Sameness and Segregation: The effects of communication and competition on political participation of African-Americans

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Some previous research on the contextual causes of individual political participation has argued that increasing community heterogeneity increases political participation; while other researchers have claimed the opposite: that increasing community homogeneity (decreasing heterogeneity) increases participation. These theories use the different mechanisms of conflict and improved social networks. On the one hand, conflict which is theorized to increase in a heterogeneous environment is thought to increase participation and, on the other hand, more efficient social networks which are more likely in a homogenous context are thought to do the same.

I argue that, in the case of race, these theories are not incompatible and, in fact, both mechanisms operate if the level of aggregation by which heterogeneity is measured is properly specified. In fact, it seems that that the seemingly contradictory evidence has been a result of the researcher's choice of the level of data aggregation. Using a model that combines contextual and individual level data and a measure of racial segregation rather than simply a measure of diversity, I demonstrate that both competition and communication increases turnout. Using data from the 1996 National Black Election Study, I demonstrate that, in the context of race, increasing homogeneity on a neighborhood level increases participation; while racially segregating these neighborhoods within a larger community, also increases participation.

Theories about the effects of political and social context on individual political behavior have largely converged on two seemingly opposite hypotheses: on the one hand that demographic *homogeneity* should increase political participation and, on the other hand, that demographic *heterogeneity* should increase political participation. The mechanisms for these competing theories are communication and competition, respectively. Some scholars have looked at a neighborhood, city, or county and argued that demographic sameness should result in increased political participation because of the ease in communicating between like individuals. On the other hand, other scholars have looked at a geographic entity and argued that demographic difference should increase participation because of competition between different interests. These theories have usually modeled the relative homogeneity of a given contextual unit by standard measures of diversity, such a Gini coefficient or a simple proportion. I will show that the notion that the two processes are mutually exclusive is a side-effect of the way homogeneity is measured. When a more appropriate measure of homogeneity is used, I can show that both communication and competition are important to participation.

This paper will argue that communication happens within competition. C*ommunication* happens at a relatively smaller, more local level; and on this level participation should be driven by increasing homogeneity. *Competition,* when it is inter-group, happens on a geographic level larger than that of communication; and on this level participation should be driven by increasing heterogeneity. Moreover, the more obviously groups are spatially defined, the more clearly groups can compete. This means that a measure of spatial segregation should better capture the relationship between context, competition, and participation than does a measure of pure diversity. In this paper then, I will demonstrate that a model of participation that measures heterogeneity at two levels of aggregation and uses segregation rather than diversity is an improved model of the effect of context on individual behavior.

Scholars of political behavior have occasionally turned to the effects of a person's environment on their political participation. Early behavioral studies, especially those of Paul Lazarsfeld and his colleagues (Lazarsfeld, Berelson, and Gaudet 1944), placed central importance on the contextual influences of behavior. However, the field has largely been dominated by studies that emphasize the importance of individual characteristics (most

completely by Wolfinger and Rosenstone 1980)[1]. In recent studies, scholars such as Dennis Chong, Cathryn Cohen, Michael Dawson, Claudine Gay, James Gimpel, Robert Huckfeldt, Jannelle Wong and, recently and most extensively, Eric Oliver and David Campbell have turned their attention to contextual influences. Context can be operationalized in a number of ways. It has been explored using a number of relevant demographic features, including party (Oliver 2001; Campbell 2006), income (Cohen and Dawson 1993; Huckfeldt 1979), urbanization (Verba and Nie 1972; Oliver 2001), and race (Gimpel, Cho, and Dyk 2006; Gimpel, Lay, and Schuknedcht 2003; Rubenson 2005; Campbell 2006).

The literature reviewed above has all, directly or indirectly, modeled the effects of homogeneity on individual behavior. I will show that homogeneity is actually best measured at two differently sized geographic entities. A larger size, in which greater heterogeneity leads to greater participation because of increased competition and a smaller size, a locality, in which greater homogeneity leads to greater participation because of the communication enabled by more efficient social networks. In this paper I measure the contextual causes of African-American voter turnout. At the local level, homogeneity is measured by the percent African-American in zip codes. On the larger level, I will measure the context by spatial residential racial segregation at the city level. The use of segregation, rather than simply diversity, is a theoretical contribution that I will describe below.

Competition or the utilization of social-networks are the two mechanisms usually proposed to drive individual participation. If it is accepted that political participation is caused, at least in part, by self-interest, then it seems that at least one of these must explain some participation. The accumulation of resources for self-interested reasons is necessarily the denial of those resources to others. If others vying for the same resources are within the same polity, then political competition will result. To the extant that very little, if any, of the politics of distribution occurs on the individual level, it seems that participation must also involve the operation of social-networks that facilitate participation because self-interested individuals have an incentive to encourage participation by their political allies in order to gain resources. For convenience, in this paper, I will refer to the utilization of social networks as *communication*. The existence of social networks is often referred to as social capital in the literature of the same

[1] Although Verba and Nie, in their seminal 1972 work, devote a chapter to the importance of context to participation when they test centralization and "isolation" as predictors of aggregate community participation.

name (see Putnam 2000). The utilization of networks for political purposes often uses networks that are more political then social, or is a combination of both, i.e. political machines in the United States (Putnam 1995). Also, when used for political purposes, messages that are transmitted across social networks may involve communication that is not two-way and could involve processes that are best described as coercion. Nevertheless, because the existence of organizations is not a central feature in the theory to be proposed here, as it is in the social capital literature, and networks are used for transmission between or the cascading of information across a group of people, I will refer to the process of message transmission through social networks as communication. Theories of both conflict and communication are theories of the effect of the relative homogeneity of a given environment and how that environment affects individual political participation. This paper will focus only on the demographic and spatial dimensions of an environment, which, consistent with the literature, will be called *context*.

The mechanisms for contextual effects on political behavior fall into, what I would describe as, two general categories: psychological and social. This paper will focus more heavily on the latter: that is that rational individuals will have an increased incentive for communication and competition due to certain manifestations of their social context; in this case the relative proximity of the members of social groups that comprise the polity in which they live. Psychological theories assert that a social context will change the probability that an individual will form certain preferences or that they will act on those preferences. A fully described model of participation would certainly include variables from both of these categories. However, limitations on data make psychological mechanisms particularly difficult to model. Psychological variables must often be measured by proxy with the suggestion that the observed relationship is due to psychological mechanisms. For example, it could be supposed that segregation primes racial identity and that increased racial identity increases participation. However, in the absence of an accurate measure of racial identity, the stage of a model that captures the effect of segregation on racial identity must simply be identified as one possible component of the observed systematic relationship between segregation and participation. That is the strategy undertaken here. A more complete treatment of the topic should include a more complete study of the psychological mechanisms behind contextual causes of behavior. Nevertheless, I assert that most behavior modeled here can be explained adequately by assuming rational actors are operating out of self-interest and that their actions are structured by the

manner in which certain social context makes it more rational for them to expend resources on the transmission of messages through social networks and less rational to free ride in political competition against another group.

Much of the research on political competition has recently been examined and elaborated on by Campbell (2006). Campbell recognizes that many scholars have studied the effects of community heterogeneity on civic engagement and, as Costa and Kahn (2003) summarize, all have concluded that heterogeneity, including racial heterogeneity, decreases *civic engagement*. Campbell's insightful contribution is that civic and political participation, however, are not the same enterprise and are not subject to the same motivation on the individual level. Civic participation, i.e. volunteering, joining, etc. is subject to the influence of civic norms. Civic norms that promote civic participation are more likely to be fostered in a homogeneous community, ceteris paribus.

Political action, on the other hand, is motivated by competition. Whether it is over matters of resources or ideology, politics is often a matter of competition for one rule of law over another. Assuming competition over policy can motivate political participation and assuming more similar people have less to compete over than less similar people, contextual homogeneity should decrease participation because it decreases competition. In a stylized polity that has uniform tastes competition over the implementation of different ideologies would be eliminated (although one might expect that competition over economic resources would remain). Campbell proposes that contextual homogeneity should decrease political participation because political competition is reduced. This is what Campbell finds, at least for certain contextual variables, such as partisanship, for which his findings are consistent and strong. Additionally, Campbell recognizes that there is a social norm component of political participation, similar to the civic norms that increase civic engagement. These civic norms are thought to operate more effectively in a homogeneous environment and Campbell shows that voting does increase with both extreme homogeneity and extreme heterogeneity. Thus, Campbell finds that the relationship of voting to homogeneity (in this case partisan homogeneity) is parabolic with participation increasing at both ends.

However, Campbell finds inconsistent support for modeling race as a significant contextual factor in affecting turnout. I argue that this seems unlikely to be an accurate model of American politics considering the significance of race in the United States. This result could be

because of the difficulty with aggregated measures explaining individual behavior. This problem has plagued contextual research generally, not just Campbell's quality analysis. Campbell uses county level demographic measures to model behavior. While his results are important, it is not convincing that there should be a relationship between county context and individual behavior. It should be noted that this is not a problem unique to Campbell; many other scholars have used what seem to be extremely large levels of aggregation to explain individual behavior. For example some scholars have even used state level data, (Hill and Leighly 1999), which probably captures some institutional effects, but is surely inadequate as a measure of contextual demographics.

Beyond just data limitations, trying to place a person in a geographic unit that best captures contextual influences on their behavior is complicated by the relationships between different identities, issues, and geographic entities. For example, a person is most likely concerned about the entire nation when the issue is national defense and sees other nations as adversaries in any political contest. However, in regards to the manufacture of the machinery of national defense, a person may conceptualize politics at the city level as their city competes with others for contracts and jobs. When considering the location of the manufacturing center that will build the machines of national defense, a person may no longer consider politics in terms of inter-city competition, but in terms of some smaller neighborhood as they compete to have the manufacturing center either in their neighborhood for convenience of travel or far away to keep their neighborhood free of the pollutants of industry. And all of this, of course, is complicated by the presence of competing, multiple identities within an individual.

Because of these difficulties, a crucial question for scholars of contextual effects centers around finding the proper geographic entity to capture the relationship of interest. Given individual voters (as in this paper) should a model posit that their behavior is affected by the context of their immediate neighbors, their census tract, their zip code, their county (as is most commonly modeled), their state, or something else? Of course, it is also likely that individual behavior is affected by a geographic entity that does not fall into the boundaries of pre-defined political or organizational boundaries.[2]

[2] It is important to remember that in contextual effects models the context *is a causal variable*. In models attempting to explain behavior, the context in which a person lives (or works, or goes to school, etc.) causes that person to behave in a certain manner. This is, of course, not a radical claim in social behavior research more generally. It is widely accepted, for example, that the school that a student attends will affect that student's

Homogeneity and communication

Communication within social networks involves the transfer of messages. Public opinion scholars have demonstrated that individuals are more likely to accept messages from sources with which they identify (Zaller 1992). The more homogeneous a population, the more likely the message is to be passed from one individual to another because these individuals are more likely to come in contact and more likely to receive the message from a source from which they are likely to accept. Receiving and accepting the message then allows them to transmit the message to another member of the network. If this is a message explicitly calling for, or demonstrating the importance of, political participation, it could lead to greater participation by individuals receiving it. The source of the message is not necessarily important. The effective operation of a social network can internally transmit messages from an external source throughout a population, thus social networks can operate because of an elite-driven external mechanism, but a message calling for collective action could also emanate from an internal political elite. External elites have often called on residents of specific geographic areas to participate politically and American political parties are structured such that local elites encourage participation for the benefit of the national party and its candidates. Regardless of the source, once the message has been adopted by local population, especially by local elites, it makes it more likely that collective action problems can be overcome.

Can individual voters, elite or otherwise, be expected to evaluate the efficacy of attempting to communicate a message to or attempt to turnout a particular voter to participate? Repeated research in American politics has demonstrated that the political preferences of an individual voter can be partially predicted by characteristics that are sometimes easily observable by other people, such as race and location (although no demographic characteristic predicts as well as the usually unobservable partisan affiliation). Therefore, a voter, in deciding whether to motivate another voter to turnout can estimate the probability that a voter will vote in the manner they would prefer based on the observable values of their preferences. There is evidence that voters assign partisan identifications to others based on observable characteristics (see Green,

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academic achievement. This is not to claim that the effect of the context is not a function of other variables, which in turn might be a function of other variables. In schools this could be that academic achievement could be a function of the quality of the teachers in the school, which in turn could be a function of the socio-economic status of the neighborhood in which the school is located. However, without entering into an infinite regress of causality, it is recognized that context can have a causal effect on behavior and can capture a proportion of the variance in a model of behavior beyond that of just individual level characteristics.

Palmquist, and Schickler 2002). Intuitively, it is not difficult to imagine that when a voter sees a person, maybe even interacts with them a little, they would make a judgment about that person's policy preferences if called on to do so. The degree of sameness within a network then, should affect the incentive for voters to utilize the network or to react to the attempted utilization of the network by others for political gain. If this network operates over a geographic area, then the homogeneity of that geographic area should affect participation.

If it is assumed that an individual prefers to communicate for political purposes with those of similar political preferences, and that communication is also limited by preference compatibility between potential communicators, then as context changes over increased spatial distances, it is likely that preferences will change as well. This makes cooperation for a political goal less likely. The incentive for communication may also be limited by political demarcations. Resources are often allocated by political divisions and there is usually no incentive to cooperate for an economic good across political boundaries if it can only be allocated to one. This leads to the unusual situation in which an individual may have no reason to communicate with a person that lives across the street from them because of an invisible division of a political boundary that limits the allocation of scarce goods. Oliver (2001) has demonstrated that these invisible political boundaries do in fact matter in politics. He shows that a person's behavior is affected by the municipality in which they live as opposed to a larger urban area (i.e. Santa Monica rather than Greater Los Angeles), even if that municipal division is demarcated by nothing more than a street sign rather than physical space. This is similar to the findings of Verba and Nie (1972), which tested the hypothesis that the "isolation" of a community, measured by spatial distance and interconnectedness of transportation and communication to larger transportation centers, should increase political participation. They argue that participation is increased in isolated communities due to greater importance of that local community and its politics to the individual residents. If the efficacy of communication should decrease as the size of the aggregation increases and more geographic political boundaries are crossed, then homogeneity should be less of a predictor of participation as the geographic context becomes larger. This contributes to the theory that homogeneity seems to best be measured at some local level in which social networks can operate.

I assert that the mechanisms of competition and communication are unlikely to operate on the same level of aggregation, therefore it is necessary to examine multi-level context to

capture both these mechanisms in the same model. In the political behavior context, communication, the mechanism activated by increased homogeneity, is a mechanism that operates between individuals and can only be effective up to the limits of organizational capacity. Thus communication effectiveness is almost certainly inversely related to geographic distance. This is to say individuals can choose to communicate and increase the size of the group with which they communicate, but that this group is eventually limited in size by problems such as technological limitations and decreased monitoring ability. Here social monitoring is thought to require, and be limited by, communication. As discussed above, Campbell and others recognized the incentive for individuals not to vote can be overcome by social norms and sanctions that reward the individually non-rational behavior of voting. Social norms would seem to have greater variation as geographic distance increases, thus decreasing the effectiveness of these norms to shape behavior. Additionally, formal theorists have recognized that the incentive not to vote is diminished by internal monitoring in communities and that the effectiveness of monitoring is inversely related to the size of the community (Schwartz 1987). The smaller the community, the easier it is to keep tabs on your neighbors. There is also the theoretical expectation that free riding will increase as group size increases (Olson 1965), regardless of spatial distance and technological limitations. Rational choice theorists, such as Dennis Chong (2000) have demonstrated that the rational argument for not voting can be overcome when networks allow for "cooperation and defection" to be "rewarded or punished in the course of everyday interaction with friends and associates" (p.16). Additionally, closer spatial proximity greatly increases the probability of direct person to person contact, which numerous studies, most recently Gerber and Green (2000), have shown to be more effective than mass communication in affecting turnout. All this is to say that a social network's efficacy decreases with spatial distance. In political terms, the space over which social networks effectively operate may also be limited by political boundaries. It is difficult to say how large the area is in which networks operate, but there is likely an upper bound because there is almost certainly decreasing returns between the effectiveness and size of a social network.

Segregation and competition

I have argued that communication most effectively increases political participation when operating on a local level. Conversely, I will argue that competition most likely operates on a

relatively larger level and should be modeled using a level of aggregation larger than that of the locality. If individuals view competition in terms of groups and groups are geographically clustered, then competition should operate *between* some sort of contextual aggregation, which allows for group competition, rather than *within* a contextual aggregation as the mechanism of individual communication must operate. There are numerous psychological theories to suggest that inter-group competition arises frequently and even easily in human populations (most prominently those of Tajfel: Tajfel, Billig, and Bundy 1971; Tajfel 1981; and Tajfel and Turner 1979; for a summary, see Huddy 2003.[3]). That individuals in the United States do in fact identify with racial groups or the reasons for this phenomenon need not be explored here. It is sufficient to point out that social psychological literature has demonstrated that inter-group competition is a common phenomenon in human societies and the spatial segregation that creates or maintains an in-group/out-group distinction provides conditions for intergroup competition to flourish. Tajfel and Turner (1979), in summarizing a wide body of literature write that:

> ...the mere perception of belonging to two distinct groups – that is, social categorization per se – is sufficient to trigger intergroup discrimination favoring the in-group. In other words, the mere awareness of the presence of an out-group is sufficient to provoke intergroup competitive or discriminatory responses on the part of the in-group. (p. 15)

Groups may be defined by a number of characteristics, such as race, class, or partisanship. In geographically clustered populations in the United States, geography and other demographic characteristics are often correlated, which would presumably make inter-group identification even easier by reducing cross-cutting cleavages. Moreover, because economic goods are often delivered to certain geographically delineated areas, to the exclusion of other areas, geographically delineated groups are likely to be important politically. Therefore, when modeling the effect of heterogeneity on increasing *competition* and therefore participation, the geographic context that affects individual participation should be spatially large enough to incorporate more than one group that is competing over the same policy goal. It seems that the geographic contexts in which individuals form groups with similar political interests and therefore communicate to increase turnout are a smaller part of the larger geographic context in which groups compete for their political interests.

Because spatially clustered groups sharing similar political preferences compete against other spatially clustered groups, it follows that the more obviously spatially separated groups are,

[3] For a discussion of race-based competitive attitudes about out-groups, see Vanneman and Pettigrew 1972.

the more easily competition will occur. Therefore, increased spatial segregation should increase inter-group competition. If individuals respond to this competition with individual action, then individual political participation will increase.

Sociological studies indicate that racial segregation increases attitudes such as hostility towards other races. Welch, et al.(2001) have found that interracial contact can have a positive effect on interracial attitudes. The more an area is segregated, the less likely it is that this contact will happen. An attitude like hostility, while not the same as competitiveness, seems like it is an attitude that would contribute to viewing individuals of another race as competitors. This reinforces my claim that increased racial segregation will contribute to the competitive mechanism that increases participation. However, it should be emphasized that I am not proposing a theory that relies on the presence of racial conflict. This could account for some participation, but it is more important to consider that voting, the mode of participation studied here, is a "conflictual activity" (Verba and Nie 1972 (p. 52)) and that contexts that increase the likelihood of conflict should increase the likelihood of voting, regardless of any latent tendencies for conflict. Thus I argue that the spatial segregation of interests as delineated by demographics will increase voting.

The demographic context I use to test this claim is racial context. Besides having some qualities associated with identity politics that makes it particularly subject to the effects described here (more on this below), race obviously is a variable of important social and political consequence in the United States. The two levels of aggregation that I use to test this claim are the zip code and the city. Gimpel, Lay, and Schukrecht (2003) have argued that the zip code is the best approximation of a neighborhood.[4] For the larger level of aggregation, I use the city. More specifically, I use Metropolitan Statistical Areas (MSA's) as defined by the U.S. Census. MSA's include all the cities within a distinct geographic conglomeration of cites. They range from a minimum size of 50,000 to the size of Long Beach-Los Angeles, CA MSA and its population of over 16 million. MSA's would seem to be the best approximation of the appropriate level of aggregation. Alternatives, such as the county, offer delineations that do not necessarily match perception. Looking at Los Angeles for example, it seems unreasonable to

[4] It should be noted that others, such as Crane (1991) writing from a sociological perspective, have criticized the zip code as a good approximation of neighborhood. Of course, the relevant definition of neighborhood can differ depending on the scientific use and discipline. For the purpose of political studies, Gimpel, Lay, and Schukrecht make a compelling argument. Ultimately, the proper definition of neighborhood is something that probably can and should be tested.

artificially segregate voters in Los Angeles County from nearby counties when they function as one continuous geographic and cultural entity (Oliver's (2001) findings not withstanding). Additionally, the MSA is the geographic entity by which segregation is usually measured.

This paper will focus on the effects of context on African-American voters by employing the 1996 National Black Election Study (NBES). This is done for two reasons. First, there is reason to believe that some of the psychological mechanisms in this model (explained below) will be particularly relevant to African-American voters. And because the variable of interest is specifically racial context, African American voters provide a useful starting place from which to expand to other groups. Second, the NBES is one of the only studies of voting behavior with publicly available geo-codes at a level as local as the zip code. The National Election Study, for example, is only reducible to the congressional district. Because of its size and closer proximity to more natural geographic boundaries, there is good reason to believe that the zip code is a better measure of neighborhood context than the congressional district (Gimpel, Lay, and Schukrecht 2003). Further research on this question, based on the promising results when looking only at African-Americans, should include more exact geo-codes and other racial groups.

Segregation and African-Americans

For African-American voters it is particularly likely that segregation serves as an effective means of prompting political participation through group identification. Dawson (1994) has identified what he describes as "a model of black utility and linked fate" (p. 80) which points the unique historical circumstances of the black population in the United States that makes it more likely that blacks will rationally use race as a cognitive short cut to determining their own utility. Dawson rests his claim on social identity theories that the perception of depravation and the unique historical circumstance of blacks will lead to stronger identification with the group. He writes that "the historical experiences of African Americans have resulted in a situation in which group interests have served as a useful proxy for self interest" (p. 77). In short, a black voter in making political decisions can say, what is good (bad) for blacks, is probably good (bad) for me. For a black individual that lives in a racially homogenous rather than heterogeneous neighborhood, Dawson's claim is particularly persuasive because it is likely that this individual shares group interests with neighbors across all dimensions (i.e. economic,

racial, political) and therefore the manner in which a policy effects, not only any other black individual, but blacks in her neighborhood, is analogous to how the policy will affect that individual black voter. Combining Dawson's logic of historical precedent with the geopolitical reality of segregation makes his claim more powerful. Verba and Nie (1972) make a similar argument in explaining African-American political participation, when they argue that, "the barriers separating blacks from the white population suggest that cooperative activity, fostered by a sense of group membership, should be particularly characteristic of black political behavior" (p. 160).

The mechanism of segregation described here should be particularly relevant for African-Americans. Indeed, no other ethnic group has historically or currently experienced segregation approaching the degree and persistence of that experienced by African-Americans (Massey and Denton 1993). Even today, for most African-Americans, the experience of being black and the experience of ghettoized living are intertwined (Cutler, Glaeser, and Vigdor 1999). Indeed, David Sears and Victoria Savalei (2006), drawing on many other social scientists, and their own survey work have demonstrated a significantly higher level of racial identity among blacks than other groups.

Although my argument is about context generally, it should be noted that when examining racial context, economic resource disparity likely plays a role in making racial context an effective predictor of individual behavior. Part of Dawson's claim, drawing from social identity theory, that depravation is a powerful cause of group identification should mean that the life in an under-resourced black community, which is often the manifestation of segregation in the United States, and is very often associated with social depravation should lead to increased salience of identity. In addition, social psychologists have argued that the salience of intergroup distinctions is markedly accentuated by intergroup inequality and status (for a discussion of this research see Duckitt 2003). It is well established that salient identities can affect political actions (Conover 1984, 1985, 1988) and that race is a salient identity to many African Americans (Dawson 1994, Bobo 1988). The correlation of inequality with segregation could mean that segregation causes this increased identity to take on a politicized form that increases participation**.** Many political scientists, including Cohen (1999), Dawson (1994), Gurin (1975, 1989), Miller, Gurin, Gurin, and Malanchuk (1981), and Morris (1984) have argued that "marginalized" groups rely more on community structures and resources of the group for

individual advancement and that collective survival replaces the individual calculus often studied by social scientists. If the collective survival comes to outweigh that of the individual, the problem of the free-rider should be diminished.

HYPOTHESIS

Using the specific instruments available for this paper then, I propose the following hypotheses:

H1: Increasing homogeneity within a zip code, as measured by percent African-American, should be positively related to political participation for African-Americans.

H2: Increasing residential racial segregation in a city, as measured by segregation of African-Americans in Metropolitan Statistical Areas, should be positively related to political participation for African-Americans.

To recap my reasoning: Contextual heterogeneity has been found to increase political participation. I hypothesize that heterogeneity should increase participation, but only in a polity of sufficient size. While I cannot test the necessary level of aggregation, I will show that Metropolitan Statistical Area aggregation is sufficient within the levels of aggregation available to most researchers of American politics. Furthermore, I argue that because political competition is a group phenomenon and because the spatial separation of groups allows for the better operation of the mechanisms that facilitate intra-group communication and inter-group competition, that residential segregation at the Metropolitan Statistical Area level is actually more of a variable of interest than simply diversity and better explains political participation. I also argue that heterogeneity should not increase participation at a sufficiently small level of aggregation, instead I argue that opposite, that more homogenous communities, at a geographic size in which communication can be aided by homogeneity, should increase political participation.

Figure 1 is the schematic of my hypothesis. In this figure a, b, c, and d represent individual probabilities of voting. *The hypothesis stated here predicts that:* $d > b \approx c > a$.

HOW TO MEASURE SEGREGATION

It is important to emphasize what this theory captures that is different than previous work on contextual effects. Previous work, when using any contextual variable, race or otherwise, has only looked at proportions in one geographic entity.[5] By proportion I mean that the model either incorporates a measure of diversity, such as a Gini Index, or a pure proportion, such as proportion black or proportion Democrat. What I would like to emphasize here though is that the use of a measure of segregation is a distinct measure from a pure proportion or measure of diversity and when combined with a smaller geographic region, the model captures a contextual effect that cannot be measured by pure proportions measured across one level of aggregation. The correlation between these measures demonstrates this empirically. But first simply consider my two-level approach from a modeling perspective: measuring only a single proportion leaves a certain type of ecological inference problem. That is if a person is living in a county or other large aggregation that is measured by a certain proportion, say percent black, and it is estimated that percent black is systematically related to a behavior, say turnout, it is still not known what the immediate context of that individual is. That individual could not live in a neighborhood that has the population proportions expected to affect turnout. It could be that the percent black in the neighborhood of that individual is very low or very high. Unless we believe that only the larger aggregation, like a city affects behavior, then there is problem with only using the larger level of aggregation. In reality, what a researcher is measuring is that probability that an individual living in an area with certain contextual proportions will behave, regardless of how those proportions affect that individual. The model in this paper does not entirely avoid this problem but it does help that this model relies on smaller levels of aggregation. Additionally, unless we believe that individuals are affected only by one context, single level measures are unsatisfying. To take a blunt example; an individual in California is both a Californian and an American and their behavior is probably reflective of both.

[5] Occasional exceptions, such as Campbell (2006), do employ proportions across more than one geography, but they do so using highl levels of aggregation, such as state and county, which is very unlikely to, and indeed do not, capture the effect I describe here. Additionally, they provide no theoretical expectation for why context should have different effects on different levels of aggregation. Oliver and Wong (2004) suggest that "when comparing the impact of contact and conflict across racial environments, the racial composition of both the macro and micro contextual unit needs to be considered. (p. 570)". Their model includes racial composition at the census block level and a dummy variable for each of the three cities in their sample. It is unclear if the modeling of a dummy variable for only three different cities would capture the effect I model here.

Segregation and proportions are not the same measure. An examination of correlations shows this. Table 1 shows the Pearson correlations for the NBES sample between the three measures of residential segregation and the composite measure (see below) for non-Hispanic Blacks used in this study and the MSA and zip code percent of non-Hispanic Blacks. The correlation between Absolute Concentration and proportion black is high relative to the rest, but is negative (-.598).[6] Furthermore, diversity at the city level and the zip code level are not the same thing. The correlation between percent non-Hispanic black in MSA and zip code is .27.

The proper measure of segregation is important to testing my hypothesis. I have asserted that the best way to predict participation on a level larger than that of the neighborhood in which social networks can operate is not by simple homogeneity but by a measure of segregation. Therefore, it is important that I do not use a measure of segregation that is simply another measure of sameness. Douglas S. Massey and Nancy A. Denton (1993), in their seminal work on segregation in the United States identify five separate dimensions of segregation. These are evenness, exposure, clustering, centralization, and concentration. Subsequent literature, such as Glaeser and Vigdor (2001), have identified some of these dimensions as more important than others depending on the desired measure. In a critique, Reardon and Sullivan (2004) demonstrate that measures of segregation are either *spatial* or *aspatial* measures. They show that aspatial measures "define the social environment of each individual", while spatial measures "quantify the extent to which these social environments differ across individuals" (p. 123). Borrowing from the analogies of Reardon and Sulliva, as well as others, the difference between these two concepts can be pictured as a checkerboard. If each black or white piece is a neighborhood, aspatial measures capture the composition of each piece, that is how black or white is the composition of that individual piece. Spatial measures define the relationship of each of these pieces to the others on the board. Moving the pieces around on the board would alter the spatial measures, but would not alter the aspatial measures. For this reason, aspatial measures have often been criticized for not accurately measuring all aspects of segregation. A measure of proportion is an aspatial measure of segregation. Of Massey and Denton's dimensions, evenness and exposure are aspatial dimensions, while clustering, centralization, and concentration are spatial. This is a useful distinction for my model. The mechanism of

[6] In the entire population of MSA's in the United States, the correlations are similar, although Absolute Clustering Index is significantly more correlated with percent black at .54.

competition should be predicted by spatial measures that define the spatial relationship of groups that are potential political rivals, while the mechanism of communication should be predicted by aspatial measures that define the spatial relationship of potential politically allied individuals.

For aspatial measures that affect communication in this model, instead of using the measures of evenness and exposure of a city, I use the simple homogeneity of the individual's zip code. This serves the same purpose but at a more exact level of aggregation and a level at which it would be reasonable to expect that social networks can operate to increase participation. Clustering, centralization, and concentration then are the measures which my model uses to predict participation motivated by competition. Massey and Denton describe these three measures:

> "neighborhoods may be tightly *clustered* to form one large contiguous enclave or scattered about in a checkerboard fashion; they may be *concentrated* within a very small area or settled sparsely throughout the urban environment. Finally, they may be spatially *centralized* around the urban core or spread out along the periphery. (p. 75)"

The Census Bureau definition of these measures and their mathematical construction is described in the appendix. Figure 2 is a graphical representation of the relationship between these measures of segregation. Each individual figure is a representation of a relatively high level of a single measure and a relatively low level of another. In this figure, each circle represents a neighborhood. The black and white circles are homogeneous neighborhoods with a high proportion black and white respectively. Figure 3 represents the difference between neighborhood homogeneity, homogeneity of a city, and spatial segregation. The gray circles in the left-hand figure represent heterogeneous neighborhoods that are aggregated together in a single MSA that has a black majority, but low spatial and aspatial segregation. The right-hand figure represents an MSA with extremely homogeneous neighborhoods, that is high aspatial segregation, but low spatial segregation because of the spatial integration of the homogeneous neighborhoods.

In my model, clustering, centralization, and concentration are combined into a single multiplicative measure called Spatial Segregation Index that is on a scale of 0 to 1.[7]

[7] Centralization has a range of -1 to 1. Negative one indicates extreme segregation away from the center, while 1 indicates extreme segregation to the center. Both phenomena should have the same effect in this theory because both periphery and central segregation create the conditions for competition between groups. Because the effect is theorized to be the same, the absolute value of this measure is used in order to maintain the 0 to 1 range of the

Theoretically, it seems that these three measures are dependent on each other in a multiplicative way.[8] For the 125 MSA's used in this sample, the Spatial Segregation Index ranges from almost zero (.002) to .587. The largest clustering of observations is in the New York MSA with a Spatial Segregation Index of .365 and 44 observations. Twenty-seven observations were gathered in the Detroit MSA, which has the highest level of segregation at .587. The mean Spatial Segregation Index is .252 and the median is .249. The distribution of the Spatial Segregation Index can be seen in Figure 4.

As a measure of diversity, some scholars have used the Gini Index. I maintain, as I have for the use of pure proportions, that the Gini Index, as an aspatial measure of segregation does not capture the same phenomenon as I describe in this model because it is not a spatial measure of segregation. Although the Pearson Correlation between the Gini Index and both the individual measures used to create the multiplicative index and the index itself are quite high in some cases (see Table 2), the Gini Index is not theoretically the same concept. In results not reported here, I have found in regression analysis that the Gini Index does not appear to be related to individual voting behavior, nor does it improve the overall goodness of fit of the models in this paper when used in place of the Spatial Segregation Index.

MODELS AND MEASURES

The 1996 NBES included 1216 voting-age African-American respondents. Of the 1216 cases, only those which could be matched with a specific zip code are useful to this study. Cases were discarded because of non-response to the zip code question or responses which could not be found in U.S. Census or U.S. Postal Service zip code databases. The latter were assumed to be coding errors.[9] After deletion of the cases which could not be matched, 696 cases remain. The dependent variable is self-reported turnout in the 1996 Presidential election.

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multiplicative index that was created using this measure. However, this is of no consequence for this paper because all MSA's in the sample have a measure of centralization greater than 0.

[8] The Pearson correlation coefficients for these measures are in this table.

	Clustering	Concentration
Centralization	0.388	0.436
Clustering		0.352

[9] Two reported zip codes were matched to the nearest possible zip code in the databases through inference about what was intended to be coded.

The segregation data and contextual control variables in this model are taken from the U.S. Census. I include individual level covariates of voting, as commonly identified (see Wolfinger and Rosenstone, 1980) and I also include contextual control variables at both the zip code and MSA level. The construction of these variables and individual level control variables are described in the appendix.

Contextual measures of poverty and wealth inequality are included in two of the four models estimated here. The percent poor at the zip code level and Gini index for the MSA are included. The expectation of the effect of community poverty on participation is not clear. Costa and Kahn (2003) find wealth equality to be a significant determinant of certain civic activities in many of the studies they review. Cohen and Dawson (1993) found neighborhood poverty, when it reaches a certain threshold, to effect some political participation. But they do not study voting and do not use a continuous measure of poverty, instead dividing it up into poverty thresholds, for which they find a statistically significant relationship for only some. I make no a priori assumptions about the effect of communal poverty on participation. There is reason to believe that it could depress turnout beyond the already strong effect of individual poverty in depressing turnout. It is not clear though that class or income level is a salient political identity in the United States. Generally, there is evidence that an individual's identity can be greatly affected by the political salience and relative minority status of a particular identity (see Huddy, 2003 for a review of this research). It seems that in the last several decades in the United States, race has certainly been a more salient identity than income or class. Indeed, the nature of segregation in the United States, that it cuts along both racial and economic lines, could contribute to this. Contextual measures of wealth inequality are also different in nature than the other contextual control variables included in this model because they partially rely on an identity component. From an individual's perspective, outside of resource allocation from elites, contextual poverty only matters to participation if they identify with their class or income. Population density is a control variable in this model, for example. There is no need for individual identity to be salient for an individual to be affected by population density. Because there is no clear theoretical expectation, I will estimate models with and without the contextual poverty and income variables.

A recent article by Chong and Kim (2006) shows that individual economic status affects support for racial and ethnic group interests. They interact economic status with individual

experiences of racism to predict preferences on issues related to racial solidarity. I have suggested, although I do not test here, that feelings of racial solidarity, similar to the theories described by Dawson, could be an aspect of the importance of racial context in political behavior. It is possible then that individual income could have a similar effect on behavior when interacted with an individual's immediate racial context. For this reason, two models will be estimated that include an interaction term of percent black in the zip code and log income. It seems reasonable that there will be a systematic relationship between individual characteristics, contextual characteristics, and participation that is interactive between the individual and contextual level. In fact, the very premise of the theory I have proposed here relies on an implied interaction between the individual characteristic of race and contextual measures. However, because the variables of interest in this theory are contextual, I remain agnostic about the presence of an interactive effect between income and racial context and will estimate models with and without this term.

There is a matter of model assumptions in this theory that must be explained. As stated, my theory might be interpreted to imply that the there is an interactive relationship between the percent black on the local level (the zip code) and segregation at the larger level (the city). This might imply that the effect of living among a more homogenously black neighborhood at high levels of segregation is different than the effect of living in the homogenously black neighborhood at low levels of segregation. This is not my claim, although I do not dismiss that it might be a valid model. My theory is that of an additive model. The implication is that a black individual living in a more homogenously black area will be more likely to participate than a black individual living in a less homogenous area due to the mechanisms associated with communication, ceteris paribus. Equally, a black individual living in a more segregated area will be more likely to participate than an individual living in a less segregated area because of the mechanisms associated with conflict. Therefore, an individual living in a neighborhood with high homogeneity and high segregation will vote more than one with high homogeneity and low segregation, but not because of the effect of segregation on the effect of homogeneity. Communication should be utilized whether segregation exists or not.

To summarize, I estimate four models, two with contextual income variable and two without. One of each of these pairs includes an interaction term between log income and percent

black in the zip code. I test my hypotheses by constructing logit generalized linear models (GLM). I describe these models below for the VOTE of person *i*:

$$VOTE_i \sim f_{bernouli}(vote_i \mid \pi_i)$$

where

$$\pi_i = g(x_i, \beta_i)$$

such that

$$\pi_{\mathbf{i}} = \frac{1}{1+e^{(-x_i\beta)}}$$

I have propsed four models of XB :

basic model :

$$x_i\beta = City_{\mathbf{segregation}_i}\beta_0 + neighborhood_{\mathbf{homogeneity}_i}\beta_1 + X_{\mathbf{individual}_i}\mathrm{B}_{\mathbf{individual}} + X_{\mathbf{contextual}_i}\mathrm{B}_{\mathbf{contextual}}$$

basic interaction model :

$$x_i\beta = City_{\mathbf{segregation}_i}\beta_0 + neighborhood_{\mathbf{homogeneity}_i} * income\beta_1 + X_{\mathbf{individual}\,i}\mathrm{B}_{\mathbf{individual}} + X_{\mathbf{contextual}_i}\mathrm{B}_{\mathbf{contextual}}$$

contextual poverty model :

$$x_i\beta = City_{\mathbf{segregation}_i}\beta_0 + neighborhood_{\mathbf{homogeneity}_i}\beta_1 + gini\beta_2 + neighborhood_{\mathbf{poverty}_i}\beta_3 + X_{\mathbf{individual}_i}\mathrm{B}_{\mathbf{individual}} + X_{\mathbf{contextual}i}\mathrm{B}_{\mathbf{contextual}}$$

contextual poverty interaction model :

$$x_i\beta = City_{\mathbf{segregation}_i}\beta_0 + neighborhood_{\mathbf{homogeneity}_i}\beta_1 * income\beta_1 + gini\beta_2 + neighborhood_{\mathbf{poverty}_i}\beta_3 + X_{\mathbf{individual}_i}\mathrm{B}_{\mathbf{individual}} + X_{\mathbf{contextual}i}B_{\mathbf{contextual}}$$

In these four models $X_{indiviudal}$ is a matrix of individual level controls and $X_{contextual}$ is matrix of contextual control variables measured at both the MSA and zip code level. The basic model has no interaction and does not include the variables for contextual poverty and income distribution. The basic interaction model includes the interaction between individual income and neighborhood homogeneity. The contextual poverty model and contextual poverty interaction model include the variables for contextual poverty and income distribution and the contextual poverty interaction model includes the interaction term.

All variables, with the exception of age, education, and income, have been scaled from 0 to 1 for ease of interpretation. I have calculated robust clustered standard errors to account for

possible homogeneity of error structure due to the clustering of observations within MSAs.[10] Because of the imputed data, the coefficients and standard errors are estimated independently using 20 different data sets and combined using the model described by Honnaker, King, and Blackwell (2006). Estimation was performed in R with standard errors calculated using a modified version of the Sandwich package by Zeileis (2006). All subsequent simulations were executed by code generated by me.

RESULTS

The results of regression analysis of all four models generally support the hypothesis. Table 3 displays the coefficient and standard error estimates for these models. The model specification does have some effect on the estimates. The estimated effect of Percent Black in Zip Code changes across models, both with and without the interaction. Comparing the models suggests that Percent Black in Zip Code does predict turnout however the effect is interactive with personal income (*basic interaction model*) and contextual poverty (Percent Poor in Zip Code) and wealth inequality MSA Gini Index) diminishes the effect (*contextual poverty model and contextual poverty interaction model*). Table 4 highlights the z-scores and associated p-values of statistical significance in order to demonstrate the general stability of these estimates. The estimated effect of Spatial Segregation Index remains stable across all models. Data limitations leave the result with uncertainty that is not unexpected with the limited number of cases and the necessity of expanding the estimates of the standard errors due to clustering. Percent Black in Zip Code is less stable. It achieves the conventional standard of statistical significance in one model and comes close in two others; however the uncertainty of the estimate for this variable in the *contextual poverty model* is too large for it to be reasonable to make inferences from this model.[11]

That the effects come close to achieving the conventional standard of statistical significance is promising for this model. Crane (1989) has argued that estimates of effects of neighborhood in regression analysis are *necessarily* biased downward because the arbitrary

[10] The MSA with the largest number of observations is New York with 44. The mean number of observations per MSA is 5.57, the median is 2 and the modal number is 1.

[11] The instability in the estimates of Percent Black in Zip Code may be a result of the relatively high correlation between contextual poverty and contextual percent black when measured on the zip code level when Percent Poor in Zip Code is included in models 2a and 2b. The correlation between these two variables is .58. It is important to note too that despite instability in the Percent Black in Zip Code caused by the introduction of the contextual poverty variables, the coefficients for Spatial Segregation Index remain virtually unchanged.

delineation of neighborhoods aggregates true sociological neighborhoods, which would not be expected to share a consistent effect on individual behavior, into a larger artificial unit of aggregation. This causes the estimates to actually be the weighted averages of many true sociological neighborhoods. The greater coefficient estimate for Spatial Segregation than Percent Black in Zip code could be partially a result of Spatial Segregation being measured on the MSA level which is a geographical aggregation that takes into account geographic and social boundaries when being defined. The less arbitrary nature of the MSA than the zip code may mean that it is less subject to the aggregation bias proposed by Crane.

These findings suggest hypothesis 2 is correct, that participation for African-Americans will increase with increased segregation at the city level. The findings also suggest that hypothesis 1 can be accepted, that is that participation for African-Americans will increase as neighborhood homogeneity, measured at the zip code level, increases. This also reinforces the recent findings by Chong and Kim (2006) which suggested that individual poverty interacts with context to affect behavior and opinion. It is also significant for the earlier findings by Cohen and Dawson that contextual poverty is an important element of a model of individual participation. While the estimates of MSA Gini Index and Percent Poor in Zip Code do not yield estimates that can be separated from a null effect in such a way that inferences can be made, these variables do affect the estimates of other key variables. Furthermore, a Chi-squared Test of the difference in Log Likelihood of the models indicates that including the contextual poverty and inequality variables makes a statistically significant reduction in the variance of the models. It seems then that Cohen and Dawson were correct in including these measures, but that it is possible that the effect they attributed to contextual poverty was actually the effect of contextual racial homogeneity and segregation. This cannot be concluded with certainty in this paper though because Cohen and Dawson use census tract level measures of contextual poverty and the comparison across different levels of aggregation might not be valid. When it can be more directly tested what the proper size of “neighborhood” is, then these inconsistencies might be more readily explainable. There is both reason to believe that a census tract is too small of a measure and that a zip code is too large. However, the two key theoretical insights of this paper, that racial context should be measured across more than one size of aggregation and that spatial segregation better explains context than simple diversity, are unaffected by this inconsistency.

It should also be noted that when Percent Black in MSA (not Percent Black in Zip Code) is included in a regression with the Spatial Index of Segregation that the estimated coefficient for segregation is not only larger than that for percent black (an average across all models of 1.62 versus .944, both variables are on a 0-1 scale), but segregation is related to the dependent variable in such a way that it can reasonably be assumed that the relationship did not occur by chance, while there appears to be no relationship between MSA percent black and turnout with these controls (z-score of 1.59 versus .296 across all models, z-scores Percent Black in MSA not reported in table). This is important because previous research has modeled political participation and other behavioral dependent variables, including racial attitudes, as being dependent on racial proportion or fracturalization, at similar levels of aggregation, such as the county. It appears that what these previous studies may have been approximating was not simply how the proportion of a given race affects individual behavior, but instead the effect of how a given racial group lives spatially vis a vis other racial groups. The evidence from the test presented here indicates that contextual homogeneity, on a level larger than a neighborhood, will not adequately explain individual behavior. Instead, models should include a measure that captures the competition generated by spatial segregation.

The findings here also have implications for the important work of Verba and Nie (1972), which argued, as mentioned above, that the isolation of a community increases participation because residents have a greater incentive to be concerned with matters within the community rather than external to the community. The two-level model that I have tested here suggests that some of Verba and Nie's findings may be a result of, not only a process within a community, but also the external force of competition between communities. I find support for both forces in the model used here in that there appears to be a causal relationship between the context of both a local community and its spatial relationship with other communities.

Looking at the substantive expectations of these estimates demonstrates the important implications of this theory. Table 5 displays the expected probability of turnout for African-Americans in 1996 at different levels of city segregation and neighborhood homogeneity. The table displays the expected values of turnout generated by the four models using the first and third quartiles of segregation and homogeneity. The cells contain the expected probability of voting and the 95 percent confidence interval of the estimates, which were generated by

simulating 10000 draws from the coefficient distribution.[12] In order to generate quantities of interest across values of the explanatory variables realized in the United States, I represent values based on quartiles of the U.S. African-American population rather than the sample. This yields values of more substantive interest, but makes little difference in interpretation. In the United States, 25 percent of urban-dwelling African Americans live in MSA's with a Spatial Segregation Index of less than .118, while the most segregated 25 percent lives in MSA's with a Spatial Segregation Index of more than .365. The 25 percent of African-Americans that live in the least homogeneously black neighborhoods live in zip codes in which under 19.7 percent of the residents are black, while the 25 percent in the most homogenously black neighborhoods live in zip codes in which over 76.3 percent of the residents are black. These are the values of the causal variables used to generate the expected values of turnout reported in the table.

There is very little difference in expected values across models, indicating that the substantive implications of this theory are not sensitive to the marginal changes in model specification. In each model, the results are precisely as were predicted in Figure 1. The expected probability of voting at different realizations of segregation and homogeneity reveal that *high segregation and high homogeneity > high segregation and low homogeneity > low segregation and high homogeneity > low segregation and low homogeneity.* Figure 5 demonstrates the expected probability of voting across all values of spatial segregation in the United States with estimates produced by the *basic model*. In this figure, the two horizontal lines represent the changing probability of voting as the MSA Spatial Segregation Index changes at two different levels of neighborhood homogeneity (Percent Black in Zip Code) while all other independent variables are held at their means. The blue line represents the neighborhood homogeneity experienced by the .25 quartile of the United States African-American population; the red line is the homogeneity experienced by the .75 quartile. Each line is bounded by vertical lines representing the 95 percent confidence intervals of these estimates based on 10000 simulations. It can be seen that the expected probability of voting for the .75 quartile of

[12] The values generated by simulation might be higher than one would find intuitively satisfying. However, this is likely a result of inflated reports of turnout (see footnote 16 in Appendix 2). That the variable on turnout is perfectly observed, with no non-reports makes it almost certain that there is misreporting of turnout by respondents, probably biasing the mean turnout upwards. This would cause unnaturally inflated expected values to be generated by simulation. There is no reason to believe, however, that self misreporting is correlated with any of the independent variables in the model, so the difference observed in turnout as the independent variables change should not be affected.

neighborhood homogeneity is always greater than the expected probability for the .25 quartile and both are increasing across the entire range of the Spatial Segregation Index.

This table and figure also indicate the important substantive finding that the contextual effect of segregation has a greater impact on participation than neighborhood homogeneity. Moving from low segregation to high segregation has a greater effect in every model than moving from low neighborhood homogeneity to high neighborhood homogeneity. However, the difference in these estimates should be considered in light of Crane's argument about the downward biasing effect of arbitrary aggregation discussed above. The table also reveals that moving from low neighborhood homogeneity and low city segregation to high neighborhood homogeneity and high city segregation has a substantively large effect of between 7.3 to 11.5 %, depending on the model.

The importance of this effect is potentially large. The United States remains a society with significant and socially troubling amounts of de facto segregation. Indeed, public institutions and political units, such as schools and cities, often display a remarkable degree of spatial and aspatial segregation. There is a paradox involved here in that in the United States, segregation is most often associated social ills for racial minorities. If politicians are more likely to respond to those that politically participate and segregation is also causally related to political empowerment, then this poses a challenge for public policy: a country, such as the United States, that generally equates greater participation with healthier democracy will have to simultaneously promote the socially desirable end of integration, while doing so potentially concurrently reduces participation, one of the contributing factors of empowerment.

APPENDIX 1: MEASURES OF SEGREGATION

The Census Bureau defines there three measures as follows (U.S. Census Bureau 2005):

Absolute concentration: The total area inhabited by a group and compares this with the minimum and maximum areas (the areal sum, respectively, of the fewest number of the geographically smallest and the greatest number of the geographically largest areal units) that could accommodate a group of that size (at observed densities). The index varies from 0.0 to 1.0, where a score of 1.0 means that a group has achieved the maximum spatial concentration possible (all minority members live in the smallest areal units).

Absolute centralization: The distribution of the minority group around the center and also varies between -1.0 and 1.0. "Positive values indicate a tendency for [minority] group members to reside close to the city center, while negative values indicate a tendency to live in outlying areas. A score of 0 means that a group has a uniform distribution throughout the metropolitan area" (Massey and Denton, p. 293).

Absolute clustering: "expresses the average number of [minority] members in nearby [areal units] as a proportion of the total population in those nearby [areal units]", where distances between areal units are measured from their centroids (Massey and Denton, p. 294). It varies from 0.0 to 1.0.

If:

n=the number of areas (census tracts) in the metropolitan area, ranked smallest to largest by land area; n2=rank of area where the sum of all t_i from area n (largest in size) down to area n2 is equal to X

x_i=the minority population of area i; X=the sum of all x_i (the total minority population)

a_i=the land area of area i; A=the sum of all a_i (the total land area)

t_i=the total population of area i; T1=the sum of all t_i in area 1 up to area n1; n2=rank of area where the sum of all t_i from area n (largest in size) down to area n2 is equal to X

c= the exponential transformation d_{ij}, the distance between area i and area j centroids, where $d_{ii} = (0.6a_i)^{0.5}$

The formulas for each are as follows:

Absoluate Concentration :

$$1-\frac{\sum_{i=1}^{n}\frac{x_i a_i}{X}-\sum_{i=1}^{n1}\frac{t_i a_i}{T_1}}{\sum_{i=n2}^{n}\frac{x_i a_i}{T_2}-\sum_{i=1}^{n1}\frac{t_i a_i}{T_1}}$$

Absolute Centralization :

$$\sum_{i=1}^{m}(X_{i-1}A_i)-\sum_{i=1}^{m}(X_i A_{i-1})$$

Absolute Clustering :

$$\frac{\sum_{i=1}^{n}\left(\frac{x_i}{X}\sum_{j=1}^{n}c_{ij}x_j\right)-\left(\frac{X}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}c_{ij}\right)}{\sum_{i=1}^{n}\left(\frac{x_i}{X}\sum_{j=1}^{n}c_{ij}t_j\right)-\left(\frac{X}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}c_{ij}\right)}$$

APPENDIX 2: VARIABLE CONSTRUCTION

The contextual data for this study is taken from the U.S. Census. Matching individual level cases to zip code level contextual data is of key importance to this analysis. There is a difficulty in matching because the 1996 survey was administered in between the 1990 and 2000 so that neither decennial Census will be entirely accurate. To estimate the contextual variables in November 1996, I simply calculated all contextual level data at the value it would be if there was linear, continuous change between 1990 and 2000. That is the 1990 value plus seven-tenths of the difference between the 1990 and 2000 values ($Census_{1990}$+ .7*($Census_{2000}$- $Census_{1990}$)). While this is not a perfect measure, it probably is a better estimate than using either of the decennial Censuses alone. The use of the estimated 1996 data was tested against using the 1990 and 2000 data alone and it does not result in regression estimates that are substantively different.[13] The only exception to this data construction is with the zip code level population density which was calculated using 2000 Census data only for the zip code area because 1990 zip code area size is unavailable.

Zip codes boundaries and designations do change and the Census changed its entire definition of a zip code between 1990 and 2000. In 2000 zip codes became Zip Code Census Tabulation Areas (ZCTA's) which are used only by the Census, not the United States Postal Service. The ZCTA's do not follow the zip codes exactly and are instead aligned to follow other census geographic boundaries. This surely causes some inaccuracy in the comparison of the 1990 and 2000 contexts. However, most changes were very small and it seems safe to assume that the changes from zip codes to ZCTA would be distributed randomly across the sample. There were 28 zip codes from 1990 and 6 from 2000 that did not exist when the other census was administered. For this reason, the data from only one census was used.

To control for additional contextual causes, other than homogeneity in the zip code and segregation in the MSA, that could account for the variance in the dependent variable several contextual measures at the zip code and MSA level are included. These are the log of population density in the zip code and MSA, log of the African American population count and whole

[13] My use of the estimated 1997 data is based on the assumption that any population changes are roughly linear during the 1990 to 2000 decade. I believe that modeling this as linear is a reasonable assumption. A shock could obviously cause migration, birth, or death patterns to behave in a non-linear fashion over a ten year period. For example, from 1910 to 1920, it would be foolish to assume that change proceeded linearly because of the tremendous surge in internal migration and the influenza plague towards the end of the decade. However, from 1990 to 2000, there is no apparent reason that the assumption of linear migration does not adequately represent the population changes well enough that it would not be preferable over using data from 1990 or 2000.

population count in the MSA, and a dummy variable for whether the observation is the resident of the central city of an MSA. There is also a dummy variable for observations in the Southern states. In addition to being a necessary control in most American politics behavior studies, it is necessary because of the difference in the historical and resultant modern spatial structure of racial segregation in the North and South in the United States (Massey and Denton 1993). Additionally, a variable for the presence of a black mayor is included following the analysis by Bobo and Gilliam (1993) which suggests that the presence of a black mayor creates empowerment in African-American communities that increases turnout. The presence of this dummy variable will control for any possible spurious effect being attributed to segregation that is actually the result of empowerment through a black mayor. The list of black mayors is taken from the Joint Center for Political and Economic Studies (Bositis 1997). Following Bobo and Gilliam, I code the individual as living in a city with a black mayor if the mayor was the mayor of the "largest city" (p.390) in the Metropolitan Statistical Area.[14]

Ideally, the estimation of this model would control for the contextual political heterogeneity as well. There is a difficulty in this however because election returns are usually only available when aggregated by the county as the smallest unit. To control for political heterogeneity then would require the introduction of yet a third level of aggregation, which may not as well capture the mechanisms described in this theory. Previous work, such as Campbell (2006) has shown that political context is a significant predictor of participation. However, there is no theoretical reason to believe that political context should affect the estimates of racial context in such a way that omitting it, in order to limit the levels of aggregation in the data, is not preferable to including it in order to strive for full specification.[15]

Individual level variables for years of education, age squared, gender, and party identification, and the log of income are included. To control for political knowledge, which has been shown to be a significant predictor of participation, I construct additive measures of political information, as described by Zaller (1992).

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[14] Bobo and Gilliam use the "primary sampling units" from the 1987 General Social Survey and also use the Joint Center for Political and Economic Studies. I believe that my treatment of the variable should match their fairly reliably, but it should be noted that there were not only more black mayors in 1996 than 1987, but the NBES sampled respondents in more cities with black mayors then the General Social Survey.

[15] The alternative would be to measure segregation at the county level, but for reasons of data availability and the appropriateness of using the MSA in the contextual theory just described, this would not be preferable.

In preparation for the estimation, missing data was imputed for some individual control variables using the Amelia 2 program for multiple imputation (Honnaker, King, and Blackwell 2006). Individual income data included 5.6% missingness, while no other variable included more than 2% missing data. In most cases, "no response" and "don't know" were coded as missing. However, in the political information variable "don't know" were simply coded as the minimal response. No independent variable or contextual variables were imputed. Twenty imputed data sets were created. [16]

[16] It is worth noting that the NBES reports no "don't know" or "no response" responses to the question "Did you vote…". These answer options were available and were used by respondents in other questions. Even with over-reporting of voting, it is doubtful that all 1216 of the original respondents answered the question "yes" or "no". Whether the NBES coders corrected non-responses or the surveyors were instructed to press the non-respondents on that question but not others, is not known. However, assuming whatever corrections the NBES made were random, this should be of little consequence to the results. It probably inflates expectations of turnout, but would not affect the estimated effects of explanatory variables.

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Figure 1: Theoretical Expectation of Voting While Segregation and Homogeneity Vary

		city segregation	
		low	*high*
neighborhood homogeneity	*low*	**a**	**b**
	high	**c**	**d**

Table 1: Pearson Correlations Between Measures of Segregation and Proportional Measures of Diversity

Spatial Measure of Segregation	MSA Percent Black	Zip Code Percent Black
Absolute Centralization Index	0.022	0.176
Absolute Clustering Index	0.108	0.342
Absolute Concentration Index	-0.598	0.053
Spatial Segregation Index	-0.022	0.328

Table 2: Pearson Correlations Between Measures of Segregation and Gini Index

	Gini Index
Absolute Centralization Index	0.475
Absolute Clustering Index	0.845
Absolute Concentration Index	0.555
Spatial Segregation Index	0.857

Figure 2: Measures of Segregation

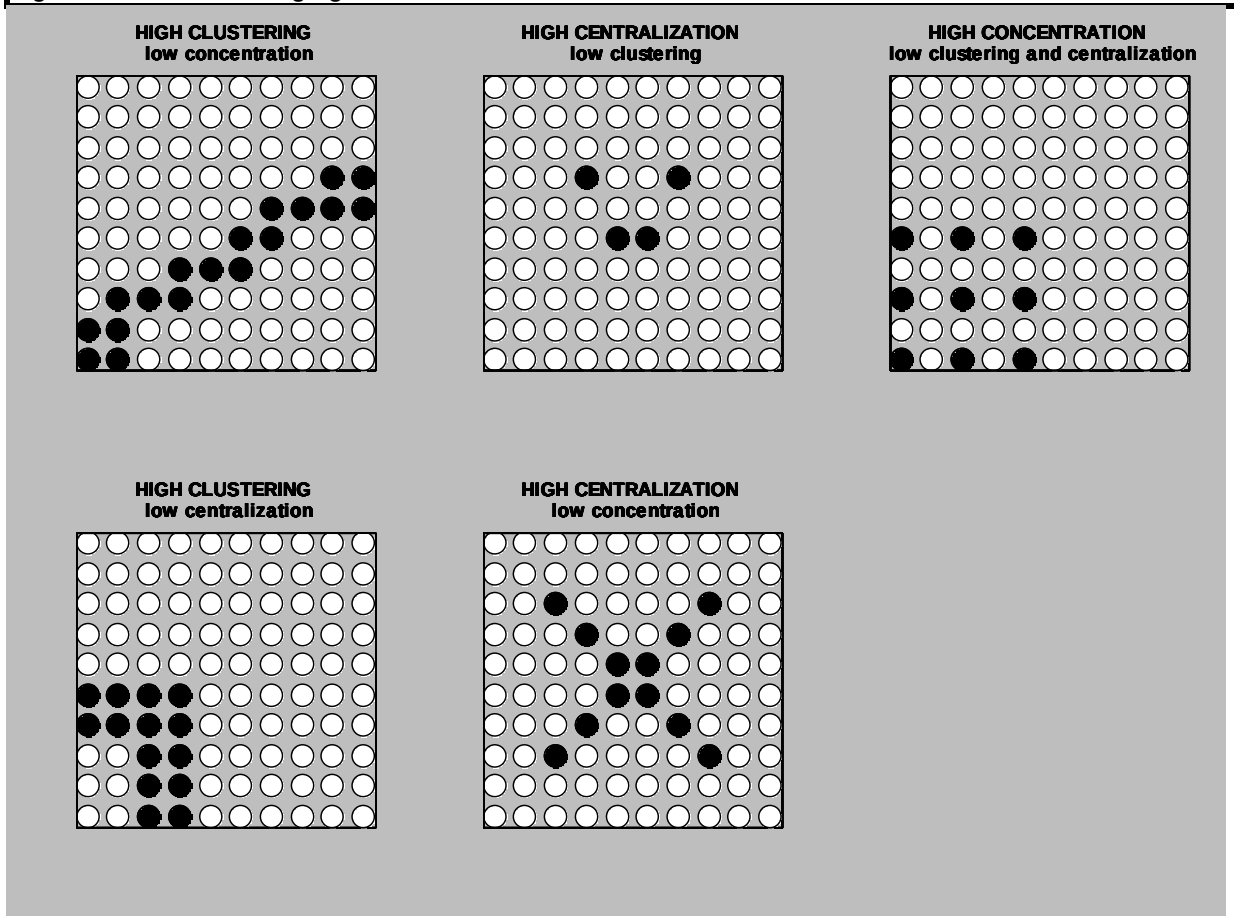


Figure 3: Homogeneity and Segregation

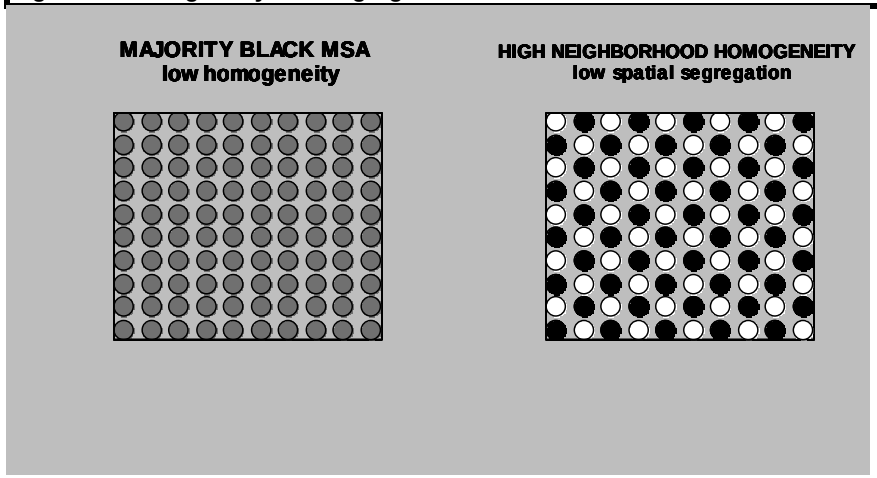


Table 3: Estimated Regression Coefficients for the Effect of Contextual Variables on Individual Voting

		basic model	*basic interaction model*	*contextual poverty model*	*contextual poverty interaction model*
Key Explanatory Variables	Spatial Segregation Index	1.676* (0.999)	1.581 (0.998)	1.649 (1.039)	1.57 (1.038)
	Percent Black in Zip Code	0.567 (0.432)	7.177* (4.206)	0.164 (0.509)	5.96 (4.087)
	Log Income	0.029 (0.145)	0.332* (0.201)	0.046 (0.146)	0.307 (0.204)
	Percent Black in Zip Code * Log Income	-	-0.652* (0.372)	-	-0.569 (0.365)
Individual Control Variables	Education	0.446*** (0.069)	0.449*** (0.069)	0.46*** (0.07)	0.461*** (0.069)
	Age Squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
	Female	-0.300 (0.224)	-0.306 (0.225)	-0.300 (0.221)	-0.304 (0.222)
	Republican	-0.814*** (0.135)	-0.827*** (0.134)	-0.832*** (0.131)	-0.843*** (0.132)
	Political Information	0.133 (0.49)	0.121 (0.487)	0.168 (0.486)	0.154 (0.482)
	Rich (earns over $105,000 annually)	1.436 (1.478)	1.47 (1.598)	1.383 (1.506)	1.393 (1.604)
Contextual Control Variables	Log MSA Population	0.202 (0.614)	0.181 (0.619)	0.036 (0.609)	0.023 (0.61)
	Log MSA Black Population	0.13 (0.537)	0.153 (0.543)	0.249 (0.537)	0.265 (0.539)
	Percent Black in MSA	1.289 (3.196)	1.168 (3.225)	0.702 (3.149)	0.618 (3.162)
	Log MSA Population Density	-0.254 (0.239)	-0.247 (0.236)	-0.362 (0.265)	-0.352 (0.264)
	MSA Gini Index	-	-	5.612 (3.939)	5.396 (4.077)
	Black Mayor	-0.176 (0.26)	-0.156 (0.26)	-0.309 (0.275)	-0.288 (0.273)
	Log Population Density of Zip Code	0.043 (0.115)	0.049 (0.118)	-0.004 (0.117)	0.005 (0.119)
	Percent Poor in Zip Code	-	-	2.241 (1.628)	2.049 (1.596)
	Resident of Central City	-0.468 (0.387)	-0.483 (0.39)	-0.266 (0.384)	-0.288 (0.388)
	Southern Location	0.414 (0.424)	0.433 (0.433)	0.499 (0.418)	0.514 (0.427)
	Intercept	-6.163* (3.172)	-9.299** (3.828)	-6.921** (3.275)	-9.582** (3.881)
	-2* Log Likelihood	642.22	639.66	637.08	635.16

*Dependent Variable is Voting Participation in the 1996 general election. Robust clustered standard errors are in parentheses. N=696. * is p<.1, ** is p<.05, ***is p<.01*

Figure 4: Distribution of MSA Spatial Segregation Index

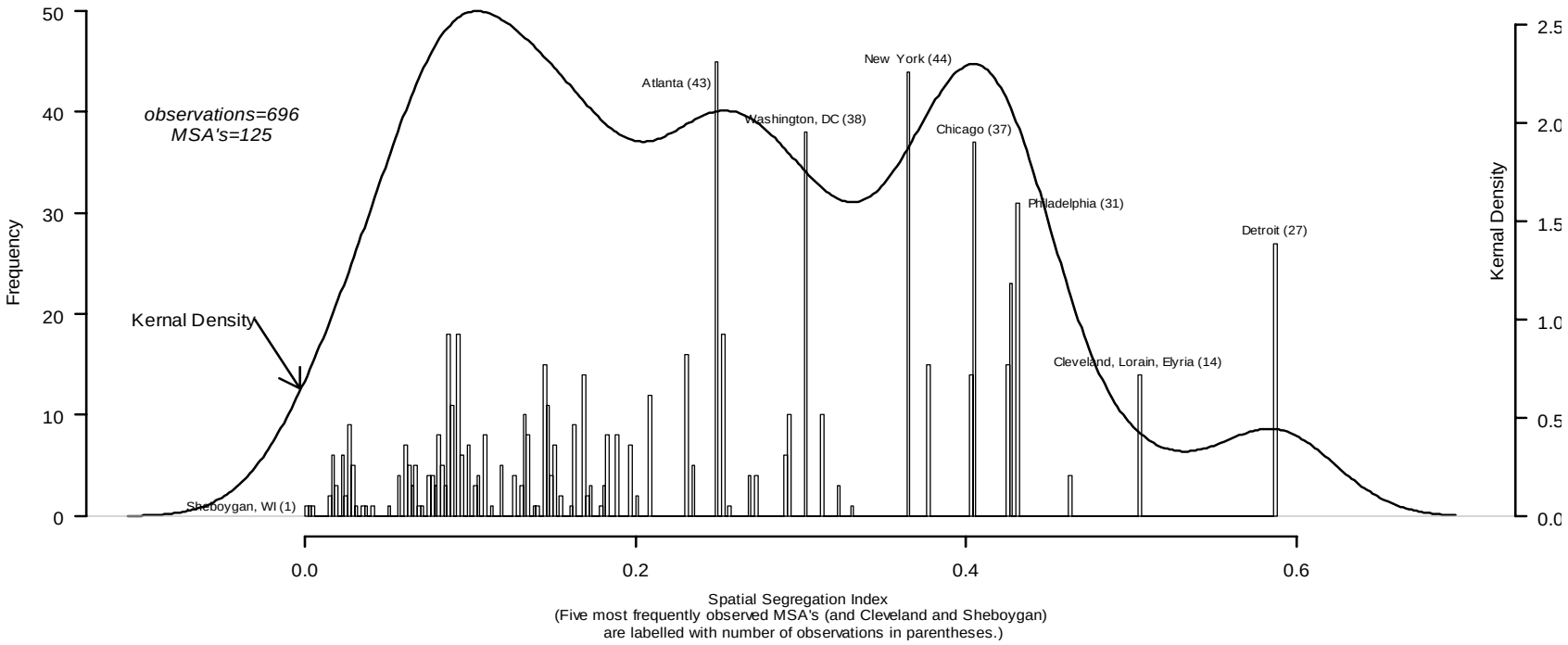


Table 4: Measures of Statistical Significance for Estimates of Explanatory Variables (z scores and p values)

	basic model	*basic interaction model*	*contextual poverty model*	*contextual poverty interaction model*
Spatial Segregation Index	1.678 (0.093)	1.586 (0.113)	1.583 (0.113)	1.513 (0.13)
Percent Black in Zip Code	1.313 (0.189)	1.706 (0.088)	0.321 (0.748)	1.458 (0.145)

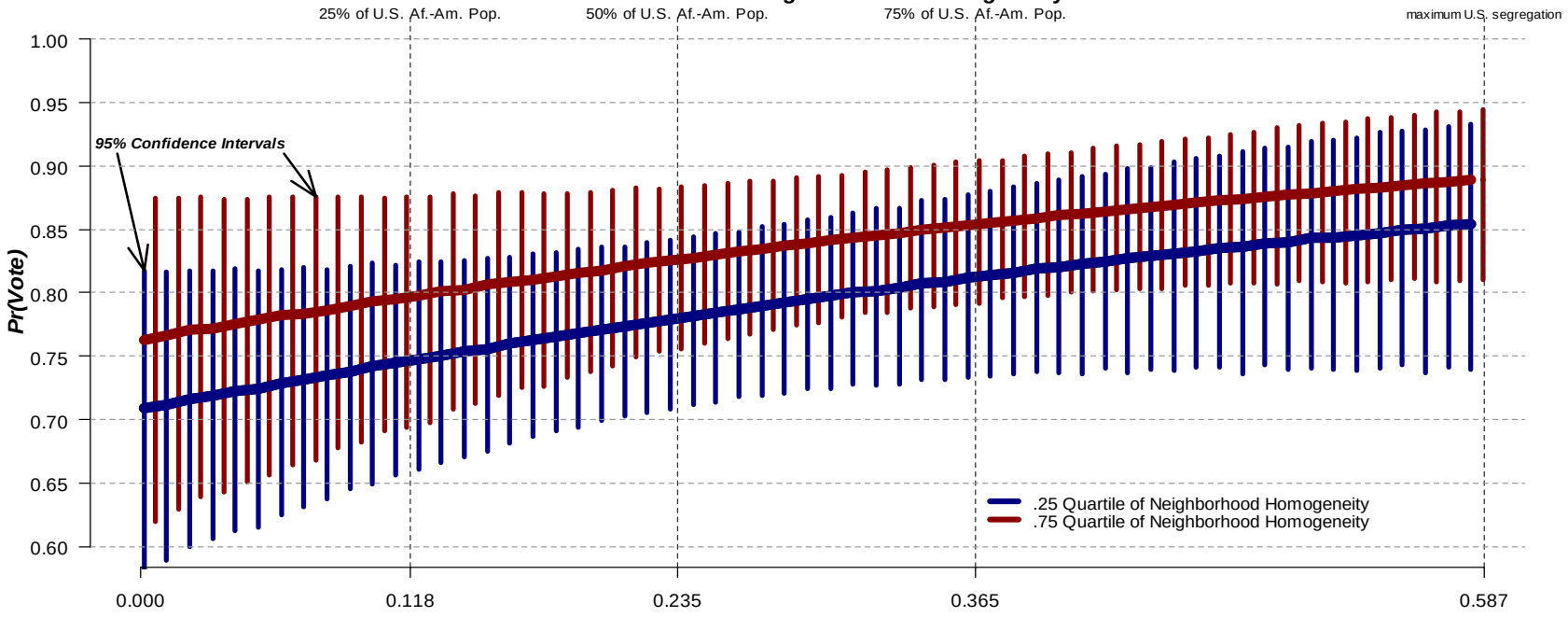
Cells contain z-scores of regression estimates, with the associated p-vlaues in parentheses. Standard errors are robust clustered.

Table 5: Expected Probability of Voting as Segregation and Homogeneity Change

		MSA Spatial Segregation (competition)			
		1st quartile (.118)	3rd quartile (.365)	1st quartile (.118)	3rd quartile (.365)
Zip Code Percent Black (communication)	1st quartile (.197)	***basic model*** 0.744 *(.656:.822)*	0.814 *(.738:.878)*	**basic interaction model** 0.745 *(.658:.822)*	0.815 *(.736:.880)*
	3rd quartile (.762)	0.799 *(.704:.876)*	0.859 *(.800:.908)*	0.797 *(.698:.876)*	0.855 *(.794:.904)*
	1st quartile (.197)	***contextual poverty model*** 0.768 *(.674:.846)*	0.833 *(.766:.890)*	***contextual poverty interaction model*** 0.768 *(.676:.846)*	0.830 *(.762:.890)*
	3rd quartile (.762)	0.782 *(.674:.870)*	0.844 *(.772:.902)*	0.781 *(.668:.872)*	0.841 *(.770:.990)*

Values in cells are expected probability of voting in 1996 national election based on 10000 simulations with all other variables held at mean values. Italicized numbers in parenthesis are 95% confidence intervals of the estimates calculated by robust clustered standard errors Quartiles are quartiles of U.S. African-American population. Numbers in parentheses in margins are values of independent varialbe at that quartile.

Figure 5: Expected Probability of Vote as MSA Segregation Increases at Two Levels of Neighborhood Homogeneity



Neighborhood homogeneity = percent black in zip code. All other variables held at mean. Expected values generated by 10000 simulations of the basic model.