descriptive representation even when the African American share of the electorate is small, we expect the main effect term on the seats-to-persons ratio to be positive and statistically significant.

We accordingly estimate a second model, which we label Model 2, in which we interact the seat-to-persons ratio with the African American share of the electorate (again omitting fixed effects):

$$[\text{Percent Representatives}]_{i,t} = \beta_0 + \beta_1[\text{Seats-Persons Ratio}]_{i,t} + \beta_2[\text{Percent Electorate}]_{i,t} + \beta_3[\text{Seats-Persons Ratio*Percent Electorate}]_{i,t} + \beta_4[\text{Year}]_i + \beta_5[\text{Single-member Districts}]_{i,t} + \beta_6[\text{Voting Rights Act}]_{i,t} + \varepsilon_{i,t} \quad (2)$$

The same cases are used to estimate this model.

Last but not least, to triangulate our findings by taking a brief look at other ethnic and racial minorities in the U.S., we estimate versions of Models 1 and 2 for three other prominent minority groups: Latinos (Models 3 and 4), Asians (Models 5 and 6) and Native Americans (Models 7 and 8). Data on the number of representatives from these minority groups (which we use to calculate the percentage) and the proportion of a state's population belonging to these groups is taken from the Gender and Multicultural Leadership Project (GMCL) and the U.S. Census, respectively.[16] However, because this data is only available for 2006,[17] Models 3-8 are cross-sectional instead of time-series cross-sectional, which means that we drop the year variable and the state fixed effects from the models specified in Equations 1 and 2.[18] All else is as before.

Results and Discussion

[15] We additionally controlled for the African American share of a state's federal representatives (specifically, the share of a state's House delegation) to account for the possibility of a coattails effect running from federal to state elections. However, because controlling for this variable does not alter our conclusions, we omit this variable in the interests of space and for comparability with the other minority models.

[16] We thank Pei-te Lien and her colleagues at the GMCL for this data.

[17] For correspondence with the data on minority group descriptive representation and share of the electorate, all other data is from 2006 or the closest preceding state election year.

[18] We note that including dummy variables for regions, variously defined, does not affect our conclusions.

Estimation is using ordinary least squares (OLS) regression[19] with robust standard errors.[20] Table 2 presents the estimated coefficients and standard errors for the seven U.S. state models.

[Table 1 about here]

It provides evidence generally supportive of our hypothesis that relative legislative size matters (H1).

Let us begin with African Americans. In the additive specification (Model 1), the sign on the seat-to-persons ratio is positive, meaning as the ratio increases, the descriptive representation of African Americans---as measured by their share of the seats in the lower or only chamber of the state legislature---is predicted to increase, *ceteris paribus*. This effect is statistically significant at conventional levels using a two-sided test (p=0.00).

More importantly, the interactive model specification (Model 2) also supports our hypothesis. Both the interaction term and main effect term of the seats-to-persons ratio are positive and statistically significant at conventional levels using a two-sided test (p=0.00). To precisely determine the predicted effect of relative legislative size for this model, we must calculate its marginal effects over the observed range of the conditioning variable, the African American share of the electorate (Brambor, Clark, and Golder 2006). While not shown here for reasons of space,[21] the estimated marginal effects are always positively signed and statistically significant, providing strong support for the hypothesis. Moreover, because the interaction term is positively signed, the effect of an increase in legislative size is predicted to become larger as the African American share of the electorate increases. Finally, the estimated marginal effects are also substantively significant. Using as our yardstick an increase in the seats-to-persons ratio from the observed first quartile to the observed third quartile (an increase of 0.00027), the predicted increase in the African American share of state representatives when the corresponding share of the electorate is at its observed maximum (57%) is about 8 percentage points. This is obviously a substantial real-world effect. When the African American share of the electorate is instead at its mean (6%), the effect is a smaller but non-trivial increase of 1.6 percentage points.

In our brief look at the descriptive representation of other minority groups, the evidence remains largely supportive of H1. For Asian and Latinos, the seats-to-persons ratio is statistically significant at conventional or close-to-conventional levels (p = 0.075 for Latinos, 0.0049 for Asians, two-sided tests) in the expected positive direction in the additive models (Models 3 and 5). Moreover, the substantive magnitudes are meaningful.[22] The interactive models are more mixed. For Latinos, both the interaction term and main effect term are positively signed (Model 4), though neither attain conventional levels of significance. The marginal effects are all positively signed but statistically insignificant (if only narrowly so for the most common, moderate Latino shares of the population). In contrast, for Asians, the interactive model (Model 6) is not supported: the interaction term is negatively

[19] We use OLS, despite a proportional dependent variable, because we obtain similar results from alternative, less easy-to-interpret approaches including: logging the dependent variable; fractional response models; and re-specifying the dependent variable as a binary outcome, with "1" representing the "success" of an African American representative being elected, given that the proportion is calculated using data on both the number of "successes" (number of African American representatives) and total number of "trials" (electoral contests, meaning total number of seats).

[20] Panel-adjusted Newey-West (1987) standard errors are employed for Models 1 and 2, and White's heteroskedastic-consistent (1980) standard errors are used for Models 3-8. However, alternatively employing a state-clustered robust estimator for Models 1 and 2 yields similar conclusions. See the supplemental paper for more information.

[21] See the supplemental paper for these and all other marginal effects, which are discussed but not reported in the interests of space.

[22] For example, for Latinos, an increase across the interquartile range of the seats-to-persons ratio is predicted to increase the share of Latino representatives by 0.41 percentage points. With the median Latino share being 0.96 percentage points, this is substantively significant.

signed, of small magnitude, and statistically insignificant. The main effect, however, remains positive, substantively large, and close to statistically significant (p = 0.13, two-sided test). Further, given the observed range of the Asian population share, the estimated marginal effects (again not shown for reasons of space) are positively signed for all states except Hawaii, a very high outlier,[23] and are statistically significant for the (small) values of the Asian share of the population where most of the observed data lies.

However, the predicted relationship is not found for Native Americans. The estimated coefficient on the seats-to-person ratio in additive Model 7 is negatively signed and statistically insignificant, and while in the interactive Model 8 the main effect's sign turns positive, it remains insignificant. Moreover, the interaction term is negatively signed, and the marginal effect is predicted to be negative when the Native American share of the population is more than about 1 percentage point (more than half of the observed cases), contrary to our hypothesis. This contradictory finding may reflect the state-by-state variation in Native American population share, or simply that the institution impacts Native Americans differently. There is a dearth of empirical research on the political behavior of Native Americans, and these results indicate room for further research.

We close by briefly discussing the findings regarding the control variables. First, as expected, the passage of time has had a statistically and substantively significant effect on African American descriptive representation in state legislatures. Second, also as expected, a minority group's share of a state's electorate (population) has both a statistically and substantively significant positive effect on the group's descriptive representation, especially for Latinos and Asians. Third, again as expected, the use of exclusively single-member electoral districts is found to have the predicted positive effect, although the effect is only statistically significant for African Americans and the substantive impact---the largest for this group---is moderate if non-trivial (an increase of about 1.5 percentage points). Fourth and finally, the Voting Rights Act is found to have the predicted positive and statistically significant impact for African Americans alone; for this group, moreover, its substantive effect is quite large, ranging from an increase of 4.2 to 6.7 percentage points.

Women's Representation

To further triangulate our results, we turn to an analysis of women's representation in U.S. state legislatures. Our dependent variable is the percentage of state representatives in the lower or only chamber who are women.[24] Data on the number of seats in the legislative chamber is taken from Dubin (2007), while data on the number of women representatives is taken from the Center for the Advancement of Women in Politics at Rutgers University.

Our key independent variable is the seats-per-person ratio of the lower or only chamber of the state legislature, where the denominator is a state's theoretical electorate.[25] Several other independent variables are included in the model. The first is a dummy variable for the states employing only single member districts, versus at least some multi-member districts. Contrary to the case for racial/ethnic minorities, evidence from research at the state level points to the fact that women generally benefit from multi-member districts (e.g., Welch and Studlar 1990; Moncrief and Thompson 1992; King 2002), so we expect the presence of multi-member districts to increase women's representation. The second is the percentage of a state's federal representatives (i.e., the state's House delegation) who are women, also

[23] Excluding Hawaii reduces the statistical and substantive significance in the additive model, but increases it in the interactive model.

[24] Because similar results are again obtained when using the natural log, we report results using the more easily interpretable simple percentage in what follows.

[25] As with African Americans, we find even stronger results when using the total population instead of the theoretical electorate.

taken from Center for the Advancement of Women in Politics. We include this variable to account for the possibility of a coattails effect running from federal to state elections. The third is a set of dummy variables for region. This enables us to account for unmeasured regional characteristics that might shape women's representation --- particularly those related to political history, socio-economic factors such as labor force participation rates, and culture. Following standard practice, we divide the country into four regions: the west, south, mid-west, and north-east, with the west serving as the omitted (baseline) region.

The cases are a cross-section of state legislative sessions of the only or lower chamber. We take the state legislative session that resulted from the 2006 election (or closest preceding election) to correspond with our cross-sectional racial/ethnic minority models.[26] Because we are missing data on women's representation for three states, there are a total of 47 cases.

Models, Results, and Discussion

We estimate one model to explain state-level variation in the percentage of women representatives in state legislatures, a simplified version of Equation 1 that we label Model 9.[27] The results are found in Table 2.

Table 2 about here.

White's heteroskedastic-consistent robust standard errors are reported in parentheses to address the heteroskedasticity present in the data.

The results in Table 2 generally support H1. The seats-to-persons ratio is found to be positive, statistically significant, and substantively meaningful. As the number of people represented by one legislator decreases, women's seat share in the lower or only chamber of the state legislature is predicted to increase, as hypothesized. For example, increasing the seats-per-person ratio from the observed minimum to the observed maximum, *ceteris paribus*, is predicted to yield an average increase in the percentage of women representatives of 9.1 points.

The other variables in the analysis produce mixed results. The exclusive use of single member districts is surprisingly found to have neither a statistically nor substantively significant effect and, in contrast to previous findings in the U.S., actually has a positive sign, indicating single member districts are predicted to increase women's representation relative to multi-member districts, *ceteris paribus*. Second, women's share of a state's federal representatives is found to have a positive effect, as expected, but this effect is neither statistically nor substantively significant. Third, the state being either southern or Midwestern is predicted to both statistically and substantively significantly depress women's descriptive representation, as one would theoretically expect---at least in the case of the south.

Cross-National Analysis

We now provide a brief test of the generalizability of our findings, as well as a more direct test of H2 about the effect of relative legislative size being conditional upon the restrictiveness of the electoral system, using a simple cross-national empirical analysis of women's representation. We focus on women's representation because the identity of racial/ethnic minorities varies from country to country (e.g., Rule and Zimmerman 1994).

[26] We also opt for a cross-sectional model due to inconsistent data on women's representation pre-1985.

[27] We do not estimate an interactive model because women's share of the population (electorate) does not vary much across states.

Our dependent variable is the percentage of women in the only or lower legislative chamber of the national legislature.[28] Data on the number of women legislators and the number of seats in the lower house is taken from the Inter-Parliamentary Union ("Women in Parliaments," 2015).

Our key independent variable of relative legislative size is operationalized as before as the ratio of the total number of seats to the electorate (the seats-to-persons ratio). To calculate the measure of this variable, we take data on the size of each country's registered electorate from International IDEA's Voter Turnout Database, and data on the number of legislative seats from the Inter-Parliamentary Union. We control for five other political institutional variables that the literature has related to women's descriptive representation. These variables are: electoral system restrictiveness, operationalized as conventional as the logged average district magnitude (data from Bormann and Golder 2013); a dummy variable for the use of a mandatory quota system for gender representation (data from the Quota Project, "Gender Quotas Database," 2015); a dummy variable for the use of a voluntary quota system for gender representation (Ibid.); a dummy variable for the existence of reserved seats for women (Ibid.); and a dummy variable for some kind of presidential regime with a directly elected president (our update of data originally compiled by Hicken and Stoll 2013). We additionally control for region in order to account for unmeasured regional characteristics (from religious to cultural factors) that might shape women's representation, using a ten-category schema from Bormann and Golder with industrialized (OECD) countries as the omitted baseline category. More details about all of these variables are found in the supplemental paper.

The cases in the analysis are legislative sessions following the election closest to 2010 in all minimally democratic countries, as identified by Bormann and Golder (2013). There are 117 such legislative sessions, although after deleting cases with missing data, we are left with 114 observations.

Models, Results, and Discussion

The model we estimate, labeled Model 10, includes these variables, as well as an interaction term between the measures of relative legislative size and the logged average district magnitude. White's heteroskedastic-consistent robust standard errors are employed to address heteroskedasticity. The results of the analysis are displayed in Table 3.

Table 3 about here.

However, the regional dummy variables are not shown in the interests of space (see the supplemental paper).

We see from Model 10 that the effect of relative legislative size is conditional upon the restrictiveness of the electoral system, as H2 hypothesizes. The interaction term between the seats-to-persons ratio and the logged average district magnitude is statistically significant at conventional levels. Moreover, with the interaction term being negatively signed while the relative legislative size main effect term is positively signed, the interpretation is that relative legislative size has the largest effect in restrictive electoral systems---an effect that diminishes the less restrictive (i.e., the more proportional) the electoral system becomes. Further, in the most restrictive electoral systems (those with single member electoral districts), the substantive effect of the maximal increase in relative legislative size is significant: around 14 percentage points holding all else constant, even though this effect falls short of conventional levels of statistical significance (if not by much: $p = 0.12$, one-sided test). We accordingly find at least suggestive support for our hypotheses from this simple cross-national analysis. More research is needed, however, in light of the small sample size and the observational and cross-sectional nature of the analysis.

[28] As before, we present results from this more easily interpreted model, given that we obtain similar (if more significant) results with a logged version of the dependent variable.

While we reserve a full discussion of the control variables for the supplemental paper, we note here that all control variables have the expected signs, given the literature's hypotheses, and all either attain conventional or close to conventional levels of significance, with the exception of reserved seats. Of particular note is our finding with regard to presidentialism. While the basic measure of presidentialism used falls short of conventional levels of significance using a two-sided test, it does so only barely. Substantively, the impact of switching from a non-presidential to a presidential regime is non-trivial, resulting in a decrease in women's representation of 3 percentage points.[29]

Conclusion

In this paper, we have argued that the size of the legislature, specifically the number of seats relative to either the population or the electorate, is an important variable for understanding political representational outcomes, broadly construed, in democracies. Here, we focused specifically upon the amount of descriptive representation that traditionally underrepresented groups such as women and minorities achieve. We tested our hypothesis that relatively larger legislatures would deliver more descriptive representation, especially under restrictive electoral systems, using subnational data from U.S. state legislatures on African American, Latino, Asian American, Native American and women's representation. Supporting evidence for our hypotheses was found in most cases, with the exception being Native Americans in the U.S. Our hypotheses were also at least suggestively supported by a cross-national analysis of women's descriptive representation, providing some evidence that the results generalize beyond the United States.

At the most basic level, our findings suggest that legislative size is a political institutional variable that merits greater attention with respect to political representational outcomes. More research is certainly needed about how legislative size interacts with and compares to the effects of other political institutions, as well as about the generalizability of our findings. Nevertheless, our analysis suggests that it is worth including legislative size in the constitutional engineering toolkit. Even if there is no "precise solution" to the "number most convenient for a representative legislature" (to borrow Madison's insight from Federalist No. 55), and even if --- as Kjaer and Elklit (2014) and Squire and Moncrief (2020) persuasively remind us --- there is a trade-off between representation and efficiency, our findings suggest that many traditionally underrepresented groups in many polities are likely to benefit from legislatures that are larger than the ones that they currently employ, especially when a restrictive electoral system is in use. At minimum, in light of current debates about changes in the size of the legislature in a number of countries,[30] as well as past changes in legislative size over the last twenty years in relatively well-studied democracies such as Germany and Taiwan, it is important for the political science field to develop a better understanding of the potential impacts, representational and otherwise, of such institutional changes.

[29] See Allen and Stoll (2019) and the supplemental paper for more about presidentialism.

[30] Examples include debates about reducing the size of the legislature in the United Kingdom, and increasing the size of the national legislature in the U.S. (see, for example, Editorial Board 2018) as well as in specific U.S. states such as California.

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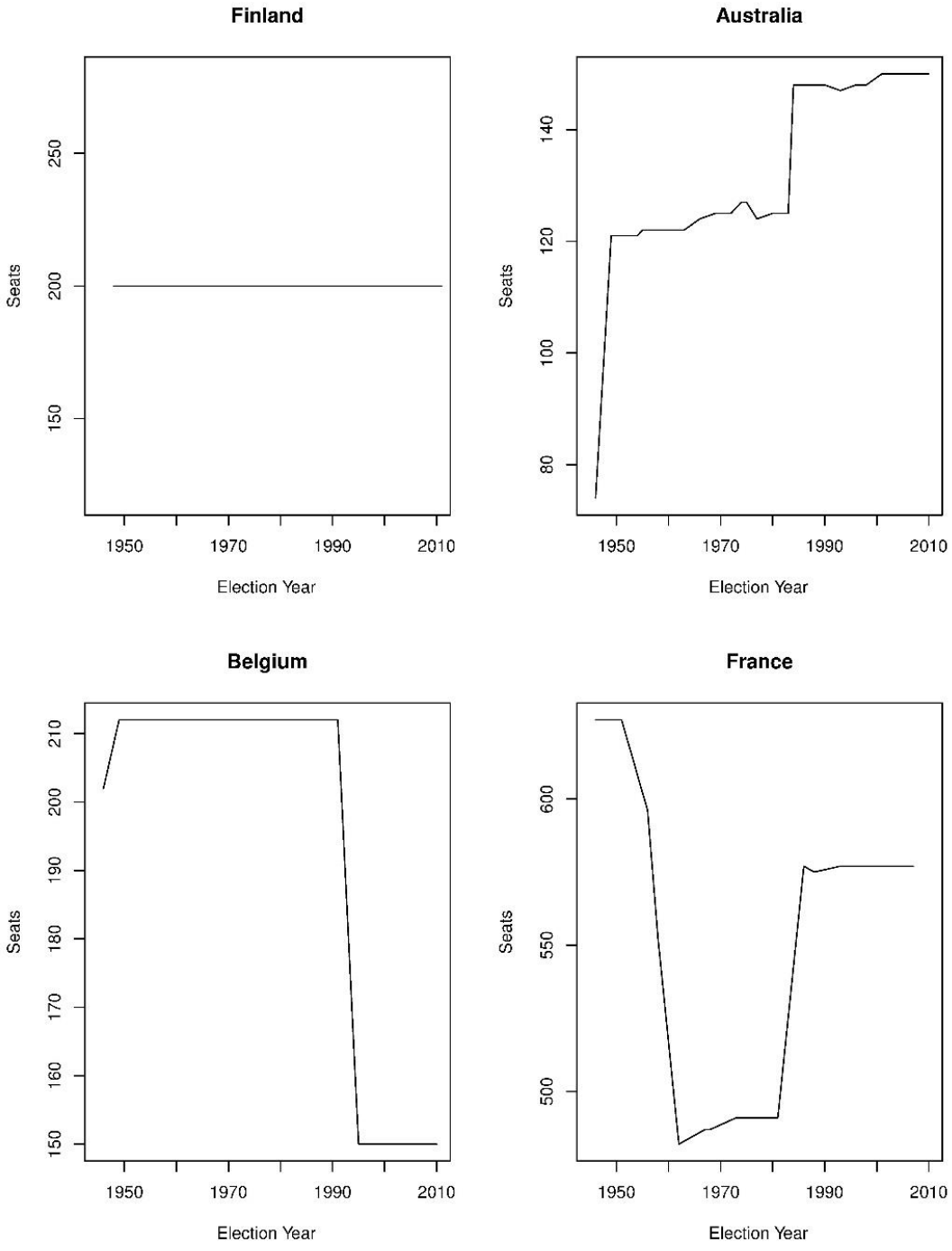

Figure 1. The number of seats in the lower or only chamber of the national legislature in four selected minimally democratic countries. Data is from Bormann and Golder (2013).

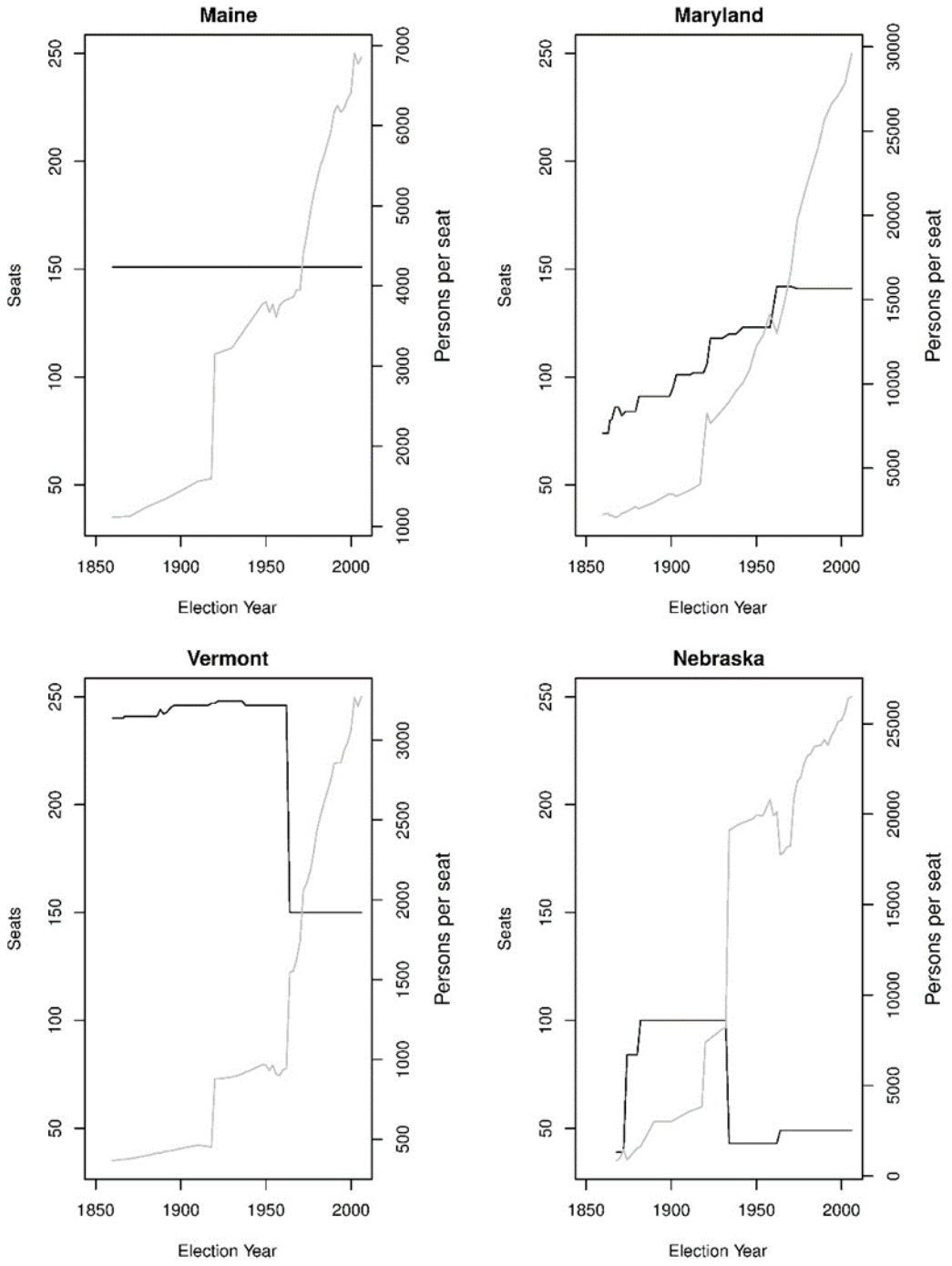

Figure 2. The number of seats (black line; left axis) and the number of persons-per-seat (grey line; right axis) in the lower or only chamber of the state legislature in four selected states of the U.S. Data on the electorate, used to calculate the persons-per-seat ratio, is our own; data on the number of seats is from Dubin (2007).

Dependent Variable: Racial/Ethnic Group, U.S. States	African Americans	African Americans	Latinos	Latinos	Asians	Asians	Native Americans	Native Americans
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept	-85***	-110***	-3.8**	-3.7***	-3.2***	-3.3***	-0.71*	-0.90*
	(4.2)	(5.8)	(1.6)	(1.3)	(0.69)	(0.75)	(0.40)	(0.43)
Seat-to-persons Ratio	3100***	3000***	9500*	600	6300***	6900	-920	2200
	(200)	(160)	(5200)	(5400)	(2100)	(4500)	(1700)	(1900)
Electorate, % African American	0.26***	0.046						
	(0.024)	(0.036)						
Seat-to-persons Ratio X		470***						
Electorate, % African American		(100)						
Year	0.043***	0.055***						
	(0.0021)	(0.0030)						
Single-member Districts Only	1.4***	1.7***	0.20	0.13	0.83	0.83	0.23	0.17
	(0.16)	(0.18)	(0.79)	(0.87)	(0.63)	(0.63)	(0.40)	(0.39)
Subject to Voting Rights Act	4.2***	6.7***	0.0045	0.30	-0.13	-0.11	0.019	0.084
	(0.58)	(0.65)	(0.77)	(0.67)	(0.60)	(0.54)	(0.31)	(0.32)
Electorate, % Latino			0.74***	0.65***				
			(0.13)	(0.055)				
Seat-to-persons Ratio X				3600				
Electorate, % Latino				(3200)				
Electorate, % Asian					0.87***	0.88***		
					(0.020)	(0.13)		
Seat-to-persons Ratio X						-260		
Electorate, % Asian						(2400)		
Electorate, % Native American							0.59***	0.76***
							(0.073)	(0.19)
Seat-to-persons Ratio X								-2100
Electorate, % Native American								(1800)
N	3492	3492	50	50	50	50	50	50
R2	0.51	0.56	0.84	0.86	0.98	0.98	0.85	0.86
Root MSE	3.6	3.4	3.1	3.0	1.6	1.6	0.91	0.87

Table 2. Estimated coefficients and standard errors for the models comprising the *U.S. state-level analysis with descriptive representation of a racial/ethnic group as the dependent variable.* State fixed effects not shown in Models 1 and 2, for which Newey-West standard errors are reported; White's heteroskedastic-consistent standard errors are reported for Models 3-8. Significance codes are for two-sided tests, all calculated prior to rounding to two significant digits: 0.01, ***; 0.05, **; 0.10, *.

Dependent Variable	Women, U.S. States
	Model 9
Intercept	28***
	(2.4)
Seat-to-persons Ratio	23,000*
	(12,000)
Only Single-member	0.086
Districts Used	(2.4)
Federal Rep., % Women	0.012
	(0.038)
Northeast	-4.0
	(2.7)
South	-9.3***
	(2.4)
Midwest	-7.0***
	(2.1)
N	47
R2	0.35
Root MSE	6.5

Table 2. Estimated coefficients and standard errors for the model comprising the U.S. state-level analysis with descriptive representation of women as the dependent variable (Model 9). The dependent variable is the women's share of the lower or only state legislative chamber. White's heteroskedastic-consistent robust standard errors are reported in parentheses. Significance codes are for two-sided tests, all calculated prior to rounding to two significant digits: 0.01, ***; 0.05, **; 0.10, *.

Dependent Variable	Women, Cross-national
	Model 10
Intercept	24***
	(3.3)
Log Average District Magnitude	1.6**
	(0.73)
Mandatory Quota	5.9***
	(2.1)
Voluntary Party Quota	3.1
	(2.6)
Reserved Seats	2.7
	(4.5)
Presidential	-3.3
	(2.1)
Seat-to-persons Ratio	4400
	(3700)
Seat-to-persons Ratio* Log Magnitude	-2500**
	(1200)
N	114
R2	0.51
Root MSE	8.4

Table 3. Estimated coefficients and robust (White's heteroskedastic-consistent) standard errors for the cross-national model of women's representation (Model 10). The dependent variable is the women's share of the lower or only national legislative chamber. Regional dummies not shown in the interests of space. White's heteroskedastic-consistent robust standard errors are reported in parentheses. Significance codes are for two-sided tests, all calculated prior to rounding to two significant digits: 0.01, ***; 0.05, **; 0.10, *.