

CHAPTER 3

METHODS

In order to study institutional change in local governance structures, the attributes of the constitutional-level institutional arrangement must be identified. Identification of change in the charter as a whole illuminates the fact that change has occurred, but does not tell us which rules have changed. Constitutional rules are the object of the collective effort by the community or the selective incentives of the institutional entrepreneurs. Thus, change in governance structure is explored at the level of individual constitutional rule.

The choice of methods to examine this dynamic process is not easy. There is a pull between the desire to maintain the importance of each case's integrity and the ability to include a large number of explanatory attributes. This is the pull of qualitative methods versus quantitative methods. Each tool provides the ability to illuminate different aspects of the process. Gary King, Robert Keohane and Sidney Verba (1994, 3) note that the differences between the two methods are in "style and specific technique" and that both methods, if employed properly, contain the "the same logic of inference." Employing the two different approaches should provide a clearer picture of the dynamic process.

Two methods will be used to explore institutional change at the constitutional level in local governance, a combination of case studies and Qualitative Comparative Analysis (QCA). QCA, provides a means to build and test the theory of which attributes, either present or absent in the local community, are necessary and/or sufficient for rule change to occur.

Section 3.01 explains the attributes of the model. Each attribute of outcomes, rules, actors, and local community context will be codified and their source and measurement will be discussed. Section 3.02 presents the Qualitative Comparative Analysis (QCA) method and justifies its usefulness to study charter change. Section 3.03 explains how the outcome attributes of constitutional change and the explanatory attributes are be measured and operationalized.

3.01 Definition of Attributes in Constitutional Change

The two forms local constitutional change, charter revision and consolidation, will be explored. Charter revision is a competitive but more traditional approach to change, whereas city-county consolidation involves a more revolutionary change in the local constitution. This will allow us to examine both charter change through legislation, litigation, and referendum and consolidation referendum to provide a test of the overall theory.

In order to study the change of institutional arrangements in local governance structures, the attributes of the constitutional level institutional arrangement must be explored. As noted above, change in the charter as a whole will only illuminate the fact that change has occurred, but not which rules have changed in response to the collective effort of the community or the selective incentives of the institutional entrepreneurs. Thus, in this study, change in the governance structure is explored at the individual constitutional rule level.

The study investigates change in the individual constitutional rules for all nine of the cities in Georgia and Florida that were included in Maser's (1998) study. These cities are part of 145 cities chosen by Maser to represent approximately one-sixth of all US cities that contained a minimum of 25,000 population in 1960, stratified by state with the following criteria:

The percentage of cases from each state equals that state's percentage of everyone in the nation living in cities with over 25,000 people. If a state's percentage was less than .05, one city with population over 25,000 in the state was selected at random and added to the sample (Maser 1985, 122).

Maser tracked these cities from 1950 to 1970 at three time periods. This study extends the tracking to 2000 and looks at each city for 51 years. These cities are presented in Table 3.01.

Table 3.01 Case Study Cities

Florida	Clearwater Jacksonville Miami Beach Pensacola Tampa West Palm Beach
Georgia	Athens - Clarke County Atlanta Macon

Consolidation cases will include all those cities in this sample that held a city-county consolidation referendum between the years 1950 and 2000. This provides a set of five cities with a total of twelve attempts between 1960 and 1990. Two attempts, Jacksonville in 1967 and Athens in 1990, were successful. Table 3.2 presents the consolidation cases.

Table 3.02 Consolidation Cases

Florida	Jacksonville – Duval County, successful in 1967 Tampa – Hillsborough, failed attempts in 1967, 1970, and 1972 Pensacola – Escambia, failed attempt in 1970
Georgia	Macon – Bibb County, failed attempts 1960, 1972, 1976 Athens – Clarke County, failed attempts 1969, 1972, 1982, and successful in 1990

Outcome Attributes: The Constitutional Rules

The dependent variable, change in the constitutional rule, is defined using the concept of procedural safeguards employed by Maser (1998) and Institutional Analysis and Development Framework (Ostrom 1990). The first dependent variable is the acceptance or rejection of a proposed constitutional rule. These could be either through legislative action, referenda, or litigation. The second dependent attribute is the acceptance or rejection of a proposed constitutional rule through referendum, this will indicate whether or not an attempt to change the local constitution was based on local collective action. These will be coded as binary attributes: 1 as acceptance of the proposed rule change and 0 for rejection. Acceptance or rejection of the proposed change through referendum will likewise be coded in binary terms: 1 for acceptance and 0 for rejection.

In addition to attempts to change the charter, the three procedural safeguards (electoral systems, direct democracy, and allocating authority) will be coded as binary variables indicating presence or absence of the safeguard. Direction of change is interpreted as either an increase or decrease in citizens control of government. The rules and rule measurement are provided in Table 3.03.

Table 3.03 Constitutional Rules

<i>Maser's Procedural Safeguard Rules</i>	<i>Maser's Rule Attribute</i>	<i>Description of Rule Measurement</i>
<i>Rules for Electoral Systems</i>	rules for representation voting jurisdiction	number of district representatives
		number of districts
		number of seats on the council
<i>Rules for Direct Democracy</i>	rules to decrease risk of coordination; division; defection	initiative provision and/or decrease in number of signatures on petition
		referendum provision and/or decrease in number of signatures on petition
		recall provision and/or decrease in number of signatures on petition
<i>Rules for Allocating Authority</i>	rules to mitigate the risks of contracting; safeguard of the preferences of the median voter; and build credible commitments and signal leadership	direct election of mayor
		mayoral veto power
		mayoral power to make appointments,

Maser's cross sectional study identifies the presence of the charter rule from 1950 to 1970. However, for this study not only are successful changes identified, but also unsuccessful attempts to change charters from 1950 through 2000. These variables were collected from comprehensive analysis of all the charters for each city for successful changes and analysis of ordinances and referenda outcomes for unsuccessful changes in each city. Change is coded as a 1 if change in the rule occurs and 0 if there is no change in the rules. Direction of change is tracked and coded as to whether or not the change includes a procedural safeguard that benefits the citizen. This was coded as 1 if the change increases citizen's procedural safeguard and 0 if the change decreases citizen's procedural safeguard. A more comprehensive discussion of the case study approach in section 3.02.

Explanatory Attributes

The explanatory variables encompass the sets of variables in the working part of the institution in Figure 2.04. These differ in definition from the attributes of the local community as

defined by Rosenbaum and Kammerer (1974). Kiser and Ostrom's (1982, 182) definition of the community is that area "affected by interdependent decision making." The attributes of the community are those elements defined by Rosenbaum and Kammerer (1974) as important Environmental Changing Events (Rosenbaum and Kammerer 1974, 22).

Actors. Each group of actors will be included in the model based on their importance to the theory of constitutional change. There are two decisions available to active groups in the action arena. The demanders of the status quo support the maintenance of the current institutional arrangements, while institutional entrepreneurs support change in these rules.

The theory about the importance of each group guides the choice of attributes in each case. For the eight groups in the consolidation cases, direct measurement of the presence of support for or opposition to change will be based upon newspaper accounts. Indirect measurement of groups in the constitutional change process will measure group size and group strength in the community to designate group support for different rules in the change process. This procedure is similar to that used by Maser (1985).

The presence and size of various interests can be measured based on population characteristics and the size of various economic sectors corresponding to specific industry classification (SIC). Business groups' strength employs measures of several industries in the county: Newspapers SIC 271, Real estate SIC65, Construction SIC CON, and Business Associations SIC 861. Professional Organizations SIC 862, Labor Organizations SIC 863, and Social/ Civic Organizations SIC 864 provide a measurement of non-profit organizations. The measurement use here is the presence of an increased ratio over the previous year between the number of employees in the industry to percent of total county employees, from the County Business Patterns, 1950-2000.¹

Political leadership is the presence of a new mayor in office for the previous year. This indicates that the preference to retain office is not important to the support or opposition to change. Measurement of this attribute is from *ICMA Municipal Yearbook* from the years 1949 to 2000. This was coded as a 1 if there was a new mayor the year before and a 0 otherwise.

Government employees' growth and strength is measured as the percent of the population that is employed by the city. Growth for this group is coded present if the percent of government

employees increases at a faster rate than the general population of the city. This provides an indication of the size of government. This was taken from the U. S. Census city employment series for the targeted years.

Property owners and home owners are measured indirectly by a tax levy to tax assessment ratio. This measure allows comparison between different cities and states. The levy and assessment were normalized to year 2000 dollars, then the ratio of the year was compared to the ratio of the year before and coded a 1 if increasing. This was gathered from several sources.²

A second measure of the homeowners' preferences for certain institutional arrangements, particularly rules that govern efficiency in government, is the property tax. An increase in the percent of general revenues attributed to property taxes over the previous year could induce the property owners to require a search for other means of revenue or support efficiency measures and may call for direct democracy rule changes. This was coded as a 1 if the reliance on property taxes was increasing and a 0 otherwise.

Minority group strength is measured by several minority population attributes. The first attribute, population composition, can provide an indication of the percent of population that is Black. The measure of Black population strength is the presence of the population over twenty-five percent, coded as 1 if the Black population in the community was over twenty-five percent and 0 otherwise. Rosa Beth Kanter (1977, 208-209) note that a minority population below fifteen percent could be dominated by the majority group. However, as the group increases to over thirty-five percent, the minority group is able to form coalitions and "can affect the culture of the group" (Kanter 1977, 209). A midpoint between these thresholds was chosen to capture the potential strength of the group. Increases in the percentage of the population of minority groups can change the composition of the city and produce a perception of crisis (Rosenbaum and Kammerer 1974).

Another measure of minority group strength is representation of minority groups in local government. If the percent of the city council who are Black is greater than or equal to the percent of Black citizens in the general population then it can be assumed that their preferences are represented. This was coded 1 if the representation was greater than or equal to the general population and 0 otherwise.

Third, the ratio of Black population that lists public administration as their occupation to the total population of public administrators in the municipality can also provide a measure of representation. This provides a measure of representative bureaucracy and is a traditional baseline measure, according to Norma Riccucci and Judith Sidel (1997). Taken together, these measures provide a good picture of the representation of the group in the governance of the local community, the higher the percent the stronger the group and the more responsive the government is to their preferences.

Finally a measurement of minority strength for support or opposition of constitutional rules is the *index of dissimilarity*. The dissimilarity index is a dimension of spatial exclusion and measures the amount of residential segregation or integration of minorities in a local community (Weiher 1991; Coulibaly, Green, and James 1998; Sims 1999; Iceland, Weinberg, and Steinmetz 2002). This index, D, is calculated by the Iceland, Weinberg, and Steinmetz (2002, 122) formula:

$$D = \frac{\sum_{i=1}^n [t_i |(p_i - P)|]}{[2TP(1 - P)]} \quad \text{[equation 3.1]}$$

Where: t_i = total population of area I (census tract)

p_i = proportion of area i 's population that is Black

P = proportion of the metropolitan area's population that is Black

T = the total population

When the D value is multiplied by 100, it produces a percentage of segregation. If the tracts in the city were either all white or all Black then the D value would be close to 100 and the higher the value of the dissimilarity the greater the racial/ethnic segregation (Iceland, Weinberg, and Steinmetz 2002, 123). This index can provide an indication of desire for representation. The assumption is that a highly segregated community, where "D" is greater than or equal to 60, will foster the incentive to change the rules to provide greater representation while a highly integrated community will not have these incentives. Census tract data was used for this measure. If a city did not have census tract data then the assumption was that the dissimilarity value was no better

or worse that for periods before the available census tract.

Table 3.04 presents the indirect measures of each group and the source of the data collection. However, this table does not include the operational definition of the attributes.

Table 3.04 Indirect Measures of Actors for Charter Transformation

Attribute	Measure	Source
<i>Real Estate and Developers</i>	Increase over the previous year of % of employees in SIC 65 as a % of total county employees = 1	County Business Patterns 1950-2000
<i>Construction</i>	Increase over the previous year of % of employees in SIC CON as a % of total county employees = 1	County Business Patterns 1950-2000
<i>Business Associations.</i>	Increase over the previous year of % of employees in SIC 861 as a % of total county employees = 1	County Business Patterns 1950-2000
<i>Social/ Civic Groups</i>	Increase over the previous year of % of employees in SIC 864 as a % of total county employees = 1	County Business Patterns 1950-2000
<i>Professional Organizations</i>	Increase over the previous year of % of employees in SIC 862 as a % of total county employees = 1	County Business Patterns 1950-2000
<i>Labor Organizations</i>	Increase over the previous year of % of employees in SIC 863 as a % of total county employees = 1	County Business Patterns 1950-2000
<i>Newspapers</i>	Increase over the previous year of % of employees in SIC 271 as a % of total county employees = 1	County Business Patterns 1950-2000
<i>Government Employees</i>	Increase in the % of municipal employees as compared to general population over the previous year =1	City Employment Series GF XX No. 4 U.S. Census
<i>Homeowners and Property Owners</i>	[1] presence of the tax levy change rate is greater than the assessment change rate, where levy and assessment are in year 2000 dollars=1 [2] the increase in the percent of the general revenue from property taxes =1	Moody Municipal and Government Manual 1950-2001; Government Finances GC XX.4 1950-2000
<i>Minority Groups.</i>	presence of Black occupation in minority public administrators over 25% =1	U.S. Census Data of Cities 1950-2000
	% of council members who are Black > = % in general population =1	The National Rooster of Black Elected Officials and ICMA Yearbook
	Black population over 25% of general population =1	U.S. Census Data of Cities 1950-2000
	Index of dissimilarity > = to 60 =1	U.S. Census Data of Cities 1950-2000

The Community Context

Environmental attributes of the community are the physical, socio-economic, and demographic elements of the community: population decrease, city bond rating, expenditure to revenue ratio, property tax to revenue ratio, housing and community development to general expenditure ration.

Population decline can illuminate the desire of the local community for institutional arrangements to address local problems, since it can produce stress and underscore the inefficiencies in local government (Ruhil 1999, 9), while a sudden non-incremental increase in population can overload the system and increase demands from citizens (Rosenbaum and Kammerer 1974). This measure is provided in the U.S. Census data.

The municipal bond rating can give a measure of the city's fiscal health. A bond rating above an A is considered very good by the Moody Investment Services. Property taxes were discussed in the property owners section, but it can also measure the revenue sources of the city. The increase in the percent of property taxes over the last year can provide an indication of increased reliance on taxing for revenue and could signal dis-enchantment of property owners for the present governance structure.

Housing and community development can indicate the stress of economic depressed areas in the city. Expenditures in this area can indicate economic needs of the city. If the ratio of expenditures spent on housing and community development increase over the past year, the citizens may desire greater control of government spending. These are summarized in Table 3.05.

Table 3.05 Community Context

Attribute	Measurement	Source
<i>Population</i>	Population decrease over the last year =1	U.S. Census Data of Cities 1950-1990;
<i>Bond Rating</i>	Rating for municipal bonds of at least an A =1	Moody Municipal Investment Services 1950-2000
<i>Expenditure to Revenue Ratio</i>	General expenditures exceed general revenues for year =1	Compendium of Municipal Finances GF XX No. 4 1950-2000
<i>Property Taxes</i>	Increase in the percent of revenue from property taxes over the last year = 1	Compendium of Municipal Finances GF XX No. 4 1950-2000
<i>Housing and Community Development</i>	An increase in the ratio of expenditures on housing and community development to general expenditures over the last year = 1	Compendium of Municipal Finances GF XX No. 4 1950-2000

3.02 Case Study Analysis

Each city was analyzed using a case study approach. A comprehensive analysis of the state laws, city charters, city codes, and local ordinances and resolutions was preformed for each city. In order to accomplish this, first the state laws for Florida and Georgia were analyzed for the entire fifty years and each appropriate proposed rule change was noted. This provided a background to what rule changes were proposed. This task was easier for Georgia than for Florida. In Georgia, referenda for proposed changes are included in the Appendix of the Laws of Georgia.

Georgia cities do not have structural home rule, so many proposed changes in the structure are legislated. However, consolidation attempts must be ratified by the local electorate. This provided a set of seven proposed consolidation changes through referenda.

Although, Florida cities are granted a measure of home rule that does include structural as

well as functional home rule, this translated into a lack of proposed rule changes noted in the Laws of Florida for many of the cities. Successful changes could be tracked through the charter updates, but proposed changes required a site visit to city clerks' offices to retrieve ordinances for proposed changes.

Once the proposed rules were retrieved, a work sheet was used to code the rule as presented in section 3.01. Proposed consolidation rules were more extensive. A greater number of proposed consolidation rules that led to conflict in the communities were used. These will be further discussed in Chapter V.

Newspaper articles were consulted to collaborate the outcome of proposed changes and identify actors for consolidation. In the consolidation studies, actors were noted at least one month before the proposed consolidation constitution was presented to the public and tracked to the day after the referendum. The date around setting up committees to explore reorganization was also researched.

3.03 Qualitative Comparative Analysis (QCA) and Local Constitutional Change

This section describes how Qualitative Comparative Analysis (QCA), a relatively new tool to explore complex relationships in social sciences, will be employed to analyze constitutional rule change. QCA is a comparative method. Comparative methods are useful in exploring institutional arrangements with complex interrelationships. According to David Weimer (1995, 3) “[c]omparative institutional analysis attempts to get around these problems by assessing the consequence of specific institutional features holding other things equal.” The task is to find a method that orders the complexity. Boyton (1982, 38-51) suggests that Boolean algebra can achieve this by “defining a set” of attributes, find the configuration of the set, and provide a theory that has simplicity, truth, and fecundity.

Qualitative Comparative Analysis (QCA) employs Boolean algebra. Boolean is an algebra of logic that can link causal implications of attributes to the outcome. Although King, Keohane and Verba (1994, 89-90) acknowledge the usefulness of QCA and the Boolean approach to theory building, they question the usefulness of the approach to theoretical explanation. However, scholars in other disciplines have applied the Boolean approach to the prediction of outcomes with great success.

Boolean algebra was formulated by Charles Boole in 1854 as a mathematics of logic and probability (Floyd 1990, 142). In the late 1930s and 1940s, application of the method was seen in such diverse disciplines as biology and engineering. As early as 1948, application of Boolean logic was used in Biology (EMBO 1979, VII). In 1977, the European Molecular Biology Organization (EMBO) held a symposium on the uses of logical methods for the analysis of dynamic biological systems where Boolean algebra was shown to be a useful qualitative tool for research (EMBO 1979). While many of the studies were on genetics, Chapter 18 “Boolean Formalism and Urban Development,” provided an application of the Boolean approach to residential location of social classes in a city which linked income, ethnic origin, with “population density, neighborhood quality, home-to-work travel time” (Boon and de Palma 1979, 402).

Boolean logic was adapted to the use of circuit design in 1938 at MIT to describe the switches and relays in a circuit using a Boolean mathematical formula (Floyd 1990, 142). In system safety engineering, the objective is to identify and control hazards “throughout the life cycle of a project, program, or activity” (Roland and Moriarty 1983, 9). In system safety the Boolean approach “depicts the relationships between events in a system that leads to a final outcome” to study complex systems utilizing a fault tree analysis to determine and rank events “that cause a major undesired event” (Roland and Moriarty 1983, 215). Boolean algebra through the use of Fault Tree Analysis has allowed analysis of systems:

The method has the power of deduction. This means that combinations of events are considered in the causal chain, which is not the case with the inductive approach. The interactions between events and subsystems are always a vital element of system function. . . . If the analyst is able to obtain probabilities or rates of occurrence of the basic events, a more precise ranking of the importance of each event, as well as other probabilistic measures, may be made. (Roland and Moriarty 1983, 216)

The Qualitative Comparative Analysis (QCA) method is case oriented, as opposed to a variable oriented method. This approach retains the importance of crucial characteristics of each case that will allow analysis of the complexity of causal elements (Ragin 1987). In most variable oriented studies the goal is to show that a relationship exists in a certain population; however, the relationship may differ at the sub-population level (Ragin 1987, 166).

The variable-oriented approach disassembles cases into variables and analyzes the effect of the independent variables on the dependent variable. This is both a strength and weakness. The variable-oriented approach becomes a great data reducer at the cost of the integrity of each case. The case-oriented method provides an in depth view of the attributes and their interaction on the outcome and provides the ability to address the complexity of “multiple conjunctural causation” (Ragin 1987, 167). However, it is difficult to analyze more than a few cases in depth. The Boolean approach used in the QCA method provides a “middle ground” between the two methods to identify the “key cases and key causal conjunctures” and thus addresses the combination of causes that are relevant to the outcome (Ragin 1987, 168). The method finds patterns of variables within each case that are then combined to form “families” to explore the patterns of variation that produce an outcome.

QCA is a method developed by Charles Ragin (1987) to provide a holistic approach to empirical research and bridge the gap between a variable-oriented, quantitative method and case-oriented, qualitative method (Ragin 1994; 1987). Ragin uses the comparative method to explore phenomena that are difficult to explore using a conventional, multi-variate quantitative approach, situations with a small number of observation points and interaction between the variables.

The advantage is that even with a large number of cases, the wholeness and strength of the case study approach can be preserved. According to Ragin (1994, 304-306) the approach provides six important functions that preserve the intensive case study approach: (1) preserves the relationship between the characteristics, the “configurations,” that define the whole case; (2) integrates the combinations of conditions, “causal conjunctures” to the outcome; (3) preserves “causal heterogeneity” which allows causes to combine in different and contradictory ways to produce the same outcome; (4) explains outliers, those cases that deviate from the norm, and invariance; (5) allows for explanation of a “qualitative outcome” in context of the case; and (6) explains “outcome complexity” by linking different outcomes to different causes.

The Boolean approach is an algebra of logic that can link causal implications of attributes to the outcome. In the “limited” Boolean algebraic approach the variables have binary values of 1 if present or 0 if absent (Leussler and VanHam 1979, 62). Boolean logic uses binary values

coded as present (1) or absent (0) where Boolean expressions are formalized as answers to yes-no questions and assembled in a truth table where each element is noted as present or absent.

The construction of a Truth Table begins with the coding of raw data or observations. This can be explained easier with an example of a hypothetical study. For illustration, say we observe nine cases of consolidation attempts and fit them into the Rosenbaum and Kammerer model. These nine cases could be coded as to the presence or absence of the stages used in the Rosenbaum and Kammerer (1974) model and would be structured as in Table 3.07. These cases represent actual consolidation cases presented in (Johnson and Feiock 1999).

Table 3.06 Observed Cases of Consolidation Through Referendum

Cases	(D) Power Deflator	(A) Accelerator	(S) Status Quo Campaign	(P) Pro campaign	# Cases	(M) Merge
Row A	1	0	1	0	2	0
Row B	1	1	0	1	4	1
Row C	1	0	1	1	2	0
Row D	1	1	1	1	1	1

Where: 1 is the PRESENCE of the attribute or outcome
 0 is the absence of the attribute or outcome
 The number of observed cases are given

Table 3.07 identifies the power deflator (D), accelerator (A), and two competing sides in the consolidation campaign: those who oppose change, status quo (S), and those who desire change, pro-consolidation (P). There are only four different configurations of attributes, but this does not address all possible configurations or combinations that are possible in a Boolean algebraic expression. In this instance, since there are four attributes, there is a possibility of 2^4 or

sixteen combinations of attributes. The constructed Truth Table for all possible combinations is presented in Table 3.08:

Table 3.07 Consolidation Truth Table

Row #	(D) Power Deflator	(A) Accelerator	(S) Status Quo Campaign	(P) Pro campaign	# Cases	(M) Merge
1	0	0	0	0	0	—
2	1	0	0	0	0	—
3	0	1	0	0	0	—
4	1	1	0	0	0	—
5	0	0	1	0	0	—
6	1	0	1	0	2	0
7	0	1	1	0	0	—
8	1	1	1	0	0	—
9	0	0	0	1	0	—
10	1	0	0	1	0	—
11	0	1	0	1	0	—
12	1	1	0	1	4	1
13	0	0	1	1	0	—
14	1	0	1	1	2	0
15	0	1	1	1	0	—
16	1	1	1	1	1	1

Note: presence of attribute = 1, absence of attribute = 0, and missing observation point or “don’t care” = —

This constructed truth table can be used to explore configurations of possible outcomes. When these configurations are placed in a workable Truth Table, the configurations appear as follows:

Table 3.08 Working Consolidation Truth Table

Attributes				Outcomes
D	A	S	P	M
0	0	0	0	—
1	0	0	0	—
0	1	0	0	—
1	1	0	0	—
0	0	1	0	—
1	0	1	0	0
0	1	1	0	—
1	1	1	0	—
0	0	0	1	—
1	0	0	1	—
0	1	0	1	—
1	1	0	1	1
0	0	1	1	—
1	0	1	1	0
0	1	1	1	—
1	1	1	1	1

Note: presence of attribute = 1, absence of attribute = 0, and missing observation point or “don’t care” = —

The shaded areas with an outcome of — are termed “don’t cares.” The “don’t cares” are those combinations that are logically possible in Boolean but have not been observed in the real world. These combinations are important for theory building since they can be used as a possible combination. These will be discussed below.

In Table 3.08a, each combination has a single outcome: either 0 or 1. If there are successful and unsuccessful outcomes that contain the same combination of attributes then they

are considered contradictory. The contradictory outcomes may need to be resolved.

Contradictions are an important part of the model specification. In some cases this could mean that an attribute or property is missing from the combination.

The Truth Table is minimized using a “. . . minimization algorithm to a truth table, along with all of the file and data definition information inherited from the truth table” (Drass 1988, 6). The QCA computer program minimizes the truth table using the Quine-McCluskey algorithm to provide the most minimal equation (Drass 1988, 30). The method employs a two-step process of minimization that begins by generating all the possible prime implicants from the table and then proceeds to compare all the prime implicants to form a subset of the prime implicants that is “. . . sufficient to imply all configurations from the truth table” (Drass 1988, 30). This is the basis of the minimized truth table. Simplification of this table reduces the equation and removes redundant elements (Drass 1988, 31).

Boolean additive and multiplicative properties are logical rather than arithmetic. It can be useful to think of Venn Diagrams with the concept of intersection and union, where the intersection is the multiplication and the union is the addition (Roland and Moriaty 1983, 167). In the writing of a Boolean expression, the presence of a property will be denoted by CAPITAL LETTERS and the absence by lower case letters. For example:

Power Deflator is denoted as DEFLATOR when present and deflator when absent (D or d).
Accelerator is denoted as ACCELERATOR when present and accelerator when absent (A or a).
Status Quo group is denoted as STATUS when present and status when absent (S or s).
Pro consolidation group is denoted as PRO when present and pro when absent (P or p).
Merger is denoted as MERGER when present and merger when absent (M or m).

We can see that the combinations of attributes that are the prime implicants for the presence of outcome M, $M = 1$ are:

1	1	0	1	DAsP
1	1	1	1	DASP

In Boolean logic, the additive quality provides a means of satisfying the truth of the outcome due to the presence or absence of elements: for example if $D+A+S+P = M$ and $D=1$, $A = 1$, $S = 1$, and $P = 1$ then $M = 1$, i.e. with the presence of D and the presence A and the presence of S and the presence of P then M will occur (Ragin 1987, 89). Multiplication is not

mathematical but logical; if three properties have the presence of two properties but the absence of one, 0*1*1*1 (for example), the outcome is not 0 but the absence and the presence and the presence and the presence. Terms can be combined using the combinational logic that allows minimization of terms that simplify using a bottom-up method of step-wise reduction until no further reduction is possible (Ragin 1987, 93).

The minimization process can reduce further by the elimination of redundant terms. In Boolean if two configurations differ by only one element, then that element is considered redundant since the two configurations produce the same outcome (Ragin 1987; 1994). For example, DASP and DASP have one element each in the configuration that differs, s and S (the absence or presence of a group supporting the status quo). These two terms can be combined to produce 11-1 (or DAP: the presence of D, the presence of A, and the presence of P). This would produce the prime implicants of DAP that are necessary attributes for consolidation (the presence of a power deflation and the presence of an accelerator and the presence of a pro-consolidation group). Prime implicants for causality are those elements that are “. . . said to imply another if the membership of the second term is a subset of the membership of the first” (Ragin 1987, 95).

Observation points that are missing can provide a means to begin theory building and give greater parsimony to the expression. The entries that are coded as “don’t care” are those outcomes that exist logically but are not present in the data set (Ragin 1987; Coverdill and Finlay 1995, 466; Coverdill et al. 1994). As noted above, the “don’t cares” are an important part of theory building. The unobserved cases can be used as further simplification.

This approach allows the factoring of necessary and/or sufficient prime implicants for causality of the outcome (Ragin 1987). A necessary cause is one that must be present for the outcome to occur while a sufficient cause is one that can lead to the outcome by itself.

Recent work that has employed QCA includes studies of labor management practices (Coverdill, Finlay, and Martin 1994; Coverdill and Finlay 1995), formation of social security systems in countries (Hicks 1994), and collective action and interracial solidarity in the 1919 Great Steel Strike (Brown and Boswell 1995). Brown and Boswell’s (1995) study has direct application to this study since it links government response to groups (labor unions in this case), the strength of the group, and the development of solidarity or strikebreaking.

3.04 QCA Data Measurement and Model Operationalization

Since QCA data is all coded as binary, deciding how each attribute is coded is important. The following three tables provide a visual representation of the actors, events, and community attributes discussed in section 3.1. In each table the attribute is listed; the measurement standards and the source of the data is provided. For a definition of each attribute please refer back to section 3.1. Table 3.11 provides direct measures of actors for consolidation.

Table 3.09 Direct Identification of Actors in Consolidation Referenda QCA

Attribute	Measurement for QCA	Source
<i>Business associations.</i>	1= present; 0 = absent	Archival, newspaper accounts
<i>Academic community</i>	1= present; 0 = absent	Archival, newspaper accounts
<i>Civic Groups</i>	1= present; 0 = absent	Archival, newspaper accounts
<i>Political Groups</i>	1= present; 0 = absent	Archival, newspaper accounts
<i>Government Employees</i>	1= present; 0 = absent	Archival, newspaper accounts
<i>Resident and Citizen Associations</i>	1= present; 0 = absent	Archival, newspaper accounts
<i>Media</i>	1= present; 0 = absent	Archival, newspaper accounts
<i>Minority Groups.</i>	1= present; 0 = absent	Archival, newspaper accounts

The next chapter, Chapter 4, provides case studies of twelve attempts at revolutionary local constitutional change through consolidation. This offers a background for Chapter 5, the Boolean analysis of consolidation. Then Chapter 6 provides short histories of the constitutional change in the nine cities as a prelude to Chapter 7, the Boolean analysis of constitutional change.

End Notes

1. Techniques for determining data withheld for economic and other reasons.

A. First technique used. See if value is available by adding up other SIC parameters at same level, then subtracting the result from parent SIC. The remainder would be the missing parameter. This technique works only if all the same level SIC parameters are available or if other missing parameters are at least two letters smaller, i.e., missing parameter was a "G" and the other parameters were "E" or less. Note "D" is not used. Use an average for the smaller missing values (see #2 below). Make sure estimated value is within the given letter, i.e. for an "F" the value estimated is between 500 and 999.

Limitation: When two of the companies are larger than 500 before 1974 or 1000 after, then an upper bound is not available. When letters are used to designate the number of employees the sum of companies in the subgroup does not add up to the number in the parent SIC. Some companies are not listed in the subgroup. The number of employees for companies not listed were generally small (19-49 or less). This error would make the estimate for the desired parameter slightly large

B. Number of employees by company size ranges.

a. For 1973 and earlier years. Estimate number of employees by establishment size class only when the maximum size is less than 500. Limitation: The problem with this technique is if the largest company present for the unknown is > 500.

b. For years 1974 and beyond. Add minimum and maximum number of employments for each size class. Then compare this number to the bounds for the entire class. This will frequently narrow the range of employees in a group. Most of the time this will be the minimum for the group and the maximum sum of the establishment size. Limitation: The problem with this technique is if the largest company present for the unknown is > 1000.

C. Average Increment

Use the average increment between two known values. This technique was used for 1950's and 1960's when CBP were not published for some years. Make sure the estimated value is within the given letter i.e. F is 500 - 999. All values are between 500 and 999. One example for using this technique is when a parameter is not provided. For instance, Pinellas 1993 for SIC #271. The parameter is not provided for 1993 to 1996. However, SIC #27 (#271's parent) is approximately the same for 1992 (6008) and 1993 (6032). This would indicate #271 did not cease to exist, it just was not reported. Another reason for using this technique is when two sub categories are both of the same category. For instance, in Pinellas 1956 to 1978 numbers for SIC #48 and SIC #49 were not given. The largest number of employees is given by a letter & the largest company present for both has > 500 for 1973 and before and >1000 employees after 1973. In this case 1 and 2 will not provide a solution. The parameter was incremented by a constant between years of known data. Limitations: If the unknown parameter changes categories by going in the opposite direction as the trend between the two knows, it is difficult to estimate the unknowns. For example: 615, F, F, E, F, 937. For

all categories the number of employees can double before going into the next larger category.

D. If the first three techniques do not work, use the average of letter for missing parameter. For C use 175, for E use 375, and for G use 1750.

E. For years 1997-2000. This technique was used from 1997 to 2000 for sub categories when the new classification for jobs was instituted by the federal government. When converting from the new NAICS to the previous SIC, some of the NAICS parameters were only partially converted to a previous job category. The ratio of which part of a NAICS job category went to a given SIC job category was not give.

F. For the years 1950 to 1964, the SIC data were not published for years: 50, 52, 54, 55, 57, 58, 60, 61, and 63. For the missing years the average between the adjacent years was calculated. For 1950, the average increment between 1951 and 1952 was extrapolated backward (after 1952 was calculated).

2. The tax levy to assessment ratio was determined as total levy divided by gross digest. Yearly data was collected from 1950 to 2000 from *Moody's Municipal and Government Manual*. Data was also collected from the *Florida Statistical Abstract* for years available and the Georgia Department of Revenue for years 1994 to 2000. Ratios were compared for each city for each year for compatibility.