Qualitative Comparative Analysis and Analytical Induction: The Case of the Emergence of the Social Security State

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This article bridges two research traditions, analytical induction (AI) and qualitative comparative analysis (QCA) in the context of a study of early welfare state formation. First, the article differentiates classical AI from neoanalytical induction (NAI), tracing the latter to the former and identifying some problems with NAI. Next, it outlines QCA and identifies some problems with it. Third, it sketches two bridges, along with solutions that they offer for some limitations of NAI and QCA. One bridge links NAI's method, in essence a logical implementation of the idea of the working hypothesis, to QCA's powerful Boolean technology. The second bridge joins AI's stress on the reformulation of hypotheses in the face of negative evidence to QCA's capacities for complex inductive and logical specifications of the relations of explanatory to dependent variables. Following that, the article summarizes portions of a study of early 20th-century welfare state formation and uses them to illustrate the bridges. It concludes with a discussion of the analytical promise of a variant of QCA that stresses theory building in the AI tradition.

Qualitative Comparative Analysis and Analytical Induction

The Case of the Emergence of the Social Security State

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This article bridges two research traditions, analytical induction (AI) and qualitative comparative analysis (QCA) in the context of a preliminary study of early welfare state formation (Znaniecki 1934; Ragin 1987). The welfare state study in question, which seeks to explain the consolidation/nonconsolidation of all or most of the major, extant social insurance programs in those nations that were industrialized around 1920 was largely inspired by two examples. One was Rueschemeyer, Stephens, and Stephens (1991). This provided a dramatic implementation of analytical induction, regarded as an inductive specification of a general theoretical framework. For example,

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history informed Rueschemeyer et al. (chap. 4) that they must stress several class actors to explain the initial emergence of political democracy but might heavily focus on the landed upper class for explanation of democratic breakdowns between the World Wars. The other inspiration for my study of early welfare state formation was Ragin (1987). This seemed to offer a powerful Boolean technology and interpretive frame for the implementation of neoanalytical induction (NAI).

The bridges built here link QCA with NAI, which has developed in the wake of Robinson's (1951) critique of AI and crystalized in a few methodological texts during recent decades (e.g., Denzin 1970, 1989; Hammersley and Atkinson 1983). One bridge links NAI's method, in essence a logical implementation of the idea of the working hypothesis, to QCA's powerful Boolean technology. This bridge, which supports a thoroughly two-way exchange of ideas between QCA and NAI, vindicates NAI's logico-inductive aspirations while strenthening the case for a theory-building emphasis for QCA. The second, closely adjacent bridge, joins AI's stress on the reformulation of hypotheses in the face of negative evidence to QCA's capacities for complex, inductive, logical specifications of initial explanatory variables, including specifications of multiple conjunctural causation or causal heterogeneity. The bridges may be regarded as sources of new methodological exchanges yielding a Boolean empowerment of NAI and an analytical inductive focus for QCA.

I first differentiate Znaniecki's (1934) classical AI from NAI, tracing the latter to the former and identifying some problems with NAI. Next, I outline QCA and critique it. Third, I sketch the bridges, along with some solutions that they offer the shortcomings or, better put, limitations of NAI and QCA. Fourth, I summarize portions of the study of welfare state formation and draw on it to illustrate the usefulness of the bridges. I conclude with a discussion of the analytical promise of a variant of QCA that stresses theory building in the AI tradition and, likewise, promise of AI as a variant of QCA.

ANALYTICAL INDUCTION: CLASSICAL, CRITICIZED, AND REVISED

Classical AI. In an influential review and criticism of AI, Robinson (1951, pp. 812-13) quotes Cressey's (1950, p. 51) description of "analytical induction" as a method defined by the following procedural steps:

1. A rough definition of the phenomena to be explained is formulated.
2. An hypothetical explanation of that phenomena is formulated.
3. One case is studied in the light of determining whether the hypothesis fits the facts of the case.
4. If the hypothesis does not fit the facts, either the hypothesis is reformulated or the phenomena to be explained is redefined so that the case is excluded.
5. Practical certainty may be attained after a small number of cases has been examined, but discovery by the investigator of a single negative case disproves the explanation and requires reformulation.
6. This procedure of examining cases, redefining the phenomena, and reformulating the hypothesis is continued until a universal relationship is established, each negative case calling for a redefinition or a reformulation.

Robinson's critique of AI as causal analysis. Robinson (1951) praises AI as a research program, applauding its systemization of the method-of-working hypothesis (an hypothesis used as a gateway to a process of theory building rather than as a fixed target in a one-shot test), and its aspiration for ultimately invariant, nonprobabilistic relationships. However, Robinson is critical of AI as a method of causal analysis, as well as one of proof.

Robinson (1951, pp. 114-6) criticizes classical analytical induction as a "method of causal analysis" for its stress, especially in Znaniecki's (1934) seminal formulation, on the analysis of positive outcomes alone (P, but *not* "not-P"). This stress, in effect replicates Mill's "method of agreement" (see Ragin 1987, pp. 36-42). Robinson's criticism of classical AI's emphasis on similar outcomes extends to a criticism of its focus on the study of one case at a time.

On the restriction of analysis to cases marked by positive outcomes as in Mill's method of agreement, Robinson's (1951) criticisms proceed in the simplified terms of Table 1, which cross-classifies the dichotomous variables, Condition C and Phenomenon P. Robinson begins by noting that classical analytical induction tended to confine attention to the left-hand column of Table 1; that is, to the presence or absence of precondition C where P is already observed.[1] This restriction to cases where P obtains—in effect, to the setup for Mill's method

TABLE 1: A Stylized Paradigm of Hypothesis Investigation (after the model of Robinson 1951)

	P	*not-P*
C	(1) X	(3) ?
not-C	(2) 0	(4) X

Range of cases admitted by Znaniecki (1934)

Full range of cases

of agreement—is the source of classical AI's causal shortcoming. This restriction yields a truncated version of Table 1 that can only provide us with a possible falsification of the hypothesis (hereafter, HN) that C is a necessary condition for P. This is so because the statement that "C is a necessary condition for P" is equivalent to "not-C implies not-P." Thus observed conjunction of not-C and P in cell 2 falsifies HN.

One of Robinson's (1951) causal problems with classical AI is that restriction of research to cases for which P obtains does not allow us to attempt to falsify the proposition that C is a sufficient condition for P—C implies P—because the falsifiability of this proposition requires information on Cell 3 (see Table 1). In particular, it requires the possible presence but actual absence of cases conjoining C and not-P. (If C and not-P concurrently obtain for even a single case, then as the occurence of C may be accompanied by not-P instead of P, C cannot be a sufficient condition for P.) However, the truncated Table 1 precludes such information. This is a severe restriction, because the scientific concern with relations between causes like C and phenomena like P has been focused at least as intensely on relations like "if C, then P" as it has on ones like "no C, then no P."

However, perhaps the underlying problem with Znaniecki's (1934) classical formulation of AI is that, although all four cells of a table like Table 1 are interesting, two cells are ignored. Whether we are logicians who want a complete truth table for C and P so that we can comprehensively assess the logical implications connecting C and P, or we are statisticians who want a complete contingency table so that we can compute measures and/or tests of association, it is the whole table that suits us best.[2] Robinson's (1951) solution to the two-cell problem is to jettison Znaniecki's truncation of possible cases and open AI up to the study of full, four-cell variants of Table 1.[3]

This solution both raises and helps settle a second problem with the classical formulation of AI, namely that analysis of one case at a time is incompatible with the comparative causal analysis that Robinson (1951) prescribes.[4] To move beyond the method of agreement to at least the indirect method of difference (henceforth, difference) for which C and not-C must perfectly differentiate P and not-P requires at least two cases (at least one marked by P and one marked by not-P). Knowledge of Cell 3 is required for a decision about the sufficiency or nonsufficiency of C for P. (If C is conjoined with not-P, then C is not sufficient for P.) Similarly, knowledge of Cell 2 is required for a judgment on the necessity of C for P. (If not-C coexists with P, then C is not necessary for P.) Moreover, only cells lined up across one or the other diagonal (i.e., information on Cells 2 and 3 and on Cells 1 and 4) can establish the limiting logical case of a relationship that is both necessary and sufficient or the limiting statistical case of perfect correlation. Solution of the single-case problem, then, minimally requires two cases, and it is facilitated by the incorporation of multiple cases—as many as our interests in ranges of logical possibilities (i.e., complete truth tables), measures of association at particular significance levels, attention to holistic and nuanced qualities of cases, practicalities of data availability, and so on, require.[5]

In short, AI may proceed better through structured comparisons of cases that differ on the values of their outcome variables than it does through a succession of single-case studies of positive outcomes alone. (This is not to say that new cases cannot be introduced as part of a process of reformulation or reclassification in the face of negative evidence.) Robinson's prescription for AI would appear to be that AI expand beyond solely positive outcomes (P but never not-P), yet retain the goal of invariant, nonprobabilistic relationships.

Despite his leads for the revision of AI, Robinson (1951) concludes his criticism of AI by questioning its viability as a method that can be pursued independently of conventional statistical testing. In particular, he concludes by asserting that analytical induction "leads directly to use of the comparative method of enumerative induction," the "difference" being that "analytical induction insists on zeroes in two cells of Table 1 and provides a procedure for trying to get them there, while enumerative induction is satisfied with relatively small frequencies" (p. 816).[6] In fact, Robinson challenges the distinction between analytical and enumerative induction on the grounds that "it is a quantitative contrast and not basic" (p. 816).[7] He does this for several reasons. One is that with a "sophisticated approach to enumerative induction one realized that a perfect explanation is the ultimate goal" (p. 816). Another is that if "someone who is practicing enumerative induction has failed to achieve perfection and publishes his results as a progress report, he has made an enumerative induction"—that is, results that are not fully deterministic must be presented in statistical rather than logical terms. In addition, Robinson (1951, pp. 816-8) prefers enumerative induction as a "method of proof" (or "justification"), believing that analytical induction merely describes a limiting case of enumerative induction for which enumerations (or relative frequencies) yield no exceptions to a hypothesis. Indeed, he regards AI as a mere limiting case of enumerative induction minus recognition of the "necessity for representative sampling" (p. 818). Robinson acknowledges both AI's unique emphasis on the goal of invariant, universal generalization and its possession of a procedure for "producing complete explanation." To borrow Popper's (1963) distinction between discovery and justification, rejection of AI as proof or justification need not entail rejection of AI as theory building or discovery.

Robinson's (1951) criticisms of AI suggest that he might have concluded by embracing a revision of classical AI into a method of discovery or theory building alone, severed from pretentions to any authoritative adjudication of the credibility of whatever theory might be in question. This NAI would stress difference as well as agreement, multiple- rather than single-case analysis and provisional closure instead of "practical certainty." However, Robinson (1951) does not conclude in this way. Instead, he advocates some imprecise integration of AI and "enumerative induction" in which the goal of invariant generalization is kept in mind, aided by some retention of the method of the working hypothesis (p. 816). This enumerative induction refers to the general statistical-inductive model in which departure of relative frequencies (i.e., enumerations) from randomness—not adherence of data to perfectly deterministic patterns—is key. For Robinson, AI is subordinated to—indeed, a special, "errorless" case of—statistical induction.

Neoanalytical induction. Since Robinson's (1951) critique, AI has certainly been peripheral to the teaching and practice of the social sciences, which have stressed other modes of analysis, principally the case study and large-*N* statistical modes of analysis (the latter unmodified by any evident integration with analytical induction). Nevertheless, AI has survived both as an application of Mill's method of agreement (e.g., Schwartz and Jacobs 1979; Goldenberg 1991) and as the kind of reconstituted AI suggested by Robinson's critique of AI as causal analysis (net of his dismissal of the AI/EI distinction as not basic and critique of AI as a source of practical certainty or proof). These are the lines of classical AI transformed by (a) extension to negative as well as positive outcomes, (b) successions of multiple-case comparisons rather than single-case studies, and (c) stress on theory building over theory testing into NAI. Detailed as a revision of Cressey's (1951) six-step delineation of classical AI, NAI proceeds through the following five steps:

1. a working definition of an explicandum;
2. a hypothetical explanation of this explicandum;
3. study and comparative analysis of cases marked by negative as well as positive outcomes to determine whether the hypothetical explanation fits the facts of the cases;
4. reformulation of the hypothetical explanation or reclassification of the explicandum, or both, if the hypotheses do not fit the facts; and
5. repetition of the procedure of examining cases and reclassifying the phenomena and/or reformulating hypotheses until a universal solution is established (each negative case calling for a redefinition or a reformulation).

This NAI is presented in Denzin's (1970, 1989) symbolic-interactionist text and Hammersley and Atkinson's (1983) ethnography text. Although Denzin (1989, p. 166) presents Cressy's (1950) classical six-step presentation of AI, he then stresses that this must be modified in light of Robinson's (1951) criticisms so that it incorporates the "method of difference" as well as the method of agreement as in

Lindesmith's (1947) study of "non-addicted hospital patients" as well as addicts (Denzin 1989, pp. 166, 168). Denzin also stresses a focus on "development of a sociological theory" over "testing" (p. 166) and he emphasizes theory that will "apply to all cases of the problem under question" (p. 168), while acknowledging the usefulness of complementary recourse to "enumerative induction" (p. 169). Similarly, Hammersley and Atkinson (1983) work from Cressey's (1950) six-step enumeration, but emphasize the need to not ignore "the question of sufficient conditions" (p. 202) and to highlight "development and refinement of theory" (p. 204). True, in counseling against "too sharp a distinction between analytical induction and statistical method," Hammersley and Atkinson (1983, p. 202) do dispute the facility with which analytical induction can "produce universal statements," but this challenge does not compromise NAI's aspiration "to build up a comprehensive picture" on "the basis of necessary and sufficient conditions." It merely stresses that the effort may fall short and that closure may have to be imposed before Step 5's "universal solution" is satisfied.

Despite these departures from precise implementation of my NAI scenario, research along approximately NAI lines proceeds. Yet, unfortunately, this NAI enterprise is obstructed by several limitations. First, the shift from the method of agreement to the method of differences does not provide a logical calculus that can handle working hypotheses or theoretical developments of any complexity (see Lieberson [1991] on Mill's methods). In the commonplace case of tables like Table 1 from Robinson or its substantive reincarnation as Table 2, Panel A (see Rueschemeyer et al. 1991, Table 4.1), we are confined to 2 × 2—or at least bivariate—analyses. Just as the listing of values of explanatory variables that are shared by cases with common positive outcome values (e.g., the democratic continuity analyzed in Table 2) will not advance us very far logically, so movement from the method of agreement to that of difference will not get us much further (Lieberson 1991). The method of difference merely requires explanatory variables that will neatly distinguish between positive and negative outcomes. This is what the distinction between landed upper-class strength/weakness nearly suffices for democratic breakdown/continuity in Panel A of Table 2, where landed upper-class strength falls short of being a necessary and sufficient condition for

TABLE 2: Tabular Models of Democratic Breakdown and Continuity of Developed Nations Between the World Wars

A. A Uni-Causal Landed-Upper-Class-Power Model for Democratic Europe[a]

	Landed Upper-Class Politically Strong	*Landed Upper-Class Politically Weak*
Democratic continuity	United Kingdom	France, Small European nations
Democratic breakdown	Austria, Germany, Italy, Spain	

B. A Poorly Fitting Multicausal Model for Democratic Europe and Democratic Anglo-Settler Nations[b]

	Landed Upper-Class Politically Strong				*Landed Upper-Class Politically Strong*			
	LRLUC		*No LRLUC*		*LRLUC*		*No LRLUC*	
	No REVBP	*REVBP*	*No REVBP*	*REVBP*	*No REVBP*	*REVBP*	*No REVBP*	*REVBP*
Democratic continuity	Australia	United States		United Kingdom			Small European nations, Canada, New Zealand	France
Democratic breakdown	Austria, Germany, Italy, Spain							

NOTE: LRLUC = labor repressive agriculture of landed upper class; REVBP = revolutionary break from the past (prior to 1920).
a. See Rueschemeyer et al. (1991, chap. 4, Table 4.1).
b. Inspired by Rueschemeyer et al. (1991, chap. 4, Table 4.4).

democratic breakdown only because of the case of the United Kingdom (see Rueschemeyer et al. 1991).

Extending ourselves to more elaborate tables like Table 2, Panel B, is possible in principle. However, without an explicit logical or mathematical calculus to use, the logical or mathematical structure of such a table will soon exceed our ad hoc powers to determine whether our theory fits the facts or not. Here the complexity of the distribution of cases across the table is clarified by no such nearly perfect pattern as that of Panel A. Moreover, as statistical analysts will quickly recognize, the degrees of freedom that would be needed for any statistical analysis of a table like Panel B are lacking. It is easy enough to relegate the analysis of a table like that of Panel B to logical analysis in the abstract. But *which* logical analysis? Confronted with a table even as modestly complex as that of Panel B, the method of difference provides us with little more than a metaphor for logical analysis (see Table 2, Panel B). Multivariate data like that of Panel B are just too complex for NAI to yield deterministic logical solutions using the method of difference (Ragin 1987, pp. 67-8, 166-9; Lieberson 1991). Indeed, they are likely to exceed any ad hoc effort to find a simple logical solution to a tabular distribution as complex as Panel B's analysis of some potential political economic causes of democratic continuity. What is to be done?

Second, if our theory does not fit the facts, NAI stipulates that we reformulate hypotheses and/or reclassify (or redefine) variables and cases. But NAI procedures for reformulating and reclassifying (or redefining) variables and cases provide little methodological stimulus to the theoretical insight needed for meeting this stipulation. Of course, theoretical insight and nimble ad hoc reasoning may win out. For example, we may hit on the idea that transforming landed upper-class political strength/weakness into *national* landed upper-class political strength/weakness (i.e., NLUCPS/No NLUCPS) will transform an indecipheral puzzle like that of Table 2's Panel B into an easily solved puzzle like that of Table 3: here, democratic breakdown simply equals national landed upper-class political strength and a labor repressive landed upper class. But short of such flashes of lightning, NAI principally directs us to drop cases (albeit only with the warrant provided by some meaningful reconceptualization). For example, we might approach the enigma of Panel A with an eye to reclassifying England. We might speculate that she, together with France and Switzerland, had been democratic since the the 1870s or earlier, whereas the other nations had gained sufficient enfranchisement to qualify as democracies rather later. We might then restate our theory as one of young democracies, jettison France, the United Kingdom, and the small European nation Switzerland, and obtain a logically perfect fit to a restricted variant of Table 2, Panel A. However, such solutions tempt us with post hoc fallacies. They smack of tautology conveniently smuggled in (we can explain the cases we can explain).

TABLE 3: Perfectly Fitting Multicausal Model for Democratic Europe and Democratic Anglo-Settler Nations

	National Landed Upper Class Politically Strong		*National Landed Upper Class Politically Weak*	
	Labor Repressive Landed Upper Class	*No Labor Repressive Landed Upper Class*	*Labor Repressive Landed Upper Class*	*No Labor Repressive Landed Upper Class*
Democratic continuity				Small European nations, United States, United Kingdom, Canada, New Zealand, France, Australia
Democratic breakdown	Austria, Germany, Italy, Spain			

Inspired by Rueschemeyer et al. (1991, chap. 4, Table 4.1). LRLUC = labor repressive agriculture of landed upper class.

Even if they can be put on theoretically and substantively sound grounds, such procedures have the cost, like the general thrust of NAI reformulation and redefinition, of trading off scope for fit. How can we proceed without recourse to expedience, risk of tautology, and loss of scope?

QUALITATIVE COMPARATIVE ANALYSIS (QCA)

The Boolean approach analyzes matrixes of qualitative (typically binary) data describing the occurence or nonoccurence of traits for a set of cases. When its standard of consistency is satisfied, the Boolean approach formulates an outcome in terms of the most logically parsimonious grouping (by *ands* and *ors*, as we shall see) of a set of hypothesized preconditions that, taken together, constitute both necessary and sufficient conditions for the outcome. Because the basic technical procedures of QCA have been detailed and illustrated by Ragin (e.g., 1987, 1993), they need not be reviewed here.

The strengths of the Boolean approach for comparative research, also spelled out by Ragin (1987, 1993), merit brief restatement here.

QCA directs attention to (a) cases as wholes and as configuration of potential causes, (b) contingent causes and combinations of causes, (c) causal heterogeneity across subsets of cases, (d) fusion of concerns for deviant cases and generalization, (e) fusion of idiographic and nomothetic modes of explanation, and (f) systemization of small- to moderate-*N* studies.

A notable characteristic of the approach, which like NAI has its limitations, is the approach's diffuseness. Presented by Ragin as a bridge between, on the one hand, case-oriented modes of research that are typically intensive, qualitative, holistic, idiographic, nonstatistical, and geared toward the illumination of particulars and, on the other hand, variable-oriented modes of investigation that are typically extensive, quantitative, analytical, nomothetic, statistical, and geared toward validated generalization, QCA suggests methodological moorings all along the methodological waterfront. This breadth does have advantages. One person's diffuseness is another's versatility; and QCA may systematize small-*N* studies or bring case-oriented virtues to moderate-to-large-*N* studies as well as strike a whole range of balances between these extremes. It also may be used in an inductively intensive manner to build theory from sensitizing concepts and working hypotheses or to test the fit of a logically well-articulated theory to the facts. However, the breadth of QCA has the disadvantage of confusing us with too many mutually exclusive options. For example, are we to choose a large-*N* design that augments the risk that we will fail to attain a deterministic solution but increases the likelihood that we may have the degrees of freedom to complement QCA with conventional, statistically grounded theory testing claims in the case of a deterministic solution? (See Ragin, Mayer, and Drass (1984) for a statistical augmentation of QCA.) Or are we to choose a small-*N* design that facilitates a careful attention to subtleties of measurement and historical context for each case but confines our efforts to theory building in the absence of sufficient cases to marshall statistical evidence (neither vitiated by scarce degrees of freedom nor by capitalization on chance) for our conclusions?

Ragin's (1987, chap. 6) presentation of QCA as a hybrid method that stresses both the discovery functions of theory building and the justification functions of empirical verification/falsification attempts, of course, to finesse any sharp distinction between QCA as discovery and QCA as justification (see Popper [1959, 1963] on these distinctions). However, the limitations of QCA relative to statistical modes of theory testing and, more fundamentally, scientific justification persist. In particular, although Ragin (1987) distances his hybrid formulation of QCA from statistical modes of justification, Lieberson's (1991) assumption that statistical induction stands alone as the final abitrar of scientific truth is widely held. Moreover, the usefulness of deterministic methods, Boolean or otherwise, for tests of hypotheses—that is, as relatively authoritative empirical adjudications of the truth of hypotheses as opposed to more provisional empirical grounds for posing them—has been questioned (Lieberson 1991). To such skepticism, I would assert that QCA addresses Popper's (1959, 1963) falsificationist canons of science. Precisely specified propositions—for example, ones hypothesizing that a particular outcome O is equivalent to A and B or C and D—may not be borne out by analyses; that is, they are vulnerable to falsification in Boolean terms. Indeed, even Boolean analyses of lengthy lists of hypothesized *explicantia* may not yield deterministic logical expressions that fit all cases without contradiction.

Nevertheless, canons of statistical inference cannot be invoked to absolve a Boolean conclusion of the charge that it arose by chance (Lieberson 1991). In light of this criticism, a theory-building approach that draws on the dual logical and inductive strengths of Boolean analysis, without making the kind of strong theory-testing—or, more generally theory-justifying—claims commonly made for statistical tests, seems wise. A narrowly theory-building approach that is distanced from strong claims for theoretical assessment as well as from statistical theory testing per se seems especially appropriate—at least where confinement to small (or even moderate) numbers of cases is mandated by limited empirical instances of a theoretical domain or by limited access to data on the domain. Such an approach not only favors theory building over theory testing, leaving any definitive testing claims to later investigation—if and when larger data arrays are available—it also involves the choice of relatively small-*N* studies that allow contextual sensitivity, and it capitalizes on the advantages of QCA already outlined.[8]

BRIDGING QCA AND NAI

Bridging NAI's implementation of the method of the working hypotheses and QCA's Boolean techniques for assessing the fit of explanation to data and reformulating explanation in light of such fit potentially makes for a fruitful exchange between the two analytical procedures. QCA can greatly increase NAI's analytical power, whereas NAI can help provide QCA with a focus on a theoretically disciplined method of inductive theory building.

About analytical power, the Millian method of differences might appear to liberate systematic logical comparisons of cases by moving beyond the consideration of positive outcomes alone to negative outcomes as well. However, as a logical method, the Millian approach, although it can be applied to a series of bivariate relations, is too undeveloped for truly multivariate analyses, whereas as a gateway to an alternate, statistical mode of analysis (cross-tabular, log-linear, etc.), it leads up a pathway potentially obstructed by scarce degrees of freedom, cumbersome nonadditive (e.g., interactive) specifications, and unstable (e.g., multicollinearly degraded) estimates (Ragin 1987, pp. 60-2, 191-2; Lieberson 1991).

The Boolean procedures of QCA break the Millian logjam, routinely permitting multivariate, logical analyses of small to moderate numbers of cases that may include contextual sensitivity and causal heterogeneity. If we are confined to nominal variables, so is logical analysis. Moreover, if experience with statistical studies leaves the impression expressed by Lieberson (1991, pp. 311-2) that the invariant (or errorless) solutions that QCA requires for closure are unlikely events, experience with QCA itself indicates that this approach's deterministic closure is *not* prohibitively ellusive (see Ragin 1987). If only use of the statistical-inductive conventions of most social science theory testing is judged to offer conservative grounds for final adjudication of hypotheses, a theory-building interpretation of analyses may be adopted. Severed from strong claims for final justification (Popper 1959, 1963) of the truth of a theory, theory-building approaches have long encouraged methods of systematic reasoning and comparison as well as of unsystematic conjecture (Eckstein 1975; Hage 1976). Moreover, NAI and QCA, by drawing on empirical patterns and risking falsification (via nonclosure), at least entail some of the features of statistical-inductive theory testing. Thus they would appear to provide at least some grounds for adjudicating the credibility of theories.

This is what NAI can provide QCA in exhange for its Boolean technique: relatively precise procedures and long-standing precedence (e.g., Lindesmith 1947; Bloor 1983; Rueschemeyer et al. 1991) for implementation of the "method of working" hypotheses. NAI provides the most systematic prescription to date—at least prior to QCA—for theory building as a progressive inductive specification and development of an initial set of working hypotheses. It also articulates a kind of interaction between theory and data that many practioners of small-*N* comparisons have been practicing right along.

Moreover, NAI comes down decisively on the side of the discovery function of theory building as opposed to the justification the function of theoretical assessment. Although Ragin (1987, 1993) stresses the theory-building capabilities and uses of QCA, and even distances QCA from statistical theory-testing procedures, he also advanced QCA as a kind of hybrid of theory construction (i.e., discovery) and assessment (justifying). In so doing, he eludes but does not disarm the core objection of Lieberson (1991) to all deterministic approaches. This objection consists of the presumably widespread view that *deterministic* approaches cannot claim to implement the distinctively scientific empirical canons of theoretical justification because these are coterminous with *statistical* induction.

Here, I propose a theory-building variant of QCA that builds on the tradition of analytical induction, or similarly, a Boolean implementation of NAI. Its specific emphasis is on, first, Boolean tools for the "comparative analysis of cases marked by negative as well as positive outcomes to determine whether the hypothetical explanation fits the facts of the cases" (Cressey 1950, p. 51). It is also on "reformulation of the hypothetical explanation . . . if the hypotheses do not fit the facts"; indeed, it emphasizes Boolean implementation of any "repetition of the procedure of examining cases" that may be needed so that "a universal relationship is established" (Cressey 1950, p. 51).

The second bridge links the NAI stress on the reformulation of hypotheses in the face of negative evidence with specific features of QCA's capacities for complex logical formulation and reformulation of data configurations (multiple conjunctural causation, causal heterogeneity, etc.). In one sense, the first bridge has already done this because it connects QCA's Boolean tools to NAI as general analytical techniques: When we redo an analysis to better fit the facts, we will be using these Boolean techniques to reformulate conclusions. However, in another sense this bridge is new because Boolean analysis smuggles in an element of reformulation right from the start. If we start Boolean analysis with hypotheses about the relevance of W, X, and Z for Y, we emerge from it with a particular reformulation of the logical expression linking Y to W, X, and Z. For example, Ragin's (1987, pp. 95-7) Boolean analysis of "successful strikes" (Y) yields the following initial formulation of the relevance of "booming product market" (W), "threat of sympathy strikes" (X), and "large strike funds" (Z). Successful strikes equal booming product markets and sympathy strike threats or booming product markets and large strike funds or sympathy strike threats and the *absence* of large strike funds. This is to say in formal terms that Y = WX + WZ + Xz.

This formulation is already a reformulation of the initial theory that Y = f(W, X, Z). In particular, the mere joining of explanatory factor by "or" signs (i.e., +) and "and" signs (here implicit in WZ, WX, etc.) realizes more possibilities than our empirical insights and theoretical imaginations are likely to grasp, much less pin down, unaided by Boolean analysis. For example, it reveals heterogeneous causal configurations differentiated by "or" operators and conjunctural explanations marked by combinations like "booming product markets" and sympathy strike threats (or WZ). Thus the thrust toward inductive specification of theory that is at the heart of the method of working hypotheses is built into the Boolean analysis.

EXTENDED ILLUSTRATION OF THE BRIDGES BETWEEN QCA AND AN

In this research I hypothesize that early social security program consolidation in the sovereign industrialized nations of Europe and the English settler colonies resulted from a configuration of statist and political economic factors. Program consolidation refers to a state's adoption of most major types of social security programs extant during a given era.[9] Early consolidation refers to the adoption of three of the four major programs—old age, health, workman's and unemployment compensation insurance—by 1920.[10]

I focus on developed capitalist nations around the outset of the first World War. The core population of relatively developed nations consists of Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States. The population, in fact, includes all of the world's mass-franchise democracies prior to the conclusion of World War II (except Argentina and Uruguay, on which fully comparable data are not available), plus two more nations. These are Austria and Germany, which were proto-democracies that—despite severely circumscribed parliamentary authority—had extensive enfranchisement, parliamentary policy-making, and electoral competition for parliamentary office (Hicks, Mira, and Ng forthcoming).

Drawing on a class perspective, I expected a strong early record of welfare program innovation from states characterized by political democracy and strong working-class mobilization. Drawing on statist theoretical perspectives, I expected strong welfare program consolidation from states characterized by patriarchal statism and unitary democracy. In light of democratic pluralist stress on loose class-group linkages and party articulations, plus empowerments of group interests and identities, I expected centrist (liberal and Catholic) party governments to contribute to the emergence of income security reforms. In addition, historical accounts of early welfare state formation grounded expectations combining factors from varied theoretical perspectives. One is the Bismarckian thesis that the first national social insurance innovations emerged in Germany as a strategic response of patriarchal states to the growing strength of the socialist workers' movements. Another is the so-called lib-lab pattern of social reform, abstracted from accounts of Lloyd George's 1908-1911 reforms (Ogus 1982; Williamson and Pampel 1993). This stresses strategic responses of liberal governments to growing labor strength. These Bismarckian and lib-lab patterns were expected to generalize beyond the German and British cases.

Data and measures. The measure of early program consolidations (Consolidation) involves a simple 1-0 binary coding of nations with or without at least three of the four major social insurance programs in place under national law by 1920 (see U.S. Department of Health and Human Services 1990). Programs must be either (a) binding or (b) extensively implemented and funded. They must be binding in the sense of being (a) legally compulsory for some set of national actors (citizens, firms, etc.) or (b) virtually binding as in the case of Ghent unemployment programs.[11] Further detail on the measurement of consolidation are presented in the appendix.

Paternalistic statism (PATM) taps institutional and cultural legacies of traditional authoritarianism with its corollary traditions of paternalism, noblesse oblige, civil service privilege, and mass patronage already described in Esping-Andersen (1990), Hicks and Swank (1992), and Huber, Ragin, and Stephens (1993) (see appendix). Unitary Democracy (UDEM) is measured in terms of the joint presence of state centralization and Therborn's (1977) variant of polyarchy. In particular, centralization is measured in terms of unitary, as opposed to federal, government. Democracy is defined, following Therborn (1977), as the rule (by 1914 at latest) of officials who are competitively elected in systems marked by at least extensive, if incomplete or unequally weighted, adult franchise.

Working-class mobilization (WORK) is a measure of union and socialist party strength. It is coded as 1 for nations with (a) at least 20% of the labor force unionized (averaged across union density for 1913 and 1919) or (b) at least 20% vote for Left (Socialist, Social Democratic, Communist, and Labour parties) across all national elections to lower, or sole, house of legislature, 1906-1919 (see Mackie and Rose 1982).[12] The measure is otherwise coded zero. Union density figures are from Stephens (1979, Table 4.8) and are normed on total rather than nonagricutural labor force because of the greater relevance of the former as a baseline for the measurement of political clout. The Left vote is measured for Socialist, Social Democratic, Communist, and Labour parties across all national elections to the lower (or sole) house of legislature, 1906-1919 (Mackie and Rose, 1982).

Liberal (i.e., Democratic and non-Catholic center) party government (or LIBG) is measured with 1 for nations with governments led by liberal (i.e., Liberal, Free Trader, Radical, Center, or Farmer) parties in at least 40% of the years since the initiation of democracy (i.e., DEMO). Catholic (Christian Democratic, Catholic Conservative, Catholic Republican, and confessional) government (or CATHG) is measured for 1880-1920 with 1 for nations with Catholic government (or Catholic-led coalitional government) for at least 40% of the pertinent democratic period and a 0 for any other nation (see appendix).[13]

Analyses and findings. The proposed explanatory elements fit the data on program consolidation (see Table 4). The Boolean analysis yields a logical expression in which the composite, right-hand side (taken as a whole) constitutes a necessary and sufficient condition for the outcome on its left-hand side.

Panel A of Table 4 presents the primitive terms for each nation, the distributions of hypothesized explanatory conditions and outcomes across our 16 core cases. Austria, Belgium, Denmark, Germany, Italy, the Netherlands, Sweden, and the United Kingdom emerge as consolidators. Some patterns of preconditions are already, no doubt, apparent for particular cases from the table's distributions of preconditions, but full extraction of patterns requires Boolean reduction.

After reduction, the equation of Table 4 for positive outcomes is,

$$\begin{gathered}\text{CONSOLIDATION} = \text{cathg PATM udem WORK} \\ + \text{LIBG cathg UDEM WORK} + \text{ligb CATHG PATM UDEM}.\end{gathered} \tag{1}$$

Not only is the right-hand side of the expression a necessary and sufficient condition for the left-hand side, the presence of any one of the following three combinations of factors is a sufficient condition for 1920 consolidation: (a) the joint presence of patriarchal statism and working-class mobilization and absence of both Catholic government and a unitary democracy; (b) the joint presence of liberal party government in a context of working-class mobilization and unitary democracy and absence of Catholic government; or (c) the joint presence of Catholic government, of unitary democracy, and of legacies of patriarchal statism and the absence of liberal government.

The Bismarckian configuration for welfare state consolidation that is represented by the first combination emerges for Austria, Germany, and Italy.[14] The lib-lab, unitary-democratic pathway emerges for Denmark, Sweden, and the United Kingdom. Catholic paternalism emerges as a third way to early welfare state consolidation. Belgium and the Netherlands, the nations characterized by

TABLE 4: Post-Great War Consolidation With 16 Cases

A. Primitive Terms

Conditions	*Outcomes*	*Cases*
L T P U W	O	
1 0 1 1 1	1	Denmark, Sweden
1 0 0 1 1	1	United Kingdom
0 0 1 0 1	1	Austria, Germany
1 0 1 0 1	1	Italy
0 1 1 1 1	1	Belgium
0 1 1 1 0	1	Netherlands
0 0 0 1 0		Australia
1 0 0 0 0	0	Canada, Switzerland, United States
1 0 1 1 0	0	France
1 0 0 1 0	0	Norway, New Zealand
0 0 1 0 0	0	Japan

B. Reduced Terms

CONSOLIDATION = cathg PATM udem WORK (Austria, Germany, Italy) + LIBG cathg UDEM WORK (Denmark, Sweden, United Kingdom)
+ ligb CATHG PATM UDEM (Belgium, Netherlands)

NOTE: O = 1920 program consolidation; P = patriarchal statism (PATM); L = liberal party government (LIBG); U = Unitary Democracy (UDEM); T = Catholic party government (CATHG); W = working-class movement (WORK).

Catholic party government, patriarchal statism, and unitary democracy, but free from the complication of liberal government, also achieve early consolidation.

ILLUSTRATION OF THE BRIDGES

Bridge 1: A Boolean solution for the method of the working hypothesis. The preceding Boolean solution allows a dramatization of the possibilities opened up by traffic moving both ways across the first bridge linking QCA and NAI. From the perspectives of benefits received by NAI from the Boolean side of the span, it is difficult to imagine any logical solution to the data of Table 4 emerging from application of the Millian method, even the indirect method of difference. The virtually bivariate constraints of this method could not have mastered these data, which take three alternative combinations of explanatory variables to reproduce consolidation/nonconsolidation.

From the perspectives of benefits received by QCA from NAI, a stress on theory building allows us to forego agonizing over the equivalence of our analysis to a statistical-inductive process of theory testing. This is not to say that the process of simultaneously logical and empirical analysis pursued here does not provide an evidential basis for the final formulation. Nonetheless, Lieberson (1991) suggests that probabilistic elements rooted in real-world process, in causal underspecification, and in measurement error make deterministic solutions exceedingly unlikely. Yet a sensible formulation of 1920 program consolidation as a function of five explanatory factors has been achieved that is fully consistent with the data. In line with Popper's (1963) principle of falsifiability, this has occured where it is possible that no solution at all might have emerged. Moreover, this has been achieved for a small number of cases that would have placed severe constraints on statistical induction's need for statistical power and, in turn, ample observations. However, further investigation along conventional enumerative lines is still possible. Additional analyses in Hicks et al. (1993) suggests that the present three-configuration formulation complicated by distinctions between relatively industrialized and unindustrialized nations might be applied to a global sample of nations circa 1920. With a quantum leap in data collection, this extention of the present theory could be studied using a statistical procedure such as event history analysis (Allison 1987).[15] More important, a moment of relative closure has been reached in a process of empirically, theoretically, and logically disciplined theory construction. If further research in a different methodological mode can advance empirical scrutiny and conceptual refinement of the current model, all the better. If not, this model has already been subjected to the possibility of empirical inadequacy under the evaluative standards of NAI and QCA. In brief, QCA provides a multivariate logical technique for NAI, whereas NAI focuses the theory-building powers of QCA.

Bridge 2: Mutivariate reformulation. The Boolean solution exemplifies QCA's Boolean capacity to reformulate an initial list of causally relevant factors into a precisely specified logical/theoretical expression. From the open-ended theoretical frame, which merely identified potential explanatory factors (vaguely suggesting their possibly conjunctural operation), we arrive at a new level of theoretical articulation. This (re)formulation is complex yet intelligible because the differentiation of causal configurations and, by implication, distinct causal routes to early welfare state consolidation brings us back to a few subsets of cases (e.g., Austria and Germany; Belgium and the Netherlands), each small enough for a degree of in-depth understanding.

This theoretical articulation also bridges the understanding provided by causal heterogeneity with the universality of nomothetic general theory. Heterogeneity and universality are bridged because the logical expressions "or" terms join the three causal configurations within one overarching generalization. Indeed, within the limits of the stipulated theoretical domain of relatively industrialized nations, this expression is universal, subsuming the proper names of history (Germany, the United Kingdom) under a general formulation.

CONCLUSIONS AND DISCUSSION

Three routes to welfare state consolidation emerge from this Boolean analysis of a set of working hypotheses. NAI motivated a central focus on the reformulation, specification, and development of the working hypotheses. QCA empowered the analysis with the logical nuance (ands, ors) and multivariate computational power of Boolean logic. In light of Lieberson's (1991) criticisms of logical modes of induction viewed as methods of final theoretical adjudication, this *theory-building* focus is one of the most clearly appealing focuses of both NAI and QCA. Situating QCA within the tradition of analytical inductive work both narrows and deepens QCA's focus on theory building. Incorporating QCA into the analytical inductive tradition greatly enhances its theory-building powers.

We might, in line with NAI's attention to outcome reclassification, have built a third bridge linking NIA to QCA, in particular to QCA's concern with "outcome complexity" (Ragin 1993, pp. 305-6). Here, QCA's ability to detect heterogeneous causal configurations can inform reclassifications of single outcomes into multiple ones. (As common things have long been conjectured to have common causes, things with differing causes might be supposed to be different things.)

However, reclassification is inessential to NAI as well as to QCA. NAI may refomulate explanations as well as reclassify outcomes, whereas QCA's routinely generated alternate configurations presume like outcomes.

Aided by insights from QCA, I propose this final specification of NAI:

1. Define an outcome.
2. Propose a multivariate working explanation of it.
3. Study cases with negative as well as positive values of the outcome, using the Boolean procedures of QCA.
4. Reformulate the initial explanation of the outcome if the analysis does not yield a deterministic solution for all the cases; theoretically and substantively assess the Boolean (re)formulation of the initial explanation if it does, further modifying the Boolean (re)formulation if it does not meet this assessment.[16]
5. Repeat the above until a substantively and theoretically adequate determininistic solution is reached, considering any illuminating reclassification of the initial outcome along the way.
6. Consider results relatively provisional insofar as an inductive-statistical rearticulation of the formulation of Step 5 is practical, but relatively definitive insofar as further testing is impractical.

This last step brings QCA to a point of closure, although replication by others using different methods is, of course, advised. For example, where new data permit, more conventional modes of theory testing may be used as well.

This Boolean implementation of NAI, or analytical inductive variant of QCA, should contribute to the investigative power and focus of reseachers as diverse as cross-national comparativists and symbolic interactionists.

APPENDIX

Post-Great War Welfare Program Consolidation (Consolidation). Coded 1 or consolidated for nations with a well-funded or compulsory national law with ample coverage (i.e., coverage of at least 15% of target population) for at least three of the four major program types by 1920; otherwise coded zero. Data on program characteristics are from U.S. Department of Health and Human Services (1991), Flora (1983, Vol. 1, p. 454), and additional sources documented in Hicks et al. (1993).

Liberal government (LIBG). Liberal (Democratic and non-Catholic Center party) leadership of government, measured for 1880-1920 with 1s for nations with at least 40% years of government by a liberal party (i.e., Liberal, Free Trader, Radical, Center, or Farmer's party) or liberal-party-led coalition of parties in years since inception of democracy. Data are from Flora (1983, pp. 155-90), Mackie and Rose (1982), and Jacobs (1989).

Catholic government (CATHG). Catholic (Christian Democratic, Catholic Conservative, Catholic Republican, and confessional) party leadership of government. Measured for 1880-1920 with 1 for a nation with at least 40% years of government by a Catholic party or Catholic-led coalition of parties in relevant years since democracy and a zero for any other nation. See Flora (1983, pp. 155-90), Mackie and Rose (1983), and Jacobs (1989).

Paternalistic statist legacy (PATS). The sum of the following 5-point measures: (a) absolutist legacies, or the extent of 18th- and 19th-century state absolutism, as in Esping-Andersen (1990) and as coded from materials in Rokkan (1970, chap. 3, Table 1); (b) resisted enfranchisement, as inspired by Esping-Andersen (1990) and coded from materials in Rokkan (1970, chap. 3, Table 2); (c) class rigidity, or the strength and precision of vertical status differentiation, an elaboration of Lipset (1983); and (d) Huber et al.'s (1993) measure of absolutism, coded 1 for nations at least as paternalistic as Sweden; otherwise coded 0.

Unitary Democracy (UDEM). Nations were coded 1 that had (a) full or exclusivist democracy since at latest 1914, where full democracy requires legislative representation (with competitive parties) and extensive, if incomplete or unequally weighted, adult franchise (equal to 0 for Austria, Germany, and Japan); and (b) unitary, as opposed to federal, structure of government reflecting constitutional and de facto national subordination of subnational governmental jurisdictions by means of appointment powers, chains of command, and control of revenues (e.g., Blondel 1969, pp. 283-301; Lijphart 1984, p. 14; Hage, Gargan, and Hanneman 1989). Other nations coded 0.

Early working-class mobilization (WORK). This is a measure of working-class mobilization coded as 1 for nations with (a) at least 20% of the labor force unionized (as averaged across union density figures for 1913 and 1919 figures from Stephens [1979, Table 4.8]) or (b) at least 20% vote for Left (Socialist, Social Democratic, Communist, and Labour parties) across all national elections to lower, or sole, house of legislature, 1906-1919 (see Mackie and Rose 1982). The measure is otherwise coded 0.

NOTES

1. In addition, zero conjunctions of not-C and P enhance confidence in the hypothesis *C implies P* by excluding falsifying instances (Stinchcombe 1968, chap. 1) and joint instances of not-C and not-P instantiate the proposition. Confinement to the P column of Table 1 suffers from the exclusion of this possibility.

2. Although Table 1 is not a truth table for C and P, its four-cell variant duplicates the information in a truth table for C and P.

3. Robinson's (1950, p. 816) prescribed focus on cases marked by both negative and positive outcomes is what the early classical studies of Lindesmith (1947) and Cressey (1950) actually pursued.

4. With one case, the sufficiency (or necessity) of C for P is suggested by one case in Cell 1 (or 4); relationships of sufficiency are falsified by a case in Cell 3; and ones of necessity are falsified by a case in Cell 2.

5. The question of an initial theory's population is relevant, because a focus on cases beyond the theory's domain would be irrelevant whereas a focus on a subdomain would require some differentiation of one's theory. At every step, articulation about the domain of one's theory (working hypothesis, etc.) is necessary (see Griffin, Botsko, and Isaac 1991; Hicks, Misra, and Ng forthcoming).

6. Enumerative induction is based on the relative frequency of cases in the categories of a bivariate or, indeed, multivariate distribution (see Table 2), not just of the presence or absence of cases in cells. Thus a strong probabilistic relationship between C and P would obtain merely on the basis of higher relative frequency of cases in Cells 1 and 4 than in Cells 2 and 3.

7. Robinson asserts that analytical induction is the subset of statistical induction in which cell probabilities have values of 0.0 or 1.0. I further address Robinson's critique of AI as proof in an appendix available on request.

8. As for other specific shortcomings, QCA is weak relative to conventional narrative methods regarding descriptive suppleness (White 1987), and it is weak relative to formal narrative analysis regarding explicit analysis of temporal sequence and causality (Griffin 1993). Like NAI, it also forsakes the exploratory intensivity of case study approaches and of one-case-at-a-time approaches like classical AI (see Fagin, Orum, and Sjoberg 1991; Cressey 1951). However, these limitations are ones exposed from the vantage points of humanistic attempts to refine or debunk social science, whereas the limitations with regard to justification are exposed from the perspective of scientific epistemology itself. The latter limitations are thus more basic to authors who are, like myself, favorably disposed to the ideal of a social science.

9. Furthermore, they should be extensive and well funded in the sense of covering at least 15% of target (e.g., demographic) group and being adequately funded (within a few years) to provide notable benefits.

10. Possession of three programs out of four was chosen over possession of all four programs on the grounds that the more stringent (four-program) classification, which would confine us to Germany and the United Kingdom alone, would be too restrictive. A two-program classification, which would encompass all cases but Canada, France, and the United States, would be too permissive.

11. Ghent systems provide unemployment compensation as a union benefit but involve unions so replete with selective incentives like unemployment compensation that union membership, although formally voluntary, becomes compelling. In Hicks et al. (1993), a second measure requiring both of these criteria is used as a check on robustness and for additional

perspective, but use of the more stringent measure yields similar findings (as do analyses with slightly different nations).

12. Data points of 1913 and 1919 are used for lack of more extensive data. A 20% cut point is used for union and party measures because it taps thresholds of organizational strength paralleled in the literature (e.g., to differentiate stronger Australian unions from weaker New Zealander ones and stronger Austro-German Lefts from weaker Low-Country ones). Both union and party criteria are used because of a tendency for some nations to be notably strong on one criterion but not the other. For example, in Britain (32% on union density and 7.8% on Left vote), labor unions sufficed to be bulwarks of liberal government during 1908-1914; in Italy electoral support for the Left (scored 22.5%) was strong enough to sustain lib-lab governments despite low union membership (7%).

13. The strength of liberal (and Catholic) government is coded for years in which nations are, at least, democracies of the exclusive (partial franchise) sort allowed by my Therbornian definition of democracy. Chosen as a threshold was 40%, which permitted a substantial share of democratic rule without requiring that it rule during most years. Liberal and Catholic government charactertizations of a period are not mutually exclusive, but each type of rule tends to crowd out the other and the two are correlated negatively.

14. The Austrian and German cases fit the model neatly (Rimlinger 1971; Hofmeister 1982). Italy's fit to the cathg PATM udem WORK Bismarckian profile depends on her characterization here as a decentralized and hence nonunitary democracy due to her extremely decentralized administration of a formally unitary state (Hage, Gargan, and Hanneman 1989).

15. The appropriate Boolean expression would be CONSOLIDATION = cathg PATM udem WORK DEVT + LIBG cathg UDEM WORK DEVT + ligb CATHG PATM UDEM DEVT, where DEVT denotes the presence of a relatively high level of industrialization.

16. As a first approximation, theoretical and substantive adequacy refers, at least, to plausibility in terms of relevant theoretical materials (i.e., concepts), substantive ones (facts), and perhaps, such more general standards of theoretical and historical assessment as scope and parsimony.

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