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CHOOSING ELECTORAL RULES:  
THEORY AND EVIDENCE FROM US CITIES

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### **ABSTRACT**

This paper studies the choice of electoral rules, in particular, the question of minority representation. Majorities tend to disenfranchise minorities through strategic manipulation of electoral rules. With the aim of explaining changes in electoral rules adopted by US cities (particularly in the South), we show why majorities tend to adopt "winner-take-all" city-wide rules (at-large elections) in response to an increase in the size of the minority when the minority they are facing is relatively small. In this case, for the majority it is more effective to leverage on its sheer size instead of risking to concede representation to voters from minority-elected districts. However, as the minority becomes larger (closer to a fifty-fifty split), the possibility of losing the whole city induces the majority to prefer minority votes to be confined in minority-packed districts. Single-member district rules serve this purpose. We show empirical results consistent with these implications of the model.

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# 1 Introduction

One of the key questions in political economy is how different electoral laws affect policy outcomes. In order to provide an answer several authors take electoral rules as exogenous or predetermined and use them as explanatory variables for various policies<sup>1</sup>. However, the rules of government are themselves endogenous variables chosen at constitutional tables. Ideally, rules should be chosen behind a "veil of ignorance", that is decisions should be taken as if one ignored the identity of those benefiting from the choices themselves. In reality, however, in most constitutional tables the veil of ignorance is "see-through", in the sense that there is some knowledge of who would benefit under alternative rules and of what policy outcomes those rules would produce. Therefore the "exogeneity" of constitutions can be called into question.

Our focus is on the question of minority representation, with special reference to the nature of electoral districts and alternative rules for the choice of representatives. We have two goals in mind, one more general and one more specific. The first and more general point is to make progress in modeling institutional choice as endogenous. On the first point, most of the literature is normative, i.e. it discusses how electoral laws should be chosen, starting from the work of Hayek (1960) and Buchanan and Tullock (1962)<sup>2</sup>. A normative approach usually characterizes works in Political Science, with some notable exception such as Riker (1986) and several essays in Colomer (2004). Economists have only recently began to pay attention to the endogeneity of political insti-

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<sup>1</sup>A classic study is Lijphart (1994). The most recent contributions on the effects of institutions (taken as exogenous or predetermined) on economic policies are Persson and Tabellini (2003) for a sample of democratic countries and Baqir (2003) for a cross-section of US cities. They build upon a vast literature on the effects of alternative forms of government on policies, a literature that we do not review here. We refer the reader to Persson and Tabellini (2003) for a survey of the cross-country literature. On US states see in particular Alt and Lowry (1994), Poterba (1994), and Bohn and Inman (1996) amongst others. Mulligan and Sala I Martin (2004) offer a dissenting view, namely that policies are determined by lobbying pressure that are not much affected by institutional forms of government.

<sup>2</sup>For a survey of the literature on Constitutional Theory, see Voigt (1997).

tutions from a positive, as opposed to a normative perspective. Alesina and Glaeser (2004) for instance discuss how the choice of alternative electoral rules, which are themselves associated with different policy choices over the welfare state, are indeed the result of strategic constitutional choices. The present paper is a study in "positive constitutional theory", with a special emphasis on the question of how majorities select electoral rules to partially disenfranchise minorities.

The second and more specific goal of our paper is to analyze the evolution of minority representation in American cities. We examine empirical evidence drawn from US municipalities, that adopt two types of electoral rules: either a single-member district (also called single-district) or at-large rules (or a combination of the two). Councilmen elected by district compete for one or, more rarely, multiple seats in each geographic subdivision (district or ward) of the city. Differently, in at-large elections, officials are elected in multi-member plurality districts, voters have as many votes as there are council seats, and the only multi-member district is identified by the city itself. The basic "winner-take-all" logic holds for both rules. For given council size, the difference between single-district and at-large rules is due to geographic clustering of groups of voters with homogeneous preferences<sup>3</sup>. We show why majorities at the constitution design stage tend to adopt at-large electoral rules in response to an increase in the size of the minority when the minority they are facing is relatively small. In this case, as the size of the minority increases, for the majority it becomes more effective to leverage on its sheer size instead of risking to concede representation to voters from minority-elected districts. However, as the minority becomes larger (closer to a fifty-fifty split), the possibility of losing the whole city induces the majority to prefer minority votes to be confined in minority-packed districts. Single-member district electoral rules serve this purpose. This shift in the preferences of the (constitutional) majority, first towards an at-large

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<sup>3</sup>See Cutler, Glaeser, and Vigdor (1999) for a detailed account of racial segregation patterns in the United States. The assumption of geographic clustering will be maintained throughout the paper.

electoral rule, and then towards a single-district rule as the size of the minority increases, is precisely what the data show.

When discussing local politics in the US, one is immediately thrown into the area of race relations.<sup>4</sup> In fact, it is quite compelling to identify the "majority" with the whites and the "minority" with racial "minorities" (perfect choice of words!). The evolution of voting rights, especially in the South, allows us to test implications of the model regarding the endogenous institutional choice. Until the mid-sixties, before the civil right movement and the Voting Rights Act of 1965, racial minorities (mainly blacks) in the South were essentially disenfranchised by a battery of regulations that, although color-blind on paper, were in practice directed to severely limit black vote. In this context the choice of electoral rules and forms of governments had not much to do with a white majorities' attempt at controlling black influence on city governments, since blacks did not vote. After the mid-sixties, due to novel federal Voting Rights legislation, black influence increased substantially in terms of their ability to elect representatives. Indeed, after the Voting Rights Act of 1965, we show that decisions about electoral rules reflected changes in the relative size of the white and black populations in a way consistent with our model.

Manipulation of electoral rules is not a prerogative exclusive of American cities. Alexander (2005, p.211) describes in detail the 1947 Gaullist manipulations of electoral rules in France. In the Paris area where the Gaullist alliance was weak they introduced proportional representation, in rural areas where the alliance was strong, they introduced plurality rule. Krenzer (2005, p.229) describes strategic manipulation in Germany. One could go on.

Our empirical results on (within-)US cities variation are quite consistent with previous findings on the cross-country evidence in Alesina, Aghion, and Trebbi (2004). In both cases constitutional choices do not seem to occur behind

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<sup>4</sup>For discussion of the importance of race in American local politics, see for instance Hacker (1992), Huckfeld and Kohfeld (1989) and Wilson (1996) amongst many others. Alesina, Baqir, and Hoxby (2004) argue that even the design and number of local jurisdictions in the US depends upon race relations.

a veil of ignorance in the sense that, as the minority increases its size and/or its political rights, the majority tries to make constitutional changes that limit the protection of minorities, while behind a veil of ignorance exactly the opposite should happen (as one would take into account the likelihood of belonging to a minority).

The paper is organized as follows. Section 2 illustrates the model. Section 3 describes the institutional context of US city government to which the model is applied and our data. Section 4 illustrates our empirical results. The last section concludes.

## 2 The model

The structure of the model is as follows. There are two groups of voters, whites ( $W$ ) and blacks ( $B$ ). We denote the initial relative size of group  $B$  as  $\pi > 0$ , so that the size of group  $W$  is  $(1 - \pi)$ . The whites are, initially at least, a majority (we restrict  $\pi < 1/2$ ) and they are those who choose the electoral rule for the city (in short, we call the choice of the electoral rule: "constitution"). This is because either the blacks are disenfranchised at the time of the constitutional choice or they were outvoted at the constitutional table. The white choose a constitution with an eye on maximizing their expected utility arising from a policy outcome which will be decided by an elected council. In order to make the problem interesting there is uncertainty in the relative share of the  $W$  and  $B$  voters, so that the constitutional writers cannot be sure ex ante of the composition of the council. In other words, there is a shock to the composition of the electorate between the writing of the constitution and the choice of the policy. Moreover, the composition of the council depends on the electoral rule chosen. This modeling strategy builds upon the incomplete social contracts ideas of Aghion and Bolton (2003). We now present the model more formally.

## 2.1 Agents and expected utility

We first present a basic version of the model. We discuss extensions later. The population is equally spread over three electoral districts, numbered 1, 2, 3, and with  $M$  individuals in each. Each district chooses a seat in the council. The initial number of  $B$  and  $W$  voters in each district are given by  $B_i$  and  $W_i$  for  $i = 1, 2, 3$ . We assume that:

$$\begin{aligned} W_1 &= M; \\ W_2 &= W_3 = \left(\frac{1}{2} + z\right)M, \end{aligned}$$

where  $z$  is a real number between  $-1/4$  and  $1/2$ . In other words, the parameter  $z$  will allow us to make comparative statics on the initial number of  $B$  voters in districts 2 and 3. Note that this range of variation for  $z$  insures that  $0 < \pi < 1/2$ . Thus,  $z$  parametrizes the size of the ex ante  $W$  majority. Indeed, we have:

$$\sum_i W_i = (2 + 2z)M = 3(1 - \pi)M,$$

therefore:

$$z = \frac{1 - 3\pi}{2}. \tag{1}$$

Thus, initially the  $W$  voters have a majority and they can choose the electoral rule (constitution). Given the electoral rule, a three-member council is elected. The council decides the policy. After the constitution is chosen, there is a shock to the composition of voters in the city, to which the electoral rule cannot be made contingent upon.

More formally, we suppose that during the interim phase an exogenously given mass  $L_N$  of new  $B$  voters joins the polity<sup>5</sup>, with  $L_N = \alpha M$  where  $\alpha$  is a random variable uniformly distributed between 0 and an upper bound  $\bar{\alpha} \in (1, 2)$ . Moreover, we assume that the newcomers are not evenly distributed across the

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<sup>5</sup>One could assume that mobility across cities is affected by the nature of charter rules, electoral systems, and the identity of the mayor, an issue which we do not tackle in the model. See Epple and Romer (1991) for a classic treatment of endogenous mobility in a political economy model. However, empirical evidence of Tiebout sorting is scant. See Strumpf and Oberholzer-Gee (2002). We discuss this effect in Section 4.

three districts, but that instead one half of them joins district 2, whereas the remaining half goes to district 3 (thus, no new  $B$  voter enters district 1).

Different compositions of the council imply different policies. We assume that with no  $W$  representative and three  $B$  representatives the implemented policy is most unfavorable to the  $W$  group which obtains a low utility level  $\underline{r}$ . With one  $W$  representative the  $W$  group ends up with the status quo utility level  $u_0$ ; with two or three representatives the  $W$  group achieves its maximum utility level  $\bar{r}$ . (Think of  $\underline{r}$  as being the result of the  $B$  group's most favorable policy being implemented, and of  $\bar{r}$  as being the outcome of the  $W$  group's most favorable policy).

This last assumption is twofold. First, note that the  $W$  group is advantaged: with two  $W$  councilmen the  $W$  bliss point obtains and with only one  $W$  councilman the status quo obtains. This may capture either one of two empirical features, or both. One is some inherent advantage of  $W$ ; another, more interestingly, may capture the functioning of a council in the presence of a  $W$  mayor. For the moment we are ignoring the role of the mayor and the specifics of the form of government, but we will return to this below. Second, the assumption implies that the size of the  $B$  majority matters for the policy outcome; a two-one  $B$  majority implies a different policy from a three-zero  $B$  majority<sup>6</sup>. In any event the specifics of the policy outcome formulation do not affect the qualitative nature of the results, as we discuss below.

The ex ante expected utility of a  $W$  constitution writer is then equal to:

$$U_w = (1 - p_0 - p_1)\bar{r} + p_1u_0 + p_0\underline{r},$$

where  $p_j$  denotes the probability that  $j$  council representatives belong to the  $W$ - group at the interim stage. The choice of electoral rules (the constitution) chosen by the  $W$  voters will determine the value of  $p_0$  and  $p_1$ .

Summarizing, the timing of events is as follows:

1. Electoral rules are chosen by the  $W$  group.

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<sup>6</sup>See Alesina and Rosenthal (1995) for an extensive discussion of this assumption and a comparison with alternatives.

2. The interim distribution of preferences is realized, which translates into a majority of the council.
3. Payoffs realize.

## 2.2 Electoral rules and ex ante expected utilities

With an eye to the case of American cities, we now study two alternative electoral rules. The first one, referred to as representation "at-large" ( $AL$ ), allocates all seats to the party that wins more than fifty percent of the votes. The second rule, referred to as "single-member district rule" ( $SD$ ), requires that each candidate runs in a particular district and obtains a majority of votes within the district in order to be elected.

Given our above assumptions as to the group composition of the three districts, we immediately have that  $p_1 = 0$  under the  $AL$  rule, whereas  $p_0 = 0$  under the  $SD$  rule. We now compute the expected ex ante utilities of constitution writers in the  $W$ -group, respectively under these two electoral rules.

### 2.2.1 Expected utility under the at-large rule

Under the  $AL$  rule all council seats will go to the  $B$  group if and only if:

$$B_1 + B_2 + B_3 + L_N > W_1 + W_2 + W_3.$$

Then, the ex ante expected utility of constitution writers in the  $W$ -group can be simply expressed as

$$U_W^{AL} = p_0 \underline{r} + (1 - p_0) \bar{r} = \bar{r} - p_0 \Delta,$$

where  $\Delta = \bar{r} - \underline{r}$  is the constitution writers' loss from losing the majority, and

$$p_0 = \Pr(B_1 + B_2 + B_3 + L_N > W_1 + W_2 + W_3) = \Pr(\alpha > 1 + 4z)$$

is the probability of losing the majority. Substituting for  $z$  as a function of  $\pi$  using (1), we have:

$$p_0 = \max \left( 1 - \frac{3}{\alpha} (1 - 2\pi), 0 \right), \quad (2)$$

so that the ex ante expected loss of constitution writers in the  $W-$  group under the  $AL$  rule, is equal to:

$$L_W^{AL} = p_0 \Delta = (1 - \frac{3}{\alpha}(1 - 2\pi))^+ \Delta,$$

where we use the notation

$$x^+ = \max\{x, 0\}.$$

### 2.2.2 Ex ante expected utility under the single-member district rule

Under the  $SD$  rule council seats are allocated at the district level. The probability of the  $B-$  group winning a majority of two seats is equal to the probability that districts 2 and 3 be won by the  $B$  group. Given that the same fraction of new  $B$  voters are allocated to these two districts, which already start with the same fraction of  $B$  voters ex ante, and given that there is a fixed majority of  $W$  voters in district 1, we immediately get that the  $B-$  group obtains a two-seat majority with probability:

$$p_1 = \Pr(B_3 + \frac{1}{2}\alpha M > W_3) = p_1 = \Pr(\alpha > 4z)$$

or, after substituting for  $z$  using (1):

$$p_1 = (1 - \frac{2}{\alpha}(1 - 3\pi))^+. \quad (3)$$

We can then re-express the ex ante utility of constitution writers in the  $W-$  group under the  $SD$  rule, as:

$$U_W^{SD} = p_1 u_0 + (1 - p_1) \bar{r} = \bar{r} - p_1 \delta,$$

where  $\delta = \bar{r} - u_0$  is the constitution writers' loss from losing the majority, and therefore

$$L_W^{SD} = p_1 \delta = (1 - \frac{1}{\alpha(1-f)}(1 - 3\pi))^+ \delta,$$

is the expected loss of constitution writers in the  $W-$  group under the  $SD$  rule.

### 2.3 The size of minorities and the choice of electoral rule

Ex ante at the constitutional stage, individuals in the  $W$ -group will simply choose the electoral rule that minimizes the expected loss  $L_W$ . Our main theoretical prediction can be summarized intuitively as follows. If initially the  $W$  group commands a very large majority of votes, the constitution writers do not fear they can lose the majority under either rule, thus they are indifferent between the two rules. As the relative size of the  $B$ -group increases, however, at some point it becomes preferable for constitution writers in the  $W$ -group to move to  $AL$  in order to reduce the power of the  $B$ -voters in districts 2, 3 by confronting them with the whole pool of  $W$ -voters, including those in district 1. Doing so allows the  $W$ -group to preserve its majority as long as the fraction of  $B$ -individuals does not become too large. Finally, when the fraction of  $B$ -voters becomes sufficiently large that it becomes impossible to prevent their becoming the new majority, moving back to the  $SD$  rule allows the  $W$ -group to limit their losses: indeed, as  $\pi$  becomes sufficiently close to  $1/2$ , the risk of losing all three districts and of thereby incurring the large loss  $\Delta$ , makes the  $W$ -group prefer a  $SD$  system which guarantees them at least 1 seat in the council -and thereby limits their loss to  $\delta \ll \Delta$ - given that in this case  $B$ -voters are restricted to commanding districts 2 and 3 only. Not surprisingly, this latter motive from moving back from  $AL$  to  $SD$  disappears if the loss incurred by the minority is independent of the size of the majority, that is if  $\Delta = \delta$ .

More formally, we can state:

**Proposition 1** (a) Both rules  $AL$  and  $SD$  involve no utility loss to  $W$ -group individuals when  $\pi \in (0, \frac{1}{3} - \frac{\bar{\alpha}}{6})$ ; (b) if  $\frac{\Delta}{\delta} > (1 - \frac{1}{\alpha})^{-1}$ , then there exists a unique cut-off point  $\hat{\pi} \in (\frac{1}{3} - \frac{\bar{\alpha}}{6}, \frac{1}{3})$  such that

$$L_W^{AL} < L_W^{SD} \text{ if } \pi \in (\frac{1}{3} - \frac{\bar{\alpha}}{6}, \hat{\pi})$$

and

$$L_W^{AL} > L_W^{SD} \text{ if } \pi \in (\hat{\pi}, \frac{1}{2});$$

(c) if  $\Delta = \delta$ , then for all  $\pi \in (\frac{1}{3} - \frac{\bar{\alpha}}{6}, \frac{1}{2})$  the AL rule dominates the SD rule.

**Proof.** Part (a) is straightforward. Part (b) follows from the fact that: (i) we have

$$L_W^{AL} = 0 < L_W^{SD} \text{ if } \pi \in (\frac{1}{3} - \frac{\bar{\alpha}}{6}, \frac{1}{2} - \frac{\bar{\alpha}}{6});$$

(ii) for  $\pi = \frac{1}{3}$ , we have:

$$L_W^{AL} = (1 - \frac{1}{\alpha})\Delta > L_W^{SD} = \delta;$$

(iii)  $L_W^{AL}$  and  $L_W^{SD}$  are both linear increasing in  $\pi$  for  $\pi \in (\frac{1}{2} - \frac{\bar{\alpha}}{6}, \frac{1}{3})$ ; hence the existence of a unique cut-off  $\hat{\pi} \in (\frac{1}{2} - \frac{\bar{\alpha}}{6}, \frac{1}{3})$  with the desired properties. Finally, to establish part (c), let us reason by contradiction and suppose that for some  $\pi$  between 0 and  $\frac{1}{2}$ , we have

$$L_W^{SD} < L_W^{AL}$$

or equivalently since here  $\Delta = \delta$ ,

$$(1 - \frac{2}{\alpha}(1 - 3\pi)^+)^+ < (1 - \frac{3}{\alpha}(1 - 2\pi))^+. \quad (4)$$

First, this cannot be the case for  $\pi \in (\frac{1}{3}, \frac{1}{2})$  since in that case (4) becomes:

$$1 < (1 - \frac{3}{\alpha}(1 - 2\pi))^+,$$

which is impossible if  $\pi < 1/2$ . Second, suppose that (4) holds for some  $\pi < 1/3$ .

It cannot be the case that both expressions are positive, otherwise we would have

$$(1 - \frac{2}{\alpha}(1 - 3\pi)) < (1 - \frac{3}{\alpha}(1 - 2\pi)),$$

or equivalently

$$1 - \frac{2}{\alpha} < 1 - \frac{3}{\alpha}$$

which is impossible; and it cannot be the case that

$$(1 - \frac{2}{\alpha}(1 - 3\pi)) < 0 < (1 - \frac{3}{\alpha}(1 - 2\pi))$$

as this would imply that

$$\frac{1}{2} - \frac{\bar{\alpha}}{6} < \frac{1}{3} - \frac{\bar{\alpha}}{6},$$

again an impossibility. This establishes the proposition. ■

This proposition can be generalized to the case of  $N$  districts. We do so in the following extensions.

### 3 Extensions

#### 3.1 The N district case

Suppose the polity's population is equally spread over the electoral districts, now numbered  $1, \dots, N$ , and with  $M$  individuals in each. We maintain the assumption that the same two types of (ex ante) districts exist:

$$\begin{aligned} W_1 &= M; \\ W_2 &= \left(\frac{1}{2} + z\right)M; \end{aligned}$$

where again  $W_1$  districts are "all- $W$ " while  $W_2$  districts are an identical mix of  $W$  and  $B$ . We also maintain the assumption that district design is exogenously given as we focus on the electoral rule for given district design. There are  $N_1$  districts like  $W_1$ , therefore  $N_2 = N - N_1$ . For  $N_2 < N_1$ , it is clear that under  $SD$  the  $W$  group cannot be blocked, no matter how large the group  $\alpha M$  of  $B$  voters is. We exclude this instance and focus on the more interesting case where  $N_2 > N_1$ .

Now consider the blocking probabilities under  $AL$  and under  $SD$  respectively. Blocking under  $AL$  will occur whenever the ex post total number of  $W$ -voters,  $NM(1 - \pi)$ , is larger than the ex post total number of  $B$ -voters,  $\alpha M + NM\pi$ . Thus, nothing fundamental changes from the three-districts case, and we now have:

$$p_0 = \left(1 - \frac{N}{\alpha}(1 - 2\pi)\right)^+.$$

Turning to the  $SD$  rule, let us first assume that each district  $j$  of the  $N_2$  districts receives a fraction  $\frac{1}{N_2}$  of new comers, all of them belonging to the  $B$ -group. In this case the probability that the  $B$ -group wins a majority of seats on the council, is simply equal to the probability that the  $B$ -group acquire a majority of votes in any of the  $W_2$  districts, namely

$$p_{N_2} = \Pr\left(\frac{\alpha M}{N_2} + \left(\frac{1}{2} - z\right)M > \left(\frac{1}{2} + z\right)M\right),$$

that is

$$p_{N_2} = \Pr(\alpha > 2zN_2),$$

where now

$$z = \frac{1}{2} - \pi \frac{N}{N_2}.$$

We then obtain:

$$p_{N_2} = \left(1 - \frac{N_2}{\bar{\alpha}} \left(1 - 2\pi \frac{N}{N_2}\right)^+\right)^+.$$

Once again, the constitution writers will choose the electoral rule that involves the lowest ex ante expected loss, where

$$L_W^{AL} = p_0 \Delta = \left(1 - \frac{N}{\bar{\alpha}} (1 - 2\pi)\right)^+ \Delta$$

and

$$L_W^{SD} = \left(1 - \frac{N_2}{\bar{\alpha}} \left(1 - 2\pi \frac{N}{N_2}\right)^+\right)^+ \delta(N_2),$$

where it is reasonable to assume that the loss  $\delta(N_2)$  to the  $W$ -group if the  $B$ -group acquires majority of seats on the council, is non-decreasing in the number of seats  $N_2$  the  $B$ -group holds in that case.

Assume

$$\bar{\alpha} < N_2.$$

Then for  $\pi$  very close to zero, both  $L_W^{AL}$  and  $L_W^{SD}$  are equal to zero, so that constitution writers are indifferent between the two electoral rules. Next, note that for all  $\pi < 1/2$ , we have

$$\left(1 - \frac{N}{\bar{\alpha}} (1 - 2\pi)\right) < \left(1 - \frac{N_2}{\bar{\alpha}} \left(1 - 2\pi \frac{N}{N_2}\right)\right), \quad (5)$$

so that as  $\pi$  increases away from zero,  $L_W^{SD}$  becomes positive before  $L_W^{AL}$  does; this in turn implies that for intermediate values of  $\pi$ , constitution writers in the  $W$ -group will prefer the  $AL$  rule to the  $SD$  rule, as the former dilutes the  $B$ -votes among the whole  $W$ -population. Finally, as  $\pi$  becomes arbitrarily close to  $\frac{1}{2}$ , the expected loss  $L_W^{AL}$  under  $AL$  converges to  $\Delta$ , whereas the expected loss  $L_W^{SD}$  converges to  $\left(1 + \frac{N-N_2}{\bar{\alpha}}\right)\delta(N_2)$ . It then follows that the  $W$ -group will choose the  $SD$  rule whenever  $\left(1 + \frac{N-N_2}{\bar{\alpha}}\right)\delta(N_2) < \Delta$ .

We thus obtain a straightforward generalization of Proposition 1 to the more general case where the number of districts  $N$  is arbitrary. Note however that

condition (5) becomes hard to satisfy when the number  $N_2$  of  $W_2$  districts becomes arbitrarily close to  $N$ .

### 3.2 Uneven distribution of newcomers

In order to gain intuition in this and the following subsections, let us return to the three-district model employed in Section 2.1. In our analysis so far we assumed that equal numbers of new  $B$ - group voters would choose to locate in districts 2 and 3. However, our reasoning and result extend to the case where a fraction  $f > 1/2$  of new comers choose say district 2 whereas the remaining fraction  $(1 - f)$  chooses district 3. This obviously does not affect the probability  $p_0$  of the  $B$ - group winning all seats under the  $AL$  rule since that probability depends only upon the overall fraction of  $B$ - individuals in the overall population. Thus, we still have:

$$p_0 = (1 - \frac{3}{\bar{\alpha}}(1 - 2\pi))^+,$$

so that the ex ante expected loss from the  $AL$  rule, is still equal to:

$$L_W^{AL} = (1 - \frac{3}{\bar{\alpha}}(1 - 2\pi))^+ \Delta.$$

However, the  $B$ - group will only win a majority of seats on the council if it wins a majority of votes in districts 2 and 3, which in turn requires that it win a majority of votes in district 3, which, of the two districts, is the harder one to win. Therefore,

$$p_1 = \Pr(B_3 + (1 - f)\alpha M > W_3) = \Pr(\alpha > \frac{2z}{1 - f}).$$

This yields:

$$p_1 = (1 - \frac{1}{\bar{\alpha}(1 - f)}(1 - 3\pi))^+$$

with a corresponding ex ante expected loss under  $SD$  rule equal to:

$$L_W^{SD} = (1 - \frac{1}{\bar{\alpha}(1 - f)}(1 - 3\pi))^+ \delta.$$

Assume

$$\bar{\alpha} < \min\{3, \frac{1}{1 - f}\}$$

so that  $p_0 = p_1 = 0$  for  $\pi$  sufficiently small.

Then, it is easy to show that Proposition 1 continues to hold in its entirety when

$$1 - f \geq \frac{1}{3} \tag{6}$$

since in that case,

$$1 - \frac{3}{\alpha}(1 - 2\pi) < 1 - \frac{1}{\alpha(1 - f)}(1 - 3\pi)$$

which implies that, as  $\pi$  increases from zero,  $p_1$  becomes positive before  $p_0$  does. On the other hand, one can easily show that when (6) is violated, then the *AL* rule is always weakly dominated by the *SD* rule when  $\frac{\Delta}{\delta}$  is sufficiently large.

### 3.3 Gerrymandering

An important practical consideration is that the design of district may itself be endogenous. In particular, the constitution writing majority may be try to "gerrymander" the districts in order to minimize the number of representative elected by the minority. The possibility of unconstrained gerrymandering obviously makes the *SD* rule preferable to a majority writing the constitution. As we will discuss below, empirically this is an important consideration for American cities. How advantageous for the white majority it is to choose gerrymandering with a *SD* system versus an *AL* system, depends also on the nature of residential segregation in the city<sup>7</sup>. This is of course a well know issue in the vast literature on gerrymandering.<sup>8</sup>

In the context of the above model, the constitution writers in the *W*-group will simply choose to maximize  $f$ , that is, to pack as many new *B*-voters as possible in one district, say district 2, in order to prevent them from ever acquiring a majority of votes in the council. In the absence of any constraints on gerrymandering (one such constraint for example would be that differentials

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<sup>7</sup>Cole (1976) for instance emphasizes how at large elections, while in principle should favor minorities which are spread out within city boundaries, in fact do not.

<sup>8</sup>On gerrymandering, see in particular Cox and Katz (2002) and Friedman and Holden (2005).

between the number of voters across the various districts cannot be larger than a given percentage), the constitution writers will simply choose  $f$  equal to one, in which case  $SD$  will always dominates  $AL$ . However, if various constraints on gerrymandering limits the maximum  $f$  that can be achieved by constitution writers in the  $W$ -group, then as we just saw in the previous subsection the conclusions of Proposition 1 will again hold as long as  $f < 2/3$ .

Finally, it is interesting to note that the possibility of gerrymandering could give rise to the same pattern with  $AL$  dominating for intermediate values of  $\pi$  and  $SL$  dominating for high values of  $\pi$ , even when the loss incurred by the  $W$ -group is independent of the size of the  $B$ -majority, that is, even when  $\Delta = \delta$ . To see this, let us slightly modify our basic model by assuming that as in Proposition 1 by assuming that constitution writers in the  $W$ -group suffer from having the  $B$ -group hold even one (minority) seat in the council. Then, as the size  $\pi$  of the  $B$ -group increases from zero to  $1/2$ , the  $W$ -group will first choose the  $AL$  rule in order to dilute the  $B$ -voters among all  $W$ -voters as in our previous analysis. But then, as  $\pi$  increases further, the only way to prevent the  $B$ -group from winning a majority of seats is to move from  $AL$  to  $SD$  and at the same time "gerrymander", that is pack all  $B$ -voters in one district.

Already without gerrymandering, the  $SD$  rule already allowed the  $W$ -group to "waste"  $B$ -votes by preventing them from contaminating district 1. With gerrymandering the wasting (or packing) effect of  $SD$  is only reinforced:  $B$ -voters cannot outnumber  $W$ -voters now in two districts instead of one in the absence of gerrymandering. But the logic and predictions are basically the same with and without gerrymandering.

### 3.4 Uniform distributions of voters across districts

Suppose the three districts are evenly affected by any ex ante variation in the size of the  $B$  population, namely:

$$W_i = \frac{1}{2} + z, \text{ for } i = 1, 2, 3,$$

we have

$$z = \frac{1}{2} - \pi,$$

and that new comers are also evenly distributed across the three districts. Then the probabilities of the  $B$ -group winning under the  $AL$  and  $SD$  rules, are the same and equal to:

$$p_0 = (1 - \frac{3}{\alpha}(1 - 2\pi))^+,$$

and the ex ante expected loss of constitution writers under the two rules are also the same equal to

$$L = p_0\Delta.$$

This underlies the importance of the unevenness of the distribution of  $B$  within the electoral area (the city) if we want to explain why local constitutions shift from one rule to another as the relative influence of  $B$ - voters increases. In particular, the well known pattern of segregation in American cities makes this uniform distribution case not relevant.

Now, suppose that while ex ante  $B$ -voters are evenly distributed across the three districts, ex post new comers migrate only to districts 2 and 3. In that case, the probability of the  $B$ -group winning under the  $AL$  rule is still equal to  $p_0$ , whereas their probability of winning under the  $SD$  rule is now given by

$$p_1 = (1 - \frac{2}{\alpha}(1 - 2\pi))^+.$$

But then it is easy to see that constitution writers in the  $W$ - group will never prefer the  $SD$  rule for values of  $\pi$  close to  $\frac{1}{2}$  since

$$L_W^{SD}(\pi = \frac{1}{2}) = p_1\delta = \delta < L_W^{AL}(\pi = \frac{1}{2}) = p_0\Delta = \Delta.$$

Given that

$$(1 - \frac{3}{\alpha}(1 - 2\pi)) < (1 - \frac{2}{\alpha}(1 - 2\pi)),$$

for all  $\pi$ , as before as  $\pi$  increases away from zero, the ex ante expected loss  $L_W^{SD}$  will become positive before  $L_W^{AL}$  does. Overall, as  $\pi$  increases from 0 to  $1/2$ , constitution writers will first be indifferent between the two rules, then

will prefer the *AL* rule because it dilutes *B*-votes, then may prefer the *SD* rule because it reduces losses, but then eventually will always reverse to the *AL* rule. As we shall see in the empirical analysis, this last reversal to the *AL* rule (which is the one departure from Proposition 1) is not observed in our cross-city data.

### 3.5 Mayors and managers

Another dimension that differentiates between American cities, is the degree of autonomy of the "executive". In a mayor-council system the executive is more autonomous from the council. Therefore, it is more difficult for the council to influence the executive process relative to the council manager system. One way of modelling this situation is to assume that the majority needed to block the mayor is larger than the one needed to block a manager. An additional variation involves the power of the mayors which is different in strong mayors versus weak mayor forms of governments, as discussed below.

Without a veil of ignorance, if the *W* majority always knew that it would elect the mayor it would choose a more powerful mayor. But following the same logic of above, this would not be necessarily the case if the *W* majority is slim and there are unforeseeable shocks to the composition of the electorate. In the empirical part we also briefly explore the choice between mayor council system and manager council systems.

### 3.6 Mayors and councils

Our analysis and main conclusions in Proposition 1, remain unaffected if we replace the timing described in Section 2.1 by one in which: (i) the constitution is chosen; (ii) the mayor is elected; (iii) shocks to the composition of the electorate occur; (iv) the council is elected; (v) the policy is chosen. With the *W*-group having an ex ante majority they would choose the mayor. As we have discussed above, our choice of policy outcomes for given composition of the council can capture this institutional structure. Note that the latter implies a non-simultaneous election of the mayor and the council, a feature that

characterizes a sizeable fraction of American cities<sup>9</sup>.

What changes from Section 2.1 is that now, whenever the  $B$ -group obtains a majority of seats on the council, it is their preferred policy which prevails in equilibrium. This in turn implies that the loss incurred by the  $W$ -group becomes independent of the electoral rule. But then, under the assumptions of Proposition 1, with equal number of new  $B$ -voters in the two districts 2 and 3, the  $W$ -group will always weakly prefer the  $AL$  rule since it dilutes  $B$ -voters among the overall  $W$ -population whereas moving to the  $SD$  rule does no longer limit losses to the  $W$ -group if they lose the majority. On the other hand, if gerrymandering allows the  $W$ -group to pack all new  $B$ -voters in one district, then the  $SD$  rule will always dominate as it prevents the  $B$ -group from ever obtaining a majority of seats in the council.

## 4 Institutional setting and data

In our empirical investigation in the next sections, we shall focus on the main prediction of our model, namely that an increase in the size of the minority makes  $AL$  preferable over  $SD$  if initially the minority group (the  $B$  voters) represents a sufficiently small fraction of the overall population, whereas the opposite is true if initially the minority group represents a sufficiently large fraction of the overall population. *In other words, the preference of constitution writers for  $AL$  over  $SD$ , increases and then decreases with the initial size of the minority group.*

With the aim of testing a (reduced form) model of endogenous choice of checks and balances, Aghion, Alesina, and Trebbi (2004) employ data on a vast cross-section of countries, including democracies and non-democracies. American cities offer a potentially "cleaner" sample for testing the hypothesis of constitutional endogeneity consistently. First of all, American cities are much more similar to each other than a cross-section of countries ranging from advanced

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<sup>9</sup>See Alesina and Rosenthal (1995) for a discussion of staggered elections or simultaneous elections at the national level.

democracies to developing dictatorships. Moreover, US cities present enough time-series variation to allow us to account for time-unvarying unobserved heterogeneity in the data, arguably a potential source of bias in cross-sectional analysis. Second, the racial divide (mostly white/black historically, most recently Whites/Blacks/Asians/Hispanics) has been a prominent feature of the institutional debate and political choice in US cities<sup>10</sup>. Moreover, bloc-voting within racial lines has empirical foundation. Third, the evolution of minority "voting rights" and the Civil Rights movement in the sixties suggest a transformation of the nature of democratic institution in US cities. Before the Voting Rights Act of 1965, African Americans in the South were largely disenfranchised, consequently the choice of electoral rules was rather irrelevant from a race-relation point of view. From the mid-sixties onward white majorities had to cope with black voters; therefore they had an incentive to adopt electoral rules and forms of governments that minimized black influence. This episode allows us additional robustness checks of our model of endogenous evolution of electoral institutions. We begin with a brief review of the history of voting rights in the South.

#### **4.1 Legal and judicial interventions on voting in the United States**

There was no constitutional protection for voting and electoral participation in the United States before the Civil War.<sup>11</sup> African American individuals in state of servitude were neither granted citizenship nor, consequently, voting rights. After the war, during the Reconstruction (1867-1877), the Congress provided such constitutional protection with the ratification of the 14th Amendment in 1868 (conferring citizenship to all persons born or naturalized in the United States) and the 15th Amendment in 1870 (providing that the right of vote

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<sup>10</sup>US cities are not the only example of local politics influenced by race relations. For a discussion of electoral rules and racial politics in elections in India see Pande (2003).

<sup>11</sup>We refer to the United States Department of Justice, Civil Rights Division, Voting Section for further details and reference for this section.

should not be denied or abridged on the basis of race, color, or previous status of servitude). The Enforcement Act (1870) and the Force Act (1871) ensured additional legislative detail, among other things introducing federal oversight over elections. Such measures effectively induced an enlargement of the electoral franchise to the black minority, both in the South and the rest of the country<sup>12</sup>. Around 1872 more than three hundred Southern black legislators were holding elected offices.

However, after the 1877 compromise, following the election of the republican Hayes, the demilitarization of the South and steadily up until 1910 with the "Redemption", Southern whites succeeded in reimposing pre-war political equilibria. The introduction of a series of legal procedures, color-blind on paper but anti-black in practice, such as poll taxes, literacy tests, "grandfather clauses", "understanding clauses", vouchers of "good character", and disqualification for crimes of "moral turpitude" achieved the substantial disenfranchisement of the black minorities in the South. In addition, white majorities extensively entertained the practice of "white primaries"<sup>13</sup>. By the early 1900's the number of

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<sup>12</sup>All voters were white male according to the Naturalization Law of 1790.

Only with the 19th Amendment to the Constitution, which became law in 1920, women obtained the right to vote in all elections. Constitutional amendment proposals for the extension of the electoral franchise to women had begun in 1878 and were proposed in every session of the Congress for the following 40 years. Some States already had laws enabling women to vote before 1920. Examples are Utah, Colorado, Idaho, and Wyoming, the first State in the Union allowing women to vote in 1890. The States of New York, Massachusetts, New Hampshire, and New Jersey allowed women to vote at the end of the 18th century, but between 1777 and 1807 they revoked those clauses.

Also Asian, Native American and Mexican individuals were not allowed to vote, not being recognized as U.S. citizens. In 1924 Native Americans were granted citizenship and in 1948 the last state laws denying vote were overturned. Asians were able to obtain full citizenship after the progressive overturning of the Chinese Exclusion Act of 1882 completed in 1952.

<sup>13</sup>See Myrdal (1944) for a detailed account. According to Woodward (2002, p.85) "the state-wide Democratic primary was adopted in South Carolina in 1896, Arkansas in 1897, Georgia in 1898, Florida and Tennessee in 1901, Alabama and Mississippi in 1902, Kentucky and Texas in 1903, Louisiana in 1906, Oklahoma in 1907, Virginia in 1913, and North Carolina in 1915." Primaries were not open to racial minorities and were effectively used to skim out

Southern black legislators was back to zero: an early exemplification of the endogeneity of political institutions to sudden shifts in the electoral franchise (see Kousser, 1999). According to Woodward (2002) in Louisiana registered black voters were 1,342 in 1904, down from a peak of 130,334 in 1896. This coincided with the appearance of extensive Jim Crow legislation at the State level in the South. Until the mid-sixties the number of Southern black legislators remained close to zero. This coincided with a seemingly marginal role played by the Supreme Court in the active defense of the 15th Amendment.<sup>14</sup>

It was only from the mid 1960's that the Supreme Court started an active monitoring of electoral participation provisions and apportionment of state legislative districts. In *Baker v. Carr*, 369 US 186 (1962), the Court ruled against malapportionment. In a series of cases (*Wesberry v. Sanders*, 376 US 1 (1964), *Reynolds v. Sims*, 377 U.S. 533 (1964), *Fortson v. Dorsey*, 379 U.S. 433 (1965)) the Court ruled in the direction of re-equilibrating the weight of rural and urban votes, favoring urban minorities, that is blacks. At the same time the federal government started playing a much active role as well. President Lyndon Johnson ratified the 24th Amendment of the Constitution<sup>15</sup> (1964) and signed into law both the Civil Rights Act in 1964 and the Voting Rights Act in 1965.

The goal of the Voting Rights Act of 1965 is to remove strong obstacles in voting registration procedures for racial minorities. Section 2 of the Voting Rights Act included a broad reassessment of the principles embedded in the 14th and 15th Amendments. It deemed illegal the use of poll taxes, literacy tests, and the requirement of fluency in English for voting eligibility. Section 5 introduced black voters, hence the appellation "white primaries".

<sup>14</sup>However, there were exceptions. In *Guinn v. United States*, 238 U.S. 347 (1915), the Court ruled against a Oklahoma "grandfather clauses" provision, in *Smith v. Allwright*, 321 U.S. 649 (1944), the Court ruled against Texas' "white primaries", and in *Gomillion v. Lightfoot*, 364 U.S. 339 (1960), the Supreme Court found unconstitutional the practice of gerrymandering in the city of Tuskegee (Alabama).

<sup>15</sup>The amendment outlawed the poll tax in federal elections. Virginia ratified the amendment in 1977, albeit the ratification process was completed on January 23, 1964 (by 38 States). The amendment was ratified by North Carolina in 1989. The amendment was rejected by the State of Mississippi (and not subsequently ratified) in 1962.

strict requirements of pre-clearance (by the District Court for the District of Columbia or the U.S. Attorney General) of new voting procedures<sup>16</sup>. The bill authorized federal supervision of black voters' registration in Alabama, Georgia, Louisiana, Mississippi, North Carolina (in 34 counties), South Carolina, and Virginia (Woodward, 2002). In *South Carolina v. Katzenbach*, 383 U.S. 301 (1966), the Supreme Court upheld the Constitutionality of the Act. In *Allen v. State Board of Elections*, 393 U.S. 544 (1969) pre-clearance conditions were specified for a series of "tests or devices" of minority vote dilution, including explicitly changes to at-large elections from single district elections.

As a consequence of the Voting Rights Act, the number of registered minority voters as a fraction of voting age population doubled and in some cases tripled in Alabama, Georgia, Louisiana, Mississippi, and Virginia between 1965 and 1988 (Grofman, Handley and Niemi, 1992). Amy (2002) reports that "the number of black elected officials in the United States grew an average 16.7 percent a year between 1970 and 1977, from 1469 to 4311" (p.129).<sup>17</sup>

In the light of continuing racial polarization in 1970, 1975, and 1982 the Congress introduced amendments to the Voting Rights Act extending Section 5 of 5, 7, and 25 years and addressing the removal of persistent obstacles to effective voting by the newly registered racial minorities (like gerrymandering, annexations, at-large elections, multi-member districts, and other "structural changes" to prevent blacks from voting through electoral dilution). The Supreme Court followed suit, for example in *White v. Regester*, 412 U.S. 755

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<sup>16</sup>Section 5 precisely indicates which political organizations are covered by the act through identification of specific parameters. States fully covered under the 1975 renewal of the Voting Rights Act are Alabama, Alaska, Arizona, Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia. California, Florida New York, North Carolina, and South Dakota are only partially covered in specific counties and Michigan and New Hampshire in specific townships. See Data Appendix for details.

<sup>17</sup>In 1999 according to the Joint Center for Political and Economic Studies the total number of black elected officials was 5938 in the South (respectively 8936 in all U.S.), of which 340 were city mayors (resp. 450 nationwide), 2677 members of municipal governing bodies (resp. 3498 nationwide). There were no black senators in 1999 and 19 representatives from the South (39 black representatives nationwide).

(1973) and, with respect to dilution associated with at-large elections, in *Thornburg v. Gingles*, 478 U.S. 30 (1986). During the 1980's and 1990's the federal government and the Supreme Court tended to diverge more frequently with respect to affirmative intervention in promoting minorities' political enfranchisement (particularly, with respect to affirmative gerrymandering).<sup>18</sup>

From this brief historical excursus, we need to remember two points germane to our empirical analysis:

1) Until the mid-sixties white majorities did not have to worry about black vote in the South; only with the Voting Act of 1965 blacks were really a political block vote to reckon with.

2) The implementation by the Courts of the Voting Rights Act also took up the issues of the choice of electoral rules, precisely to avoid choices (like at large elections) that would have favored the white majority. Thus, any attempt of the white majority to engage in the kind of strategic choices implied by our theoretical model would have to face potential challenges from the Courts.

## 4.2 Data and summary statistics

This section briefly reviews the main variables employed in the empirical analysis. We refer the reader to the Data Appendix<sup>19</sup> for details on variables definition, data construction and sources. We used two sets of data; one includes

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<sup>18</sup>In 1980 the Supreme Court imposed the requirement of proof of "racial discriminatory purpose" in vote dilution cases (*Mobile v. Bolden*, 446 U.S. 55, 1980). This was rectified by a 1982 Congress Amendment, dispensing from such proof. The Supreme Court substantially challenged "affirmative gerrymandering" in *Shaw v. Reno*, 509 U.S. 630 (1993) and *Holden v. Hall*, 512 U.S. 874 (1994) among the others. Under President Bill Clinton the National Voter Registration Act (also known popularly as the Motor Voter Act of 1993) aimed at strongly promoting voter registration (for example, through the department of motor vehicles structures, unemployment, and welfare bureaus). More recently the Help America Vote Act of 2001 has shifted back to individual States most of the supervisory power over the quality of electoral franchise. Voting Rights Acts renewal hearings are due in 2007.

<sup>19</sup>Due to space limitations we produce the Data Appendix in a separate document, available on request. Please refer to the authors' webpages for a downloadable version of the Data Appendix.

characteristics of city governments and their institutional details; the other includes demographic, economic, and geographic characteristics of US cities. We collected information on US municipal governments characteristics for the period 1930-2000, at decade intervals, from the Form of Government Survey and Municipal Year Book by the International City/County Management Association (ICMA) in Washington D.C. ICMA is a professional organization of city managers and administrators publishing local government data since 1914 and a well-recognized scholarly source. ICMA survey data have been employed in a number of papers, including Baqir (2001), Sass and Pittman (2000), DeSantis and Renner (1992) among the others. Data from 1980 onward are available in electronic format; data before 1980 needed to be collected and entered from hard copies. For this reason we decided to collect data before 1960 only for the South, since it is in the South where the effect of the Voting Rights Act is more relevant and should show larger differences before and after the mid sixties.

From the various issues of the ICMA surveys we collected information on electoral rules and forms of government for each municipality, including: council size; number of district-awarded council seats; city form of government; number of councilmen belonging to different racial groups currently sitting in the council; mayor's veto power over council resolutions; mayor's vote restrictions in council resolutions; mayor's length of term in office; indicators of the presence of referendum, initiative or recall. We then constructed two "single district" variables: (i) *SD*, a dichotomous variable equal to 1 if all councilmen are elected at large, 0 otherwise; (ii) *y*, continuously defined as the fraction of councilmen elected in single districts. We also constructed two "form of government" indexes increasing in the power of the executive. The first index, indicated as *FOG*, takes the value of 1 for mayor-council, 0 for council-manager and -1 for Commission or Representative Town Meeting or Town Meeting. The second index, indicated as *SIND*, is constructed as increasing function of provisions strengthening the executive (like mayor-council and veto power) and decreasing in provisions weakening the executive (for example, recall).<sup>20</sup> With regard to

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<sup>20</sup>The mayor-council form of government consists of an at-large elected mayor (the executive

electoral rules in 2001 about 65.9 percent of the cities in the sample presented only at-large-elected councilmen, about 14.8 percent presented only district-elected councilmen. The remaining cities presented some combination of the two types of rules, with councils consisting of a fraction of councilmen representing specific geographic areas and the others "representing the whole city".

From the decadal issues of the Bureau of the Census' of Population we collected information on total population, racial groups sizes, median income, and geographic characteristics of Places and Minor Civil Divisions (MCD's)<sup>21</sup>. From 1930 to 1970, the data available allow for a breakdown into three groups: white, black, and other races (we did not distinguish between foreign-born or native). From 1980 the Census allows for a more refined breakdown (in general the breakdown includes at least Whites, Blacks, Hispanics, Asians, Pacific Islanders, and Native Americans<sup>22</sup>). Since our empirical analysis runs from the thirties to the nineties, for consistency we used the three group break down (White, Blacks, others) for the entire sample. Our variable of interest was the size of non-whites (we also reproduced all our result using blacks instead of non whites, with virtually no changes in the results). ICMA and Census data were subsequently merged on the basis of geographic identifiers and FIPS codes (unique identifiers) whenever available or matched by city name and individually checked. Details on the procedure are available in the Data Appendix.

A final caveat. ICMA surveys present different coverage depending on the year. We review their representativeness in terms of population characteristics vis-a-vis the corresponding entire Census population of places and MCD's in Appendix A. The bottom line is that sample of US cities collected by ICMA branch and a legislative branch, the council of councilmen (or aldermen), elected by ward, at-large, or a mix of both rules. The mayor acts as chief executive officer of the city. Mayor's powers vis-a-vis the council vary within this typology of government. Typically we have two variants, weak-mayor and strong-mayor. The council-manager form of government consists of a legislative branch, the council, which selects and supervises a professional administrator, the city manager. The manager is in charge of the implementation of the policy and day-to-day municipal administration and can be removed or fired by the council at will.

<sup>21</sup>Definitions and references in the Data Appendix.

<sup>22</sup>See Data Appendix.

is representative of the total population of relatively large cities, above 2,500 inhabitants, and less representative of the full population of the Bureau of the Census Places and Minor Civil Divisions (MCD's). This is the reason why in what follows, we always report results for the entire available sample and for a subsample of cities above this threshold of 2,500; the results are in general almost identical. We were also able to obtain the full lists of cities sampled from ICMA for the last survey in year 2001 and we verified the absence any response selection in the survey<sup>23</sup>. In the Data Appendix we report summary statistics for the key variables of interest for the sample of all US cities and for the sample of Southern cities. We now proceed to an empirical test of our model.

## 5 Empirical results

### 5.1 The choice of electoral rules

*Empirical Strategy* - Our main theoretical prediction is that the preference of constitution writers for at-large over single-district increases and then decreases with the initial size of the minority group.

We report a test of this hypothesis in Table 1. The empirical strategy that we employ in this table and in the majority of the following ones is to stick to a simple, yet flexible, linear (in the coefficients) parametric two-way panel model in which we account for unobserved, time-invariant heterogeneity at the city level and for time-specific effects. Proposition 1 hypothesizes a non-monotonic,  $U$ -shaped relationship between either  $SD$  or  $y$  and  $\pi$ , which provides intuitive appeal to the choice of fitting a quadratic relationship between  $SD$  or  $y$  and  $\pi$ <sup>24</sup>. For each city  $i$  in year  $t$  let us define the political variable of interest  $y_{it}$  (the fraction of councilmen elected by ward or district), the fraction of the

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<sup>23</sup>See Appendix C.

<sup>24</sup>Further, simple non-parametric evidence is provided in what follows. A third-order polynomial produced a very similar fit as the quadratic model we report. The main difference recurred for high levels of  $\pi$ , where the race of the charter writers could be non-white. Higher-order polynomials produced a worse fit than the quadratic.

minorities<sup>25</sup>,  $\pi_{it}$ , a matrix of ( $k \times 1$ ) controls  $X_{it}$  and the two-way error as  $u_{it} = \alpha_i + \delta_t + \eta_{it}$ . We specify<sup>26</sup> the following:

$$y_{it} = \beta_0 + \pi_{it}\beta_1 + (\pi_{it})^2\beta_2 + X'_{it}\gamma + \alpha_i + \delta_t + \eta_{it} \quad (7)$$

for  $i = 1, \dots, N$  and  $t = 1, \dots, T$ .

Controlling for city-specific unobserved characteristics is relevant to our empirical strategy. Historical, geographical, and cultural conditions explain much of the variation in political institutions at the city cross-sectional level (about 67 percent). However, such conditions are often difficult to measure directly and would bias, if omitted, any inference concerning the role of changes of racial composition of the city in the choice of electoral rules. Employing within-city variation allows us to account for such unobserved heterogeneity and estimate consistently the vector  $(\beta_1, \beta_2)$ . Time-specific effects are similarly useful in accounting for across-the-board effects, such as federal legislation, that again need to be controlled for, especially in the post-1965 period<sup>27</sup> when indeed legislation was extremely active. We address the issue of serial correlation in the error component  $\eta$  by relaxing the assumption of independence and clustering at the city level. Conditional heteroskedasticity of unknown type is also accounted for.

Identification of (7) is also particularly relevant. The most likely source of reverse causation affecting (7) is endogenous sorting across municipalities driven by more favorable electoral rules. Minority voters may move towards cities with better chances of representation or white voters may move out of cities with excess minority representation. Hence, Tiebout sorting would predict a correlation between changes in city racial composition and in electoral rules of the *opposite* sign to what predicted by our model. Specifically, suppose that

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<sup>25</sup>Notice that the theoretical restriction  $\pi < 0.5$  is satisfied in the data, as more than 90 percent of cities are below  $\pi = 0.361$  for the whole sample of American cities and below  $\pi = 0.433$  for the South.

<sup>26</sup>The same specification is also employed for  $SD$ . However in that case we assume a logistic distribution of  $\eta$ .

<sup>27</sup>Formal F-tests for this specification support the use of a two-way setup. Both groups of fixed effects are jointly significant in every specification.

a city changes its electoral rule in favor of white voters against black voters, then the percentage of the latter should go down because of Tiebout sorting (and possibly the white group should increase in number reducing the fraction of blacks even further). Instead, we show below that, as the share of blacks increases, electoral rules turn against them. In this light the estimates presented below need to be interpreted as lower bounds of the effects the theory predicts.

A final issue on the empirical strategy concerns the timing of the Voting Rights Act. Table 1 is divided in two parts: for the period before and after the Voting Rights Act of 1965.<sup>28</sup> The first year for which complete survey data from ICMA are available after 1965 on electoral rules (and forms of government) is 1967, which we take as the dividing line for pre- and post-Voting Rights Act and we match to the 1970 Census data. The non-monotonic relation should emerge only in case of an enfranchised minority. From the time of its introduction, the Voting Rights Act represented a sudden extension of the political franchise to blacks. We employ such date as an informative source of variation for institutional manipulation, particularly in Southern cities.

*Results* - The first four columns of Table 1 refer to the sample of Southern cities<sup>29</sup>. Column (1) shows the basic specification including all cities. Column (2) focuses on cities above the 2,500 threshold (remember the ICMA sample is more representative for cities above this size) columns (3)-(4) include additional controls for city size, median income, and a deterministic time trend at the State level. The last two columns show the same regressions for the sample of all US cities.

The model calls for a negative linear and a positive quadratic term on the

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<sup>28</sup>Note that one may want to exclude cities in which whites are a minority. There are very few of those and in addition even when whites are a minority in terms of number of inhabitants, demographic factors and vote participation patterns may still make them a majority as active voters (see Amy 1993, p.125 for an example). For this reason it is unclear which cities to drop from the sample. We tried a few experiments and our results appear robust.

<sup>29</sup>As for all the rest of our empirical analysis we exclude from the sample those cities for which we have information that the change of structure of government is the result of court mandate or State Law. ICMA data provide partial information with this respect.

share of the non-white minority; as this share increases, at-large elections become more desirable up to a point in which the voting minority is so large that the majority is better off by "packing" minority votes through single-district elections. The signs of the coefficients are consistent with this story. Looking for instance at column (1) the estimated coefficients imply that this  $U$ -shaped curve reaches a minimum at about 29.2 percent ( $0.292 = 0.885/3.028$ ) non-white minority. (Note that 66.7 percent of the sampled cities in year 2000 were below this level). The last two columns show that when we look at the US as a whole, the sign of the coefficients is the same as that for the South, but the size of the coefficient is smaller in absolute value, roughly half, suggesting that these racial effects are stronger in the South. To gauge quantitatively the size of the two effects, one can start observing the empirical distribution of the size of minorities in Southern cities. Consider as a benchmark the cross-sectional distribution of minority sizes in year 2000 (but likewise for all the decades 1970-1990) for those cities employed in the column (1) sample. The first quartile (Q1) for the fraction of minority is 9.76 percent and the third quartile (Q3) is 34.86. At Q1, given estimated coefficients in column (1) of -0.885 and 1.514 (with clustered standard errors respectively 0.308 and 0.475), an increase of one standard deviation of minority sizes (16 percent) implies a reduction of -5.56 percentage points ( $-0.0556 = -0.885*0.16 + 1.514*(0.2576^2 - 0.0976^2)$ ) of the fraction of single-district seats. This is equivalent to about one seat switching from single-district to at-large in a council of 18 seats. At Q3, the same increase of one standard deviation would instead produce an increase of about +6.6 percentage points in the fraction of single-district seats. This would be equivalent to about one seat switching from at-large to single-district in a council of 15 seats. These two estimates appear quantitatively reasonable. In order to evaluate the size of these effects one has to remember that the Voting Rights Act itself imposed limits on how much cities could switch to *AL* systems!<sup>30</sup> In other words, without Supreme Court involvement, these effects would have been surely larger, even if possibly not as large as the disenfranchisement of the 1877-1900.

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<sup>30</sup>See below for further details.

The bottom panel shows regression for the Sample of Southern cities before the Voting Rights Act, for the period 1930-1970<sup>31</sup>. Here the coefficients on the size of the minority and its square are statistically zero. This is consistent with our hypothesis that before the Voting Act electoral rules were unaffected by the city racial composition, since racial minorities (blacks) were almost completely disenfranchised.

Table 2 presents estimates employing a discrete dependent variable,  $SD$ , and a conditional logistic estimator grouping observations at the city level. This corresponds to what part of the applied literature calls fixed effects (or conditional) logit model. The implications of Table 1 carry over to this specification check consistently with the predictions of Proposition 1. Given that the likelihood contributions of cities which do not change their electoral rule are zero, one observes a smaller number of observations than in Table 1. For what follows we prefer to limit ourselves to the analysis of the continuous variable  $y$  given the greater flexibility allowed by the continuity of the dependent variable.

Time persistence is an important characteristic of political systems, therefore we employ a standard dynamic panel technique, through first differencing and application of the Arellano and Bond (1991) GMM estimator, in Table 3. This procedure has the double advantage of enriching our basic specification of a dynamic component and addressing the issue of endogeneity of size of the minority through the use of lags of the exogenous variables (the time fixed effects), endogenous variables (city population and fraction of the minority), and the dependent variable. The specification we employ is:

$$y_{it} = y_{it-1}\theta + \beta_0 + \pi_{it}\beta_1 + (\pi_{it})^2\beta_2 + X'_{it}\gamma + \alpha_i + \delta_t + \eta_{it}.$$

Together with a significant autoregressive component ( $\theta$  around 0.3 in column (1), panel a) the first three columns show the same patterns of coefficients on

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<sup>31</sup>The panel observation we indicate as 1970 indeed employs information on 1967 ICMA data, matched with 1970 Census demographic variables. We also repeated all the analysis matching the Census with the 1972 ICMA data with very similar results. We opted for 1967 because of better coverage and vicinity to 1965, the actual date of enactment of the bill.

the share of minority variable as Table 1. The minimum in this  $U$  curve is reached at a fraction of the minority of about 33.8 percent. The coefficients  $\beta_1$  and  $\beta_2$  for the size of the minority are in the same order of magnitude of our previous results in Table 1, but about two times larger ( $\beta_1 = -1.644$  and  $\beta_2 = 2.645$  in column (1) with one-step robust standard error respectively 0.712 and 1.002). Quantitatively a stronger result, this would imply a change of 1 seat from single-district to at-large in a council of 9 at Q1 (about -11.27 percentage points) and a change of 1 seat from at-large to single-district in a council of 10 at Q3 (about +9.97 percentage points). Again we also find no significant role for racial composition in the pre-Voting Rights South (panel b). Finally, we need to note that due to the lag requirements of the model we find ourselves confined to a smaller sample (especially for the all US sample: it does not go further back than 1980, so we can employ at most one lagged difference).

The specification checks for the dynamic model are reported at the bottom of each panel of Table 3. For Columns (1) and (2) the second order serial correlation p-values of the one-step procedure does not rise concerns over the validity of the instrument set, but the overidentification test's p-value obtained from the GMM two-step procedure seems low (although not granting rejection at any confidence level for the South and not at 5 percent for all US) given the low-power properties of such tests. However, additional robustness checks and the consistency of the standard linear model and this simple dynamic extension are source of reassurance.

## 5.2 Additional nonparametric evidence on the choice of rules

Simple nonparametric evidence supports the main prediction of the model as well. We expect to observe two basic regularities concerning the within variation in the data. First, the slope of a within regression of the single-district variable on the fraction of the minority (or the fraction of blacks) should be increasing in subsamples where the average minority size is increasingly higher. Second,

we would expect statistically significant coefficients of negative sign to appear at relatively small values of the fraction of the minority (where the downward-bending part of the  $U$ -shaped parabola is steeper) and statistically significant coefficients of positive sign to appear at relatively large values of the fraction of the minority (where the upward-bending part of the  $U$ -shaped parabola is steeper). A flat and insignificant relationship should appear in the middle range. We borrow a simple modification of locally weighted scatterplot smoothing (lowess) from Imbs and Wacziarg (2003) and run a series of within-city regressions in the relevant interval of minority sizes  $\pi \in [0.05, 0.55]$  employing a symmetric bandwidth of half a cross-sectional standard deviation of minority size ( $17/2 = 8.5$  percent). Again we focus on the South of the United States for the period post- and pre-1967. Specifically for each subsample we estimate:

$$y_{it} = \beta_0 + \pi_{it}\beta_1 + \alpha_i + \delta_t + \eta_{it}.$$

At increments of  $1/5$  of a percentage point of minority fraction (i.e. 0.002) we register the within-city slope ( $\beta_1$ ) and its t-statistic. We then regress the estimated slopes and the t-statistics against the corresponding mid-sample fraction of the minority. In both regressions a positive coefficient on the mid-sample fraction of the minority would confirm each of the two hypotheses discussed above. Table 4 reports results for both post- and pre-1967 for nonwhite minorities and confirms our predictions.

As expected, coefficients move from being prevalently negative at low levels of  $\pi$ <sup>32</sup> to being prevalently positive at higher levels of  $\pi$  (around  $1/2$ ). Over the interval<sup>33</sup>  $\pi \in [0.05, 0.22]$  the average coefficient for nonwhites in the post-1967 South is equal to  $-0.601$  and gives an estimate that is larger but comparable to the effect of the parametric estimate at Q1 (for an increase of 17 percent the change in single-district is  $-0.102$  versus  $-0.0556$  of the F.E. parametric model

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<sup>32</sup>Notice that flats at low values of  $\pi$  are justified by the relative equivalence of at-large and single-district rules in cases where minorities would not gain representation under any of the two rules.

<sup>33</sup>Bounds for the intervals of  $\pi$  are chosen to divide in three equal parts the support for the downward, flat, and upward part of the curve.

and  $-0.1127$  of the dynamic panel); the same holds for the average coefficient in the interval  $\pi \in [0.38, 0.55]$  ( $\beta_1 = 0.857$ ) comparable to the parametric effect at Q3 (0.145 versus 0.0660 in the F.E. model and 0.0997 in the dynamic panel). A within regression in such small subsamples (due to the small bandwidth) is demanding but nonetheless the main nonlinearity is detectable. However, we detect large fluctuations in the coefficients due to the varying (and small) number of changes in electoral rules in each subsample. We observe relatively larger (in absolute value) t-statistics mostly around the extrema of the interval of minority sizes (negative at low levels of  $\pi$  and positive at large levels of  $\pi$ ) and generally insignificant results otherwise.

### 5.3 Electoral rules and minority representation

Our basic story holds that electoral rules affect the ratio of minorities elected differently. This is the reason why the constitution writers choose differently in the first place. The ratio of non-white council members should display dependence on the electoral rules in order for the fundamental tenet of our analysis to be verified. Moreover, different rules should have different effects on minority representation at different minority sizes. By quantitatively estimating the impact of electoral rules on minority representation, we provide evidence that both statements are verified by the data and that the estimated effects move in the direction our model presumes and rationalizes.

The representational ratio is the fraction of minority councilmen in a council divided by the fraction of the population that belongs to the minority and is available for our all-US cities sample in year 1980, 1990, and 2000.<sup>34</sup> A large section of empirical Political Scientists have employed the representational ratio as the typical measures of the degree of "proportionality" of an electoral system (i.e. if composition of population racial group maps one-to-one into the racial

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<sup>34</sup>Very few cities for the all US sample present representational ratios of minorities of more than 1, indicating over-proportional representation. Even less of them are present in the South. In order to limit the role of these outliers we limit the representational ratio to be less than 5.

composition of the legislative body). We regress it on our variable of interests, the single-district rule variable. Table 5 reports the results. The null hypothesis that the electoral rule adopted by a city has no association with the representational ratio is soundly rejected in both a pooled cross-sectional regressions (Panel a) and in fixed-effect regressions in which time invariant city-specific unobserved heterogeneity is accounted for (Panel b). All specifications include year fixed effects and a set of standard controls for city size (log population) and income levels (log household median income in 1990 dollars) and we apply the same clustering as Table 1. Looking at columns (1) and (2) for the South and (3) for the whole country, single-district rules substantially increase the chance of minorities to be proportionally represented at the municipal level. Recalling that the fraction of single-district seats,  $y$ , is defined over the  $[0, 1]$  interval, our results in column (1) imply an average increase of the representational ratio of the city council between 13 (in panel a) and 35.4 (in panel b) percentage points from switching from a fully at-large rule to a fully single-district rule<sup>35</sup>. This is a quantitatively substantial effect: each black or minority vote has something less than 1/3 more weight in terms of electoral representation under single-district than under at-large elections. Both our cross-sectional and fixed-effect analysis provide quantitatively similar evidence and, as one would expect, such results are quantitatively stronger in the more segregated South.

In columns (4)-(7) we provide evidence that the impact of the single-district rule on the representational ratio is actually non-monotonic in the size of the minority by including an interaction of the single-district variable and the fraction of non-whites (the level of non-whites is included as well). At low levels of minority size both at-large and single-district should be indistinguishable in warranting representation: minority are just too small to achieve representation under any rule. However, as the minority size increases single-district will offer better chances of representation to geographically segregated minorities vis-a-

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<sup>35</sup>Virtually identical results are obtained when we define the left hand side as fraction of non white concilpersons over the fraction of non white population. We use specifically the black group in order to make our results more comparable with the previous literature.

vis at-large. Such effect will diminish, however, when the minority becomes so large that some district votes (those beyond simple majority in the district) will be wasted. This implies that the sign of the coefficient should be negative on the interaction term. In panel a) columns (4)-(7) present interactions with the predicted sign that are significant at standard confidence levels and reject the absence of a non-monotonicity. Moreover, single-district maintains his expected positive effect, while the fraction of minority has a positive coefficient. The picture in the fixed effect analysis in panel b) is less clear, primarily because the required variation in the data is a contemporaneous change over three dimensions: electoral rules, fraction of minorities, and number of minority councilmen. Albeit our data set is rich, this requirement is probably too stringent.

We are not the first to observe that at-large election favors the white majority and our results are consistent with a substantial body of Political Science literature on the matter. For instance Amy (2002) writes that "the system of voting in at large elections often makes it virtually impossible for minority candidates to get elected. At-large elections require candidates to get a majority or plurality of the vote to win, which usually allows a white majority to take all seats and to deny minorities any representation at all." (p. 150)<sup>36</sup>. Sass and Pittman (2000) also provide panel data evidence on the effect of electoral rule on minority representation reporting a representational ratio differential of 36 percent, quite comparable with our linear estimates. Our results extend to more recent data and a substantially larger sample of cities. We are not aware of previous empirical study pointing at the non-monotonicity in the effect of single-district rules on minority representation.

#### 5.4 The Voting Rights Act and electoral rules

This section investigate further how the Voting Rights Act imposes a constraint on the constitutional choice of the white majorities. The Voting Rights Act not

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<sup>36</sup>For similar views see Berry and Dye (1987). For empirical cross-sectional analysis see Karning and Welch (1982), also cited in Amy (2002).

only removes (and has removed) obstacles to minority voting registration. Any jurisdiction covered under Section 5 of the Voting Rights Act has the duty of obtaining pre-clearance for any change concerning voting from the office of the Attorney General through the Department of Justice or United States District Court for the District of Columbia. Every change proposed is individually reviewed from the Department of Justice and cleared<sup>37</sup> *"if the change does not lead to a retrogression in the position of minority voters with respect to the effective exercise of the electoral franchise"*. Case by case clearance is based on the study of the most recent Census and electoral data available and through interviews to concerned parties.

The implementation (both by Law and through the Courts) of the Voting Rights Act has been extremely successful, but it is hard to presume it has been perfect and definitive. The very fact that the VRA has been repeatedly renewed over time indicates that pressures towards distortion of voting institutions are still present and perceivable (the VRA is due for renewal in 2007). Riker (1984) brilliant account of a camouflaged litigation in a council-manager redistricting dispute (albeit in a different legal context) shows an example of how political institutions may still be distorted in favor of an incumbent majority even in such situations. We believe our analysis detects such pressure in the form of systematic strategic changes in electoral rules *under the current legal constraint*. The estimated dimension of the changes detected seems not so large to lead to a severe under-representation of blacks. Severe under-representation would raise legal highbrows and court challenges and, ultimately, legally-imposed changes in the electoral rule (which we exclude from our analysis).

There is also some evidence that the Voting Rights Legislation is progressively more effective in detecting strategic electoral manipulation. Table 6 reports median values for ethnic fragmentation, fraction of blacks and fraction of non-white minority. For the seventies both for the set of fully- and partially-covered States in the South, median minority sizes of cities increased in the vari-

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<sup>37</sup>Information concerning objected changes can be found in the motivation letters available at [http://www.usdoj.gov/crt/voting/sec\\_5/obj\\_activ.htm](http://www.usdoj.gov/crt/voting/sec_5/obj_activ.htm).

able of single-district rule are substantially higher and well outside confidence intervals of medians of cities decreasing single-district, in a direction consistent with a degree of manipulation. However, in the eighties the difference in the medians is reduced and gets substantially smaller in the nineties.

Finally, the coverage on the Voting Act is endogenous: the loci of greater potential conflict are those to which the VRA applies in full coverage. They are also the ones where the effects we detect are clearer. Table 7 reproduces the post- Voting Rights result of Tables 1 and 3 for those cities belonging to fully VRA-covered States and shows, especially for the basic panel model, greater significance and quantitatively larger coefficients. In column (2), panel a), the linear coefficient increases of about 48 percent, the quadratic 18 percent vis-a-vis the benchmark reported in column (1).

## 5.5 Form of government

For given council composition, there is anecdotal evidence that the form of government may play a role as well in the enfranchisement of minorities. The two main forms, mayor-council and council-manager, differ with respect to the role of the mayor as the pivot of the executive (stronger in the first instance). Our model is not centered on the role of form of government<sup>38</sup> but in this section we briefly review empirical evidence which may be *per se* relevant. In cities where the white voters hold a solid majority and are almost sure of electing a white mayor, they may have prefer a strong mayor form of government. On the other hand, in cities with a closer fifty-fifty split, the white constitutional writers may prefer a council-manager form of government to avoid the risk of ending with a black strong mayor. The following quote from an editorial from a newspaper targeted to Hispanics in San Diego (La Prensa, April 24, 2004) is an example of how form of government may enter the picture. In discussing proposed changes in the charter of the city of San Diego, the editorial concludes that ” *For Hispanics having a strong mayor form of government does not bode.... well for this*

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<sup>38</sup>See our discussion in the extensions of the basic model.

community. Putting so much power into one person's hands....translates into control by Republican right wings. Regardless of the changing demographics, i.e. the continual growth of the Hispanic, Asian, Filipino, black community political representation in the city of San Diego will be held by a diminishing number of white ...citizens." A relatively weak council hardly exercises any effective check on executive powers. A powerful council plays exactly the opposite role in council-manager structures.

We start considering two indexes of form of government, *FOG* and *SIND*, increasing in the degree of executive power. A strong mayor could be preferred by the charter writers as long as their position as majority of the city is strong, but a strong mayor is relatively riskier whenever minorities are large enough. At that point the more collegial council-manager form could be employed (given that whites could still be able to seat in the council). Therefore, to be congruent with our results on electoral rule, we would expect a positive coefficient on the size of the minority and perhaps a negative quadratic term in a regression where form of government is the dependent variable. Table 8 is organized as Table 1, a two-way panel model, while Table 9 mirrors Table 3, a dynamic panel model. Both Tables employ *FOG* as dependent variable. Table 10 instead presents the static panel model for *SIND*<sup>39</sup>.

These Tables suggest a blurred picture. The coefficient of size of the minority in the post-1967 sample has the expected sign only in a limited subset of regressions in Table 10, but never in Tables 8 and 9. Moreover, the coefficient on ethnic fractionalization is not statistically significant in most specifications for the South (or it is at 10 percent, but with the wrong sign). This same coefficient is insignificant (in fact very close to zero and switching sign) in the pre-1967 sample. The explanation for the wrong signs has often to do with the correlation between form of government and electoral rule (council-manager forms tend to employ at-large elections). Surely, further analysis of this issue (especially the institutional complementarity between form of government and electoral rule)

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<sup>39</sup>The lack of pre-1980 observations for most components of *SIND* limit our analysis to the simple static model.

is necessary, but on a first approximation it would appear that electoral rules more than forms of government respond to the racial composition of a city. Not surprisingly perhaps: electoral rules are the intuitive first line of defense against extensions of the democratic franchise.

## 6 Conclusions

Electoral rules are endogenous and evolve relatively quickly in response to changing underlying conditions. Minority representation depends on the ability of a majority bloc to adapt institutions to changing conditions and guaranteeing its supremacy. The experience of voting rights and electoral institutions in US cities, particularly in the South, is illuminating. Before the Voting Rights Acts of 1965, racial minorities were essentially disenfranchised in the US South. Therefore, the type of electoral institutions were irrelevant in determining the level of control of the white majority: a level of control that was almost absolute. The Voting Rights Act allowed racial minorities to enter into the political arena. The white majorities reacted, within the legal boundaries of the Voting Rights Act, by changing electoral rules as to minimize expected minority influence.

This evidence suggests how institutions (in this case electoral rules) evolve even rather quickly in response to changes in the environment and raises questions about empirical evidence that holds electoral institutions as exogenous.

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## 7 Appendix: Sample selection

In this section we aim at inspecting mayor selection issues regarding the sample of municipalities employed in the main analysis (the ICMA respondents sample).

First, we inspect differences in the distribution of population and economic covariates between the main sample (all US and South municipalities) employed in the analysis (that is the ICMA respondents sample) and the whole U.S. Census of population sample for the 1980-2000 period. This comparison is finalized at qualitatively assessing how representative is our sample of the whole population of U.S. municipalities. Significant differences in the moments of the

distributions of the covariates would indicate non-random sampling from the underlying population of U.S. municipalities.

Second, we compare population and economic covariates between the main sample (all US and South) employed in the analysis and the universe of cities to which the ICMA initially mailed the survey in year 2000. This comparison is finalized at assessing self-selection of the respondents. Significant differences in the moments of the distributions of the covariates would indicate non-randomness of non-response patterns.

Third, sample selection is also investigated for the years 1930-1970, but limited to States in the South.

Table (AI) presents qualitative evidence of sample selection. The ICMA sample covers 13 percent of municipalities reported in the U.S. Census of Population for 1980, 11 percent in 1990, and 8 percent in year 2000. ICMA respondent municipalities tend to be more ethnically divided, larger in terms of total population, and richer in terms of median income at the city level. All two-sample t tests of difference in the means across the whole Census and ICMA samples for each covariate reject equality in means significantly (below 1 percent confidence level<sup>40</sup>).

One reason for selection arises naturally from ICMA sample construction strategy. Municipalities included in the U.S. Census above 2500 population are included in the ICMA survey "universe" (Municipal Year Book, 2003). Of those below 2500 population, only municipalities affiliated to ICMA are included. For sample year 2000 ICMA respondent municipalities below 2500 amount to about 11 percent of the whole sample (376 municipalities out of a total 4193). Similar proportions are found in the 1980 and 1990 samples.

Unfortunately, such explanations do not account for selection completely. Even considering the Census and ICMA sub-samples with population above

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<sup>40</sup>Both year by year and pooled two-sample t test for difference in means were run, for a total of twelve tests (3 years: 1980-1990-2000 plus the pooled sample times 3 covariates: ethnic, pop, income). We allow for unequal variances across sub-samples. All tests are available from the authors.

2500 and comparing the two sub-samples, significant differences in the mean of the covariates do not disappear in some cases (population size).

Table (AII) presents little evidence of response selection for the sample of non-respondents and respondents in the 2001 ICMA Municipal Form of Government Survey. The choice of the year is dictated by the fact that ICMA maintains historical record of the whole list of municipalities in their "universe" for their 1996 and 2001 Form of Government surveys only. There was no corresponding equivalent list of surveyed municipalities for 1981 and 1991.

The percentage of responses received in 2001 for which data is about 54 percent, a measure conforming to previous survey's response rates as well. ICMA respondent and non-respondent municipalities tend to be equally ethnically divided and to have the same total population. Two-sample t tests for differences in means reject the hypothesis of equality at standard confidence levels (1, 5, and 10 percent). However, median income of ICMA non-respondent municipalities is lower than income of respondents in a statistically significant fashion. One possible explanation could be the availability of more administrative resources in relatively richer communities, allowing for more effective handling of survey response and similar incidental administrative tasks.

Table (AIII) reports summary statistics for both the (matched) ICMA sample obtained from the ICMA Municipal Year Book (various years) and whole Census sample for the period 1930-1970. Data for this period were collected only for cities in the South (see Data Appendix for detailed data sources).

Again as for the 1980-2000 samples reported in Table (AI) the sampling strategy adopted by the ICMA (and feasibility issues) presents statistically significant difference from the Census samples. ICMA selects larger (and therefore more fragmented) and richer cities for its analysis (see details on samples sizes in the Data Appendix). Again, t tests for differences in means provide formal support to the inspection of Table (AIII).

**Table I**  
**Size of Minority and City Electoral Rule: Within-city variation**

Estimator:	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
		South, Cities >				
Sample:	South	2500	South	South	All U.S.	All U.S.
<i>Panel (a): Post 1967</i>						
<i>Dependent variable: Fraction of councilmen elected by district</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
Frac. Minority	-0.885 [0.308]***	-0.943 [0.313]***	-0.877 [0.308]***	-0.818 [0.325]**	-0.565 [0.198]***	-0.453 [0.195]**
(Frac. Minority)^2	1.514 [0.475]***	1.819 [0.491]***	1.532 [0.478]***	1.385 [0.462]***	0.964 [0.279]***	0.777 [0.263]***
Log(City Population)	0.002 [0.038]	0.015 [0.039]	-0.007 [0.041]	-0.017 [0.043]	0.013 [0.023]	-0.003 [0.025]
Log(Median Income)			0.056 [0.093]	0.022 [0.100]		0.011 [0.054]
State trend				Included		Included
Observations	4011	3723	4010	4010	12413	12412
Number of cities	1914	1746	1914	1914	6526	6526
R-squared	0.71	0.71	0.71	0.74	0.84	0.86
<i>Panel (b): Pre 1967</i>						
<i>Dependent variable: Fraction of councilmen elected by district</i>						
	(1)	(2)	(3)	(4)		
Frac. Minority	0.421 [0.548]	0.584 [0.858]	1.233 [1.287]	1.136 [1.276]		
(Frac. Minority)^2	-0.439 [0.638]	-0.754 [1.385]	-1.722 [1.932]	-1.958 [1.941]		
Log(City Population)	0.017 [0.041]	0.021 [0.041]	0.084 [0.058]	0.095 [0.060]		
Log(Median Income)			-0.113 [0.065]*	-0.058 [0.061]		
State trend				Included		
Observations	2388	2382	2041	2041		
Number of cities	968	964	966	966		
R-squared	0.71	0.71	0.73	0.76		

Notes: Standard errors in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. In panel (a) and (b) standard errors are clustered at the city level. All regressions include year fixed effects. Panel (a) covers the period 1970-2000. Panel (b) covers the period 1930-1970.

**Table II**  
**Size of Minority and City Electoral Rule: Within-city variation**

Estimator:	Condition- al Logit	Condition- al Logit South, Cities >	Condition- al Logit	Condition- al Logit	Condition- al Logit
Sample:	South	2500	South	South	All U.S.
<i>Panel (a): Post 1967</i>					
<i>Dependent variable: Single district elections</i>					
	(1)	(2)	(3)	(4)	(5)
Frac. Minority	-11.422 [3.459]***	-11.604 [3.503]***	-11.288 [3.458]***	-5.184 [4.890]	-8.476 [2.674]***
(Frac. Minority)^2	23.753 [5.574]***	24.318 [5.660]***	23.842 [5.574]***	19.253 [7.481]**	18.359 [4.214]***
Log(City Population)	0.486 [0.430]	0.491 [0.437]	0.389 [0.436]	0.016 [0.626]	0.193 [0.289]
Log(Median Income)			0.778 [0.933]	0.695 [1.335]	
State trend				Included	
Observations	641	620	641	641	1305
Number of cities	214	205	214	214	493
<i>Panel (b): Pre 1967</i>					
<i>Dependent variable: Single district elections</i>					
	(1)	(2)	(3)	(4)	
Frac. Minority	10.805 [6.815]	10.805 [6.815]	10.345 [7.416]	11.631 [9.969]	
(Frac. Minority)^2	-12.233 [10.265]	-12.233 [10.265]	-12.177 [10.992]	-19.614 [14.690]	
Log(City Population)	-0.068 [0.422]	-0.068 [0.422]	0.453 [0.501]	0.865 [0.772]	
Log(Median Income)			-1.753 [0.967]*	-1.698 [1.407]	
State trend					
Observations	529	529	404	404	
Number of cities	163	163	147	147	

Notes: Standard errors in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All regressions include year fixed effects. Panel (a) covers the period 1970-2000. Panel (b) covers the period 1930-1970.

**Table III**  
**Size of Minority and City Electoral Rule: Within-city variation**

Estimator:	Arellano- Bond GMM	Arellano- Bond GMM South, Cities >	Arellano- Bond GMM
Sample:	South	2500	All U.S.
<i>Panel (a): Post 1967</i>			
<i>Dependent variable: Fraction of councilmen elected by district</i>			
	(1)	(2)	(3)
Lag Single District	0.313 [0.056]***	0.311 [0.055]***	0.29 [0.057]***
Frac. Minority	-1.644 [0.712]**	-1.654 [0.724]**	-2.113 [0.635]***
(Frac. Minority)^2	2.649 [1.002]***	2.822 [0.972]***	1.838 [0.706]***
Log(City Population)	-0.342 [0.258]	-0.33 [0.275]	-0.538 [0.236]**
Second Order Serial Correlation p-value	0.140	0.140	0.196
J test p-value	0.123	0.160	0.021
Observations	1506	1489	2508
Number of cities	797	782	1799
<i>Panel (b): Pre 1967</i>			
<i>Dependent variable: Fraction of councilmen elected by district</i>			
	(1)	(2)	
Lag Single District	0.751 [0.109]***	0.751 [0.109]***	
Frac. Minority	1.829 [5.259]	1.829 [5.259]	
(Frac. Minority)^2	-3.634 [7.928]	-3.634 [7.928]	
Log(City Population)	0.272 [0.319]	0.272 [0.319]	
Second Order Serial Correlation p-value	0.07	0.07	
J test p-value	0.997	0.997	
Observations	891	891	
Number of cities	462	462	

Notes: Robust standard errors in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Lag Single District is the the first lag of the dependent variable. All regressions include year fixed effects. Panel (a) covers the period 1970-2000. Panel (b) covers the period 1930-1970. Both ethnic fractionalization and population are treated as endogenous variables. The maximum number of lags used for instrumenting them is 2.

**Table IV**  
**Change in slope and t-stat of local**  
**within regressions of single-district**  
**on fraction of minority ( $\pi$ ) over the**  
**range of  $\pi$ .**

Sample:		
South	Slope	t-stat
	(1)	(2)
<i>post 1967</i>	4.596 [0.797]***	2.850 [0.473]***
<i>pre 1967</i>	0.165 [0.353]	0.897 [0.926]

Notes: Column (1) reports coefficients and standard errors corresponding to regression of locally estimated coefficients of single-district on fraction of minority on the corresponding mid-sample fraction of minority. Column (2) employs the corresponding t-statistic. Robust standard errors are in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Regressions include a constant (not reported). See text for local sample details.

**Table V**  
**City Electoral Rule and Minority Representation: Cross-sectional and Within-city variation**

Sample:	South	South, Cities > 2500	All U.S.	South	South	South, Cities > 2500	South (Black only)
<i>Panel (a): OLS</i>							
<i>Dependent variable: Representaional ratio</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Single-District	0.13	0.125	0.015	0.205	0.169	0.173	0.299
(Single-Distr. * Frac. Min.)	[0.041]***	[0.043]***	[0.018]	[0.067]***	[0.068]**	[0.071]**	[0.069]***
Frac. Minority				-0.333	-0.289	-0.315	-0.38
				[0.159]**	[0.157]*	[0.167]*	[0.163]**
				0.802	0.586	0.533	0.824
				[0.077]***	[0.081]***	[0.091]***	[0.066]***
Log(City Population)	0.106	0.117	0.102	0.08	0.096	0.108	0.072
	[0.015]***	[0.016]***	[0.007]***	[0.014]***	[0.015]***	[0.017]***	[0.012]***
Log(Median Income)	-0.362	-0.45	-0.338		-0.254	-0.352	
	[0.062]***	[0.064]***	[0.021]***		[0.068]***	[0.072]***	
Observations	3039	2767	11113	3039	3039	2767	2875
R-squared	0.07	0.08	0.06	0.07	0.08	0.09	0.09
<i>Panel (b): City Fixed Effects</i>							
<i>Dependent variable: Representaional ratio</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Single-District	0.354	0.377	0.204	0.298	0.297	0.36	0.221
(Single-Distr. * Frac. Min.)	[0.091]***	[0.081]***	[0.061]***	[0.196]	[0.196]	[0.174]**	[0.163]
Frac. Minority				0.211	0.212	0.063	0.385
				[0.472]	[0.472]	[0.436]	[0.420]
				-0.643	-0.579	-0.626	-0.568
				[0.380]*	[0.380]	[0.436]	[0.354]
Log(City Population)	-0.006	0.012	0.072	0.033	0.013	0.04	0.012
	[0.097]	[0.114]	[0.070]	[0.096]	[0.099]	[0.118]	[0.103]
Log(Median Income)	0.215	0.214	0.000		0.124	0.107	
	[0.182]	[0.202]	[0.110]		[0.183]	[0.207]	
Observations	3039	2767	11113	3039	3039	2767	2875
Number of cities	1642	1482	6158	1642	1642	1482	1570
R-squared	0.76	0.76	0.71	0.76	0.76	0.76	0.69

Notes: Robust standard errors are in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Standard errors are clustered at the city level. All regressions include year fixed effects. Sample coverage: period 1980-2000. The representational ratio is the fraction of non-white (black in column 7 of both panels) councilmen in the council divided by the fraction of the population that is non-white (black in column 7).

**Table VI: Characteristics of Cities Changing Electoral Rule Under Voting Rights Act Preclearance Condition (by decade)**

Period 1970-1980									
Voting Rights Act - South States fully covered					Voting Rights Act - All South States with some coverage				
<i>Subsample Decreasing SINGLE DISTRICT</i>					<i>Subsample Decreasing SINGLE DISTRICT</i>				
Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]		Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]	
Ethnic(t-10)	21	0.166378	.0693809	.3390113	Ethnic(t-10)	33	0.194508	.1245294	.3270092
Ethnic(t)	21	0.264663	.1964563	.4114405	Ethnic(t)	33	0.293621	.2108922	.40505
Frac. Black(t-10)	21	0.089928	.0348796	.21687	Frac. Black(t-10)	33	0.10792	.0529065	.203928
Frac. Black(t)	21	0.098622	.0468097	.2428612	Frac. Black(t)	33	0.101751	.0556345	.2656905
Frac. Minrty(t-10)	21	0.091503	.0359641	.2196268	Frac. Minrty(t-10)	33	0.109021	.0659537	.2053961
Frac. Minrty(t)	21	0.155286	.1083713	.2895482	Frac. Minrty(t)	33	0.168885	.1170527	.2795585
<i>Subsample Increasing SINGLE DISTRICT</i>					<i>Subsample Increasing SINGLE DISTRICT</i>				
Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]		Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]	
Ethnic(t-10)	47	0.399117	.3215923	.4472221	Ethnic(t-10)	60	0.373299	.3035595	.4265772
Ethnic(t)	47	0.447266	.3823418	.4795029	Ethnic(t)	60	0.429007	.3687487	.4599396
Frac. Black(t-10)	47	0.273235	.1994838	.3360678	Frac. Black(t-10)	60	0.244803	.1787823	.3061703
Frac. Black(t)	47	0.284737	.2312183	.3751268	Frac. Black(t)	60	0.25262	.1942273	.3326913
Frac. Minrty(t-10)	47	0.274588	.2008917	.3368007	Frac. Minrty(t-10)	60	0.24784	.1839426	.3074507
Frac. Minrty(t)	47	0.301235	.2507999	.3861642	Frac. Minrty(t)	60	0.293116	.2378248	.3573126
Period 1980-1990									
Voting Rights Act - South States fully covered					Voting Rights Act - All South States with some coverage				
<i>Subsample Decreasing SINGLE DISTRICT</i>					<i>Subsample Decreasing SINGLE DISTRICT</i>				
Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]		Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]	
Ethnic(t-10)	17	0.217387	.1443274	.3484081	Ethnic(t-10)	30	0.231083	.1419625	.3267115
Ethnic(t)	17	0.315041	.2239849	.4026764	Ethnic(t)	30	0.312536	.2282883	.3680777
Frac. Black(t-10)	17	0.089428	.0521425	.160876	Frac. Black(t-10)	30	0.094368	.0548517	.1727142
Frac. Black(t)	17	0.128993	.043128	.1980163	Frac. Black(t)	30	0.143769	.0895188	.1661797
Frac. Minrty(t-10)	17	0.124092	.0770264	.2160449	Frac. Minrty(t-10)	30	0.130488	.0766336	.2023592
Frac. Minrty(t)	17	0.182511	.1253335	.2545895	Frac. Minrty(t)	30	0.182582	.1275517	.2312641
<i>Subsample Increasing SINGLE DISTRICT</i>					<i>Subsample Increasing SINGLE DISTRICT</i>				
Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]		Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]	
Ethnic(t-10)	65	0.347108	.3075647	.3947446	Ethnic(t-10)	86	0.368366	.3349446	.4078901
Ethnic(t)	67	0.40034	.3682412	.4260964	Ethnic(t)	88	0.406157	.3725483	.4366212
Frac. Black(t-10)	65	0.165714	.1039453	.2080752	Frac. Black(t-10)	86	0.19266	.1584294	.2327117
Frac. Black(t)	67	0.179089	.144787	.2106473	Frac. Black(t)	88	0.200002	.1642106	.2602224
Frac. Minrty(t-10)	65	0.219606	.1854808	.2644502	Frac. Minrty(t-10)	86	0.229868	.2097406	.2767364
Frac. Minrty(t)	67	0.256799	.2300964	.2818591	Frac. Minrty(t)	88	0.272591	.2359458	.3136792
Period 1990-2000									
Voting Rights Act - South States fully covered					Voting Rights Act - All South States with some coverage				
<i>Subsample Decreasing SINGLE DISTRICT</i>					<i>Subsample Decreasing SINGLE DISTRICT</i>				
Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]		Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]	
Ethnic(t-10)	18	0.395447	.3501902	.4837628	Ethnic(t-10)	21	0.406057	.3756696	.4828541
Ethnic(t)	20	0.441584	.3721584	.4774563	Ethnic(t)	23	0.455352	.3991932	.5043442
Frac. Black(t-10)	18	0.113582	.0628309	.255522	Frac. Black(t-10)	21	0.179089	.0732573	.2642068
Frac. Black(t)	20	0.176006	.0598381	.2968652	Frac. Black(t)	23	0.239966	.0882167	.3533759
Frac. Minrty(t-10)	18	0.255387	.2146877	.3557325	Frac. Minrty(t-10)	21	0.261304	.2340239	.3530408
Frac. Minrty(t)	20	0.29508	.2291953	.3703512	Frac. Minrty(t)	23	0.324099	.2464538	.4250296
<i>Subsample Increasing SINGLE DISTRICT</i>					<i>Subsample Increasing SINGLE DISTRICT</i>				
Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]		Variable	Obs	Median	-- Binom. Interp. -- [95% Conf. Interval]	
Ethnic(t-10)	42	0.413317	.3798746	.4660986	Ethnic(t-10)	61	0.41117	.3318195	.442139
Ethnic(t)	46	0.448415	.4033347	.4838997	Ethnic(t)	67	0.447307	.4036738	.4723136
Frac. Black(t-10)	42	0.181325	.1063943	.2678239	Frac. Black(t-10)	61	0.172879	.1219406	.2654401
Frac. Black(t)	46	0.214429	.1339626	.3017227	Frac. Black(t)	67	0.216827	.1495089	.2823543
Frac. Minrty(t-10)	42	0.275677	.2340786	.3207284	Frac. Minrty(t-10)	61	0.275659	.2040158	.3016066
Frac. Minrty(t)	46	0.323101	.2709005	.373635	Frac. Minrty(t)	67	0.322583	.2719806	.3521422

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Notes: time period  $t$  for each variable refers to the final date of the period (for instance  $t=2000$  for period 1990-2000). States fully covered under the 1975 renewal of the Voting Rights Act are Alabama, Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia. Florida and North Carolina are only partially covered. Data exclude cities for which the change in electoral rule was dictated by court mandate or State law.

**Table VII**  
**Size of Minority and City Electoral Rule: Within-city variation in States Fully Covered by Voting Rights Act**

Sample:	South	South, Cities, Fully covered States	South, Cities, Fully covered States, pop>2500	South, Cities, Fully covered States	South, Cities, Fully covered States	All U.S., Fully covered States	All U.S., Fully covered States
<i>Panel (a): City Fixed Effects</i>							
<i>Dependent variable: Fraction of councilmen elected by district</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Frac. Minority	-0.885 [0.308]***	-1.307 [0.393]***	-1.332 [0.404]***	-1.305 [0.393]***	-0.85 [0.433]**	-1.27 [0.380]***	-0.849 [0.415]**
(Frac. Minority)^2	1.514 [0.475]***	1.781 [0.558]***	2.136 [0.608]***	1.79 [0.563]***	1.358 [0.584]**	1.702 [0.525]***	1.305 [0.545]**
Log(City Population)	0.002 [0.038]	-0.007 [0.056]	0.013 [0.058]	-0.01 [0.060]	-0.034 [0.059]	-0.011 [0.051]	-0.022 [0.054]
Log(Median Income)				0.018 [0.139]	0.043 [0.146]		0.022 [0.137]
State trend					Included		Included
Observations	4011	1992	1872	1991	1991	2171	2170
Number of cities	1914	962	901	962	962	1056	1056
R-squared	0.71	0.72	0.71	0.72	0.74	0.72	0.75
<i>Panel (b): Arellano-Bond GMM</i>							
<i>Dependent variable: Fraction of councilmen elected by district</i>							
	(1)	(2)	(3)				
Lag Single District	0.313 [0.056]***	0.293 [0.082]***	0.276 [0.079]***				
Frac. Minority	-1.644 [0.712]**	-2.326 [0.831]***	-2.389 [0.802]***				
(Frac. Minority)^2	2.649 [1.002]***	2.66 [1.053]**	2.683 [0.983]***				
Log(City Population)	-0.342 [0.258]	-0.182 [0.282]	-0.163 [0.282]				
Second Order Serial							
Correlation p-value	0.140	0.04	0.046				
J test p-value	0.123	0.172	0.142				
Observations	1506	768	758				
Number of cities	797	399	391				

Notes: Standard errors in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. In panel (a) standard errors are clustered at the city level. All regressions include year fixed effects. Both Panel (a) and (b) refer to period 1970-2000. States fully covered under the 1975 renewal of the Voting Rights Act are Alabama, Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia.

**Table VIII**  
**Size of Minority and City Form of Government: Within-city variation**

Estimator:	Fixed Effects	Fixed Effects South, Cities >	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
Sample:	South	2500	South	South	All U.S.	South
<i>Panel (a): Post 1967</i>						
<i>Dependent variable: Form of government index</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
Frac. Minority	-0.428 [0.347]	-0.405 [0.367]	-0.458 [0.348]	-0.236 [0.388]	-0.211 [0.244]	-0.143 [0.258]
(Frac. Minority) <sup>2</sup>	0.699 [0.515]	0.748 [0.587]	0.658 [0.511]	0.375 [0.535]	0.459 [0.325]	0.295 [0.322]
Log(City Population)	0.055 [0.048]	0.067 [0.057]	0.077 [0.051]	0.078 [0.050]	0.036 [0.037]	0.047 [0.036]
Log(Median Income)			-0.141 [0.088]	-0.135 [0.091]		-0.135 [0.065]**
State trend				Included		Included
Observations	4492	4161	4491	4491	14082	14081
Number of cities	1980	1812	1980	1980	6827	6827
R-squared	0.79	0.79	0.79	0.8	0.86	0.86
<i>Panel (b): Pre 1967</i>						
<i>Dependent variable: Form of government index</i>						
	(1)	(2)	(3)	(4)		
Frac. Minority	0.091 [0.650]	0.387 [0.970]	-0.481 [1.143]	-0.455 [1.194]		
(Frac. Minority) <sup>2</sup>	0.378 [0.815]	-0.175 [1.648]	0.742 [1.782]	0.687 [1.873]		
Log(City Population)	0.018 [0.066]	0.017 [0.066]	0.059 [0.061]	0.046 [0.065]		
Log(Median Income)			-0.226 [0.082]***	-0.188 [0.085]**		
State trend				Included		
Observations	2454	2447	2087	2087		
Number of cities	979	974	978	978		
R-squared	0.77	0.77	0.82	0.83		

Notes: Corrected standard errors in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. In panels (a) and (b) standard errors are clustered at the city level. All regressions include year fixed effects. Panel (a) covers the period 1970-2000. Panel (b) covers the period 1930-1970.

**Table IX**  
**Size of Minority and City Form of Government: Within-city variation**

Estimator:	Arellano- Bond GMM	Arellano- Bond GMM South, Cities >	Arellano- Bond GMM
Sample:	South	2500	All U.S.
<i>Panel (a): Post 1967</i>			
<i>Dependent variable: Form of government index</i>			
	(1)	(2)	(3)
Lag Form of Gov.	0.444 [0.059]***	0.459 [0.060]***	0.44 [0.053]***
Frac. Minority	-1.231 [0.654]*	-1.306 [0.670]*	-0.862 [0.596]
(Frac. Minority) <sup>2</sup>	0.997 [0.775]	1.185 [0.787]	0.868 [0.640]
Log(City Population)	-0.036 [0.224]	-0.093 [0.247]	-0.175 [0.226]
Second Order Serial			
Correlation p-value	0.161	0.131	0.094
J test p-value	0.069	0.119	0.101
Observations	1848	1820	3291
Number of cities	940	914	2383
<i>Panel (b): Pre 1967</i>			
<i>Dependent variable: Form of government index</i>			
	(1)	(2)	
Lag Form of Gov.	0.55 [0.091]***	0.55 [0.091]***	
Frac. Minority	8.964 [7.688]	8.964 [7.688]	
(Frac. Minority) <sup>2</sup>	-11.995 [11.956]	-11.995 [11.956]	
Log(City Population)	0.859 [0.405]**	0.859 [0.405]**	
Second Order Serial			
Correlation p-value	0.662	0.662	
J test p-value	0.173	0.173	
Observations	938	938	
Number of cities	473	473	

Notes: Robust standard errors in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Lag Form of Gov. is the the first lag of the dependent variable. All regressions include year fixed effects. Panel (a) covers the period 1970-2000. Panel (b) covers the period 1930-1970. Both ethnic fractionalization and population are treated as endogenous variables. The maximum number of lags used for instrumenting them is 2.

**Table X**  
**Size of Minority and Form of Government Indexes: Within-city variation**

Estimator:	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects South, Cities > 2500	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
Sample:	South	South	South	South	South	South	All U.S.	All U.S., Cities > 2500
<i>Period 1980-2000</i>								
<i>Dependent variable:</i>	<i>Term limit for Mayor</i>	<i>Length term of Mayor</i>	<i>Executive Index</i>	<i>Executive Index</i>	<i>Executive Index</i>	<i>Executive Index</i>	<i>Executive Index</i>	<i>Executive Index</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Frac. Minority	0.281 [0.154]*	0.138 [0.517]	-0.908 [1.610]	-0.413 [1.596]	-0.927 [1.635]	-0.074 [1.682]	0.811 [0.954]	0.879 [0.982]
(Frac. Minority) <sup>2</sup>	-0.375 [0.185]**	0.345 [0.700]	1.137 [2.268]	0.247 [2.235]	1.144 [2.270]	0.577 [2.424]	-0.36 [1.260]	-0.452 [1.280]
Log(City Population)	0.033 [0.024]	0.068 [0.061]	0.089 [0.149]	-0.004 [0.169]	0.093 [0.161]	0.003 [0.189]	0.054 [0.087]	0.013 [0.111]
Log(Median Income)					-0.027 [0.393]	0.065 [0.434]		0.2 [0.240]
State trend						Included		
Observations	3488	4423	2754	2504	2754	2754	9488	8731
Number of cities	1723	1970	1547	1391	1547	1547	5474	4989
R-squared	0.77	0.86	0.89	0.9	0.89	0.89	0.88	0.88

Notes: Standard errors in brackets below coefficients. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Standard errors are clustered at the city level. All regressions include year fixed effects. Term limit of mayor is computed as 1-max no. terms/8 if term limits are present, 0 otherwise. The executive index is computed as the sum of 1 if the system is mayor-council, 1 if the mayor has veto power, and length of term for the mayor divided by 7, and subtracting term limit, - 1 for the presence of recall, initiative or popular referendum.

Table D1

Summary Statistics (All U.S. sample, excl. South)						Summary Statistics (All U.S. sample, incl. South)							
year	Single District	Form of Governme nt	Fract. Minority	Population	Median Household Income	year	Single District	Form of Governme nt	Fract. Minority	Population	Median Household Income		
1980	mean	0.264445	0.366814	0.067241	22787.53	22809.2	1980	mean	0.23934	0.377363	0.09799	22559.6	21573.12
	st. dev.	0.408385	0.683129	0.111262	142177.4	8163.656		st. dev.	0.395861	0.647312	0.137489	127573.8	7987.236
	min.	0	-1	0	161	8347.087		min.	0	-1	0	113	6479.371
	max.	1	1	0.95962	7071638	91020.62		max.	1	1	0.998817	7071638	91020.62
	N. obs.	2870	3176	3151	3176	3176		N. obs.	3943	4338	4297	4338	4338
1990	mean	0.221614	0.352992	0.085131	20925.98	25754.26	1990	mean	0.22391	0.3656	0.118933	20816.74	23949.99
	st. dev.	0.381637	0.662213	0.129206	75066.69	11934.09		st. dev.	0.382196	0.625077	0.153624	69684.18	11484.99
	min.	0	-1	0	107	6783.474		min.	0	-1	0	107	5696.253
	max.	1	1	0.994365	3485398	114767.4		max.	1	1	0.994365	3485398	114767.4
	N. obs.	2904	3476	3455	3476	3476		N. obs.	3976	4814	4754	4814	4814
2000	mean	0.275712	0.278485	0.125633	22625.3	27690.47	2000	mean	0.287567	0.290456	0.158393	23113.37	26127.72
	st. dev.	0.407991	0.660554	0.153197	83089.34	12362.81		st. dev.	0.412552	0.623114	0.171226	84880.19	12285.1
	min.	0	-1	0	124	8470.961		min.	0	-1	0	124	8309.526
	max.	1	1	0.979246	3694834	116144.6		max.	1	1	0.993369	3694834	116144.6
	N. obs.	2671	2984	2984	2984	2984		N. obs.	3681	4097	4097	4097	4097
Total	mean	0.25328	0.334475	0.091855	22065.77	25383.17	Total	mean	0.249355	0.346215	0.124384	22097.58	23845.18
	st. dev.	0.399898	0.669677	0.133983	104075.6	11159.28		st. dev.	0.397537	0.632916	0.15634	96543.37	10898.35
	min.	0	-1	0	107	6783.474		min.	0	-1	0	107	5696.253
	max.	1	1	0.994365	7071638	116144.6		max.	1	1	0.998817	7071638	116144.6
	N. obs.	8445	9636	9590	9636	9636		N. obs.	11600	13249	13148	13249	13249

**Table DII**  
**Summary Statistics (South sample)**

South Region					
year		Single District	Form of Government	Fract. Minority	Population
1930	mean	0.190187	0.614458	0.240152	55689.73
	st. dev.	0.341789	0.675566	0.152765	97710.1
	min.	0	-1	0.00094	284.928
	max.	0.947368	1	0.96162	804874.1
	N. obs.	144	166	137	137
1940	mean	0.367765	0.231325	0.221453	44127.13
	st. dev.	0.459492	0.795204	0.145513	85805.16
	min.	0	-1	0.000239	4868
	max.	1	1	0.597693	859100.3
	N. obs.	415	415	229	229
1950	mean	0.345231	0.254065	0.208854	32005.15
	st. dev.	0.452349	0.74599	0.144826	73305.76
	min.	0	-1	0.000111	2774
	max.	1	1	0.723511	949708.4
	N. obs.	486	492	492	492
1960	mean	0.253952	0.264264	0.194137	34242.28
	st. dev.	0.41375	0.675556	0.145493	82867.91
	min.	0	-1	0	3202.001
	max.	1	1	0.694678	939023.6
	N. obs.	656	666	663	663
1970	mean	0.161332	0.283726	0.17797	29274.97
	st. dev.	0.354326	0.555411	0.150278	79091.1
	min.	0	-1	0	2406
	max.	1	1	0.770336	1199388
	N. obs.	904	934	936	936
1980	mean	0.17219	0.406196	0.182536	21936.64
	st. dev.	0.351701	0.536582	0.164655	74266.77
	min.	0	-1	0	113
	max.	1	1	0.998817	1595138
	N. obs.	1073	1162	1146	1162
1990	mean	0.23013	0.398356	0.208838	20532.95
	st. dev.	0.383814	0.515051	0.175684	53238.92
	min.	0	-1	0	243
	max.	1	1	0.986468	935926.6
	N. obs.	1072	1338	1299	1338
2000	mean	0.318919	0.322552	0.246224	24421.92
	st. dev.	0.422985	0.50821	0.185563	89530.48
	min.	0	-1	0	138
	max.	1	1	0.993369	1954847
	N. obs.	1010	1113	1113	1113
Total	mean	0.24545	0.33853	0.205515	26973.67
	st. dev.	0.401669	0.593737	0.166296	76418.88
	min.	0	-1	0	113
	max.	1	1	0.998817	1954847
	N. obs.	5760	6286	6015	6070

**Table DIII**  
**Voting Rights Act Coverage: Applicable Date; Fed. Register; Date**

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**States Covered as a Whole:**

Alabama	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Alaska	Nov. 1, 1972	40 FR 49422	Oct. 22, 1975.
Arizona	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
Georgia	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Louisiana	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Mississippi	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
South Carolina	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Texas	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
Virginia	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.

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**Covered Counties in States Not Covered as a Whole:**

California:

Kings County	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
Merced County	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
Monterey County	Nov. 1, 1968	36 FR 5809	Mar. 27, 1971.
Yuba County	Nov. 1, 1968	36 FR 5809	Mar. 27, 1971.
Yuba County	Nov. 1, 1972	41 FR 784	Jan. 5, 1976.

Florida:

Collier County	Nov. 1, 1972	41 FR 34329	Aug. 13, 1976.
Hardee County	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
Hendry County	Nov. 1, 1972	41 FR 34329	Aug. 13, 1976.
Hillsborough County	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
Monroe County	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.

New York:

Bronx County	Nov. 1, 1968	36 FR 5809	Mar. 27, 1971.
Bronx County	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
Kings County	Nov. 1, 1968	36 FR 5809	Mar. 27, 1971.
Kings County	Nov. 1, 1972	40 FR 43746	Sept. 23, 1975.
New York County	Nov. 1, 1968	36 FR 5809	Mar. 27, 1971.

North Carolina:

Anson County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Beaufort County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Bertie County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Bladen County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Camden County	Nov. 1, 1964	31 FR 3317	Mar. 2, 1966.
Caswell County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Chowan County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Cleveland County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Craven County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Cumberland County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.

Edgecombe County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Franklin County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Gaston County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Gates County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Granville County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Greene County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Guilford County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Halifax County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Harnett County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Hertford County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Hoke County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Jackson County	Nov. 1, 1972	40 FR 49422	Oct. 22, 1975.
Lee County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Lenoir County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Martin County	Nov. 1, 1964	31 FR 19	Jan. 4, 1966.
Nash County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Northampton County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Onslow County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Pasquotank County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Perquimans County	Nov. 1, 1964	31 FR 3317	Mar. 2, 1966.
Person County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Pitt County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Robeson County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Rockingham County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Scotland County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Union County	Nov. 1, 1964	31 FR 5081	Mar. 29, 1966.
Vance County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Washington County	Nov. 1, 1964	31 FR 19	Jan. 4, 1966.
Wayne County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
Wilson County	Nov. 1, 1964	30 FR 9897	Aug. 7, 1965.
South Dakota:			
Shannon County	Nov. 1, 1972	41 FR 784	Jan. 5, 1976.
Todd County	Nov. 1, 1972	41 FR 784	Jan. 5, 1976.

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### **Covered Townships in States Not Covered as a Whole**

#### Michigan:

Allegan County: Clyde Township Nov. 1, 1972 41 FR 34329 Aug. 13, 1976.  
Saginaw County: Buena Vista Township Nov. 1, 1972 41 FR 34329 Aug. 13, 1976.

#### New Hampshire:

Cheshire County: Rindge Town Nov. 1, 1968 39 FR 16912 May 10, 1974.  
Coos County: Millsfield Township Nov. 1, 1968 39 FR 16912 May 10, 1974.  
Pinkhams Grant Nov. 1, 1968 39 FR 16912 May 10, 1974.  
Stewartstown Town Nov. 1, 1968 39 FR 16912 May 10, 1974.  
Stratford Town Nov. 1, 1968 39 FR 16912 May 10, 1974.

Grafton County: Benton Town Nov. 1, 1968 39 FR 16912 May 10, 1974.  
Hillsborough County: Antrim Town Nov. 1, 1968 39 FR 16912 May 10, 1974.  
Merrimack County: Boscawen Town Nov. 1, 1968 39 FR 16912 May 10, 1974.  
Rockingham County: Newington Town Nov. 1, 1968 39 FR 16912 May 10,  
1974.  
Sullivan County: Unity Town Nov. 1, 1968 39 FR 16912 May 10, 1974.

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Source: Department of Justice.

**Table A I: Sample Selection (years 1980-2000)**

year		All Census Places and selected MCD's			Census Places and selected MCD's Not in ICMA Sample			ICMA Form of Government Sample (ICMA Survey Respondents)		
		Ethnic Frac.	Population	Med. Income	Ethnic Frac.	Population	Med. Income	Ethnic Frac.	Population	Med. Income
1980	mean	0.119897	9118.068	19208.98	0.1160492	7172.804	18883.43	0.1467891	22713.42	21484.27
	st. dev.	0.1455027	63175.11	6744.721	0.14351	47311.46	6485.699	0.1561237	126620.4	7971.08
	min.	0	100	3032.767	0	100	3032.767	0	113	6479.369
	max.	0.664348	7071639	91020.63	0.664348	3122307	91020.63	0.6593081	7071639	91020.63
	N. obs.	35439	35439	35439	31003	31003	31003	4436	4436	4436
1990	mean	0.1006002	6170.385	20617.8	0.0919233	4444.582	20215.08	0.1712403	20220.49	23896.39
	st. dev.	0.1471291	50790.99	8899.342	0.1423105	48046.86	8439.477	0.1655406	67579.89	11492.09
	min.	0	100	3824.79	0	100	3824.79	0	107	5696.251
	max.	0.6645895	7322564	114767.4	0.6645895	7322564	114767.4	0.6546158	3485398	114767.4
	N. obs.	44929	44929	44929	40014	40014	40014	4915	4915	4915
2000	mean	0.1501133	8582.013	22822.19	0.1439961	7315.146	22528.88	0.2196418	22981.33	26156
	st. dev.	0.1628525	62828.02	9093.845	0.1607504	60455.36	8684.614	0.1702933	83952.82	12382.84
	min.	0	100	2177.7	0	100	2177.7	0	124	8309.523
	max.	0.6665496	8008278	116144.6	0.6665496	8008278	116144.6	0.6632373	3694834	116144.6
	N. obs.	51851	51851	51851	47658	47658	47658	4193	4193	4193
Total	mean	0.1251894	7906.204	21104.66	0.1191376	6310.084	20796.38	0.1782162	21891.7	23805.9
	st. dev.	0.1545542	59126.08	8586.952	0.151941	53222	8219.904	0.166656	95344.94	10939.28
	min.	0	100	2177.7	0	100	2177.7	0	107	5696.251
	max.	0.6665496	8008278	116144.6	0.6665496	8008278	116144.6	0.6632373	7071639	116144.6
	N. obs.	132219	132219	132219	118675	118675	118675	13544	13544	13544

Note: Median income equal to 0 indicates a value of income zeroed by the U.S. Census for confidentiality purposes. Only 2 municipalities in 1980 and 2 in 2000 required such treatment and were dropped from the sample. 11185 municipalities below 100 inhabitants were dropped and 4 obs. with inconsistent racial data were dropped.

**Table A II: Response Selection (year 2000)**

year		ICMA Form of Government Full Sample		
		Ethnic Frac.	Population	Med. Income
2000	mean	0.2208746	22780.94	25502.09
	st. dev.	0.1740321	121694.4	12237.76
	min.	0	124	5897.793
	max.	0.6658266	8008278	116144.6
	N. obs.	7757	7757	7757
2000	ICMA Survey Respondents			
	mean	0.2196418	22981.33	26156
	st. dev.	0.1702933	83952.82	12382.84
	min.	0	124	8309.523
	N. obs.	4193	4193	4193
2000	ICMA Survey Non Respondents			
	mean	0.2223249	22545.18	24732.77
	st. dev.	0.1783436	154742.4	12021.1
	min.	0	124	5897.793
	N. obs.	3564	3564	3564

Note: the ICMA 2001 FOG survey sample universe has been provided by ICMA. We thank Sebia Clark for making the data available to us.

**Table A III: Sample Selection (years 1930-1970)**

year		All Census Places and selected MCD's			Census Places and selected MCD's Not			ICMA Form of Government Sample		
		Ethnic Frac.	Population	Med. Income	Ethnic Frac.	Population	Med. Income	Ethnic Frac.	Population	Med. Income
1930	mean	0.3292589	22008.04		0.331009	8764.79		0.3248581	55308.09	
	st. dev.	0.1502718	60550.19		0.1526281	27382.69		0.1446257	97456.01	
	min.	0.0018783	284.928		0.0042565	1985.251		0.0018783	284.928	
	max.	0.6480194	804874		0.5599921	505508		0.6480194	804874	
	N. obs.	485	485		347	347		138	138	
1940	mean	0.3030753	28999.28		0.3029203	5904.107		0.3031768	44127.13	
	st. dev.	0.1564919	69525.07		0.162654	10389.01		0.1526823	85805.15	
	min.	0.0004773	2522		0.003721	2522		0.0004773	4868	
	max.	0.501893	859100		0.501893	111580		0.500385	859100	
	N. obs.	379	379		150	150		229	229	
1950	mean	0.2554969	15490.66	9398.706	0.2360436	6030.967	9272.253	0.2893527	31953.97	9619.227
	st. dev.	0.1734978	52227.8	6513.281	0.1790261	31175.21	3651.893	0.157986	73240.03	9654.049
	min.	0	1012	975.1038	0	1012	1937.759	0.0002228	2774	975.1038
	max.	0.5287216	949708	215854.8	0.5287216	802178	41493.78	0.5028492	949708	215854.8
	N. obs.	1351	1351	1350	858	858	858	493	493	492
1960	mean	0.2346919	17858.46	13421.45	0.2094234	6570.596	13895.89	0.2711151	34129.25	12728.9
	st. dev.	0.1769923	58170.46	4990.751	0.1821448	26076.79	5552.122	0.1626483	82698.15	3936.007
	min.	0	1851	2094.594	0	1851	2094.594	0	3202	2324.324
	max.	0.5097046	939024	42929.05	0.5097046	763956	36564.19	0.5051175	939024	42929.05
	N. obs.	1626	1626	1648	960	960	978	666	666	670
1970	mean	0.2113373	17452.66	21521.73	0.2018225	9929.842	21489.66	0.2412711	41119.77	21622.34
	st. dev.	0.1742144	58033.25	7005.694	0.1744557	32521.35	7413.138	0.1701882	99564.85	5541.271
	min.	0	1235	4692.664	0	1235	4692.664	0	4906	10051.55
	max.	0.5558298	1199388	76871.13	0.5558298	730359	76871.13	0.5053402	1199388	59262.89
	N. obs.	2044	2044	2040	1551	1551	1547	493	493	493
Total	mean	0.2435539	18233.4	15623.49	0.2268228	7969.613	16195.77	0.2755909	37886.61	14453.68
	st. dev.	0.1754291	57900.31	8089.185	0.1794255	29711.03	7994.725	0.1628231	86579.32	8157.32
	min.	0	284.928	975.1038	0	1012	1937.759	0	284.928	975.1038
	max.	0.6480194	1199388	215854.8	0.5599921	802178	76871.13	0.6480194	1199388	215854.8
	N. obs.	5885	5885	5038	3866	3866	3383	2019	2019	1655

Note: The table includes only observations with non missing values.