Innovation in the States: A Diffusion Study*

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In the past decade political scientists have witnessed an outpouring of literature on state policy outputs. Although policy is generally acknowledged to be a multidimensional phenomenon, comparative state policy research, with a few exceptions, has had expenditures as its primary focus. One of the few nonmonetary dimensions investigated previously was innovation by states.[1] This article seeks to extend in a more rigorous fashion the investigation of innovation by states.

Introduction

An innovation is generally defined as an idea perceived as new by an individual; the perception takes place after invention of the idea and prior to the decision to adopt or reject the new idea.[2] In this study, as in Walker's, an innovation is more specifically defined as a law which is new to the state adopting it, i.e., it is equivalent to a single adoption.

The observable data are the adoptions by states of particular laws. When states first learned of the idea is unknown. The data do not encompass new ideas or practices adopted by the state's bureaucracy, nor do they include "disadoptions" by means of a state court's declaring a law unconstitutional. In practice, innovation may stimulate huge appropriations or it may have little monetary impact if the program is adopted but never funded. Consequently, there is good reason to study the process by which states adopt new ideas as well as the process by which they maintain existing programs, i.e., expenditures.

The laws under consideration here are from issue areas central to the "have have-not" struggle, described as the essence of politics by V. O. Key, Jr.[3] It is more likely that a political explanation, not an economic one, can account for differences in selected "have-not"-oriented policy areas than it can for the broad range of policy areas included in some studies.

The policy areas selected are education, welfare, and civil rights. Education was singled out by Key as an arena of "have have-not" conflict;[4] welfare was the focus of Cnudde and McCrone's study specifically because of its centrality to the "have have-not" struggle;[5] the adoption of civil rights was the focus of a study by Lockard, one of Key's former students.[6] Within the areas selected there is some potentially interesting variation: Education is probably less "have-not"-oriented than the other two fields; civil rights innovations ordinarily would require less funding than public welfare or education programs.

Insofar as possible, the laws selected were ones whose adoption was free of federal influence because in expenditure analyses it has been found that federal spending often has a substantial impact on state and state-local spending patterns.[7] Some of the laws considered here were enacted by states prior to the federal government's entry into the field, e.g., public welfare laws before 1935. Others deal with subjects exclusively in the state's jurisdiction, e.g., teacher certification. This distinction between federal stimulation and state initiative is not made in Walker's exploratory work. Walker treats the dates on which states began to participate in federal grant-in-aid programs the same as the dates states adopted laws independently. Hence, the results of the two efforts may vary somewhat.

The laws also were selected for the durability of the issue; it took a long time for all states to adopt any one law. Indeed, the data extend back as far as the 1780s in one case. In some instances the process of adoption by all states is not yet complete. All laws in the three policy areas which meet these criteria and whose dates of adoption were summarized in available sources were selected. Table 1 lists the laws, the time periods during which they were adopted,

* The author wishes to acknowledge with gratitude the constructive criticisms of Professor John Sprague and Professor James W. Davis, Jr., Washington University, and Professor John Wanat, University of Kentucky. The author is also grateful for the financial support of the Woodrow Wilson Foundation.

[1] Jack L. Walker, "The Diffusion of Innovations Among the American States," *American Political Science Review*, 63 (September, 1969), 880–899.

[2] Everett M. Rogers, *Diffusion of Innovations* (New York: Free Press of Glencoe, 1962), p. 13.

[3] V. O. Key, Jr., *Southern Politics in State and Nation* (New York: Alfred A. Knopf, 1949), p. 307.

[4] Key, p. 307.

[5] Charles F. Cnudde and Donald J. McCrone, "Party Competition and Welfare Policies in the American States," *American Political Science Review*, 63 (September, 1969), 858–866.

[6] Duane Lockard, *Toward Equal Opportunity: A Study of State and Local Anti-Discrimination Laws* (New York: Macmillan, 1968).

[7] Richard E. Dawson and Virginia Gray, "State Welfare Policies," in *Politics in the American States*, 2nd ed.; ed. Herbert Jacob and Kenneth N. Vines (Boston; Little, Brown and Co., 1971), p. 459.

and the number of states adopting them.

Using this data base, we will consider three questions: (1) How do new ideas diffuse or spread among the states? They may diffuse like many other new ideas, through user interaction. If this diffusion process is regular, i.e., predictable, a dynamic model of the process can be constructed. Comparison can be made between policy areas to ascertain how diffusion differs according to the issue involved. (2) Why are some states more innovative than others? The common hypotheses relating competition and economic resources with public policy will be tested and the results compared by issue area. (3) Are there identifiable patterns of innovation? An effort will be made to determine if the same states are innovative in all three policy areas.

Diffusion of Innovations

The process by which an innovation spreads is called diffusion; it consists of the communication of a new idea in a social system over time.[8] Diffusion research has been carried out in the disciplines of: anthropology (e.g., the diffusion of cultural traits among primitive tribes); rural sociology (e.g., the diffusion of hybrid seed corn among farmers);[9] medical sociology (e.g., drug adoptions by physicians);[10] education (e.g., some 150 studies made at Columbia University under the direction of Paul Mort); industry (e.g., the diffusion of a new product among consumers); political science (e.g., the diffusion of city manager governments in the 48 states);[11] and medicine (e.g., the contagion of a disease).[12]

Empirical investigation in rural sociology, sociology, and education has demonstrated that for a wide variety of innovations, the frequency of their adoption over time is normally distributed; their cumulative distribution over time has the "S"-shape of the cumulative normal curve.[13] Three explanations are offered in the literature for this repeated finding:

(1) The time of adoption for any given case "is determined by the interplay of an infinitely large number of elements in the social milieu," thereby fitting the requirement of the normal distribution that "the value of each event is the

[8] Rogers, *Diffusion of Innovations*, p. 13.

[9] Bryce Ryan and Neal C. Gross, "The Diffusion of Hybrid Seed Corn in Two Iowa Communities," *Rural Sociology*, 13 (March, 1943), 15–24.

[10] James S. Coleman, Elihu Katz, and Herbert Menzel, *Medical Innovation: A Diffusion Study* (Indianapolis: Bobbs-Merrill Co., 1966).

[11] Edgar C. McVoy, "Patterns of Diffusion in the United States," *American Sociological Review*, 5 (April, 1940), 219–227.

[12] Norman T. J. Bailey, *The Mathematical Theory of Epidemics* (New York: Hafner, 1957). For sources of 1500 other diffusion studies see: Everett M. Rogers and F. Floyd Shoemaker, *Communication of Innovations: A Cross Cultural Approach*, 2nd ed. (New York: Free Press of Glencoe, 1971), pp. 388–466.

[13] Rogers, *Diffusion of Innovations*, chap. 2, *passim*.

Table 1. Innovations in Three Policy Areas, Duration of Adoption Process, and Number of Adopters

Innovation	Time Period	No. of Adopters
Education		
State Boards of Education	1784–1949	40
Chief State School Officer	1835–1912	37
Compulsory School Attendance	1852–1918	48
Degree Requirement for Teaching in Elementary School	1930–1969	46
Degree Requirement for Teaching in High School	1896–1966	44
Welfare		
Merit System for State Welfare Dept.	1883–1942	48
Old Age Assistance	1923–1938	48
Aid to the Blind	1898–1945	48
Aid to Families with Dependent Children	1911–1937	48
Civil Rights		
Anti-Discrimination in Public Accommodations	1947–1966	31
Fair Housing (Public or Private)	1937–1965	19
Fair Employment	1945–1966	28

Sources: Fair Employment, Housing, Public Accommodations: Duane Lockard, *Toward Equal Opportunity: A Study of State and Local Antidiscrimination Laws* (New York: Macmillan Co., 1968), p. 24; U.S., Civil Rights Commission, *Voting*, Book 1 (Washington: Government Printing Office, 1961), pp. 208–210; U.S., Housing and Home Finance Agency, *Fair Housing Laws* (Washington: Government Printing Office, 1964), p. 10.

Merit System: Council of State Governments, *Book of the States, 1952–53*, 9 (Chicago: Council of State Governments, 1952), 179.

OAA, AB, AFDC: Anne E. Geddes, *Trends in Relief Expenditures, 1910–1935*, U.S., Works Progress Administration, Division of Social Research, Research Monograph 10 (Washington: Government Printing Office, 1937), pp. 91–92.

Degree for Elementary and High School: T. M. Stinnett, *A Manual on Certification Requirements for School Personnel in the United States* (1967 ed.; Washington: National Education Association, 1967), p. 80.

Compulsory School Attendance: August W. Steinhilber and Carol J. Sokolowski, *State Law on Compulsory Attendance*, U.S., Department of Health, Education, and Welfare, Office of Education, Circular #793 (Washington: Government Printing Office, 1966), p. 3.

Chief State School Officers and State Boards of Education: U.S., Federal Security Agency, Office of Education, *State Boards of Education and Chief State School Officers*, Bulletin #12 (Washington: Government Printing Office, 1950), p. 27 and p. 8.

result of the chance combination of a great many minute and relatively equal factors."[14]

(2) The cumulative normal curve is similar to an individual's learning curve which is "S"-shape in its cumulative form. Adoption by a state is then equivalent to a learning trial by an individual.[15]

(3) There is an interaction effect, i.e., adopters influence those in the social system who have not yet adopted. As more persons adopt, the effect on nonadopters increases.[16] Actually, the normality or non-normality of the adopter distributions is independent of the theoretical assumption that ideas spread because adopters somehow influence nonadopters.[17] Other curves, particularly the logistic curve of population growth, have been widely used to fit the same kind of data (innovations) with the same goodness of fit.[18] The interaction explanation is more appealing on substantive grounds; observers of state governments point out that decisionmakers emulate or take cues from legislation passed by other states. Indeed, this function is institutionalized in the Council of State Governments, financed largely by states. Walker argues that this competition of ideas largely determines "the pace and direction of social and political change in the American states."[19] Thus, in formal diffusion theory and in Walker's application of it to state governments, one assumption is that gain in adoptions is due to nonadopters' emulation of adopters. In the following section a simple interaction diffusion model is developed and then evaluated using the twelve laws being studied here.

A Diffusion Model Based on Interaction. The rate of spread of adoptions can be denoted by ΔA_t and is some function of those already adopting:

$$(1)\quad \Delta A_t = f(A_t),$$

where A_t is the cumulative proportion of adopters in the tth year and ΔA_t is the difference in the cumulative proportion of adopters at t and $t + 1$, defined as $\Delta A_t = A_{t+1} - A_t$.[20]

The most elementary way to consider the function f is as the number of pair relations between adopters and nonadopters or simply their product. This interpretation assumes that the population is completely intermixed, i.e., that "leaders" from each adopter state come in contact with "leaders" from each nonadopting state. Furthermore, the model omits diffusion from other sources, e.g., innovation stimulated by the minimum standards attached to federal grants-in-aid.[21]

If the proportion of adoptions is proportional to the interaction between those who have adopted and the potential adopters, then f could be expressed as:

$$(2)\quad f = bA_t(L - A_t),$$

where b is the coefficient of diffusion from interaction,

L is the maximum possible proportion of adopters for a particular law, and

$L - A_t$ is the pool of potential adopters in year t.

If $L = 1$, all states have the potential for adoption. There are compelling reasons, however, why every state will not be susceptible to adopting a particular law: Hard-to-amend limitations in the state's constitution or values of the political subculture might cause a state's leaders to be practically immune to diffusion from interaction. Therefore, L, the limit on the pool of eligible adopters, should be treated as a parameter to be estimated for each law.

By substitution,

$$(3)\quad \Delta A_t = bA_t(L - A_t)$$ and, after rearranging and decrementing the index t,

$$(4)\quad A_t = A_{t-1} + bA_{t-1}(L - A_{t-1}).$$

The cumulative proportion of states having adopted any law at year t depends upon the proportion of states retaining the law plus some proportion b of the interaction between previous adopters and eligible adopters. The coefficient of the first term, A_{t-1}, is set equal to 1, implying that all states which adopt a law keep it. Although this assumption is not strictly true in all cases (e.g., states may retain a law but

[14] H. Earl Pemberton, "The Curve of Culture Diffusion Rate," *American Sociological Review,* 1 (August, 1936), 550, 549.

[15] Rogers, p. 153.

[16] Rogers, p. 154–155.

[17] Rogers, p. 154–155.

[18] Coleman, Katz, and Menzel, pp. 100–103; however, for a warning on the futility of curve fitting as a satisfactory test of theoretical relevance see: William Feller, *An Introduction to Probability Theory and Its Applications,* II (New York: John Wiley & Sons, 1966), 52.

[19] Walker, "Diffusion of Innovations among American States," p. 890.

[20] For explanation of the application of difference equations to social data see: Samuel Goldberg, *Introduction to Difference Equations* (New York: John Wiley & Sons, 1958).

[21] More elaborate models could be constructed in which there is diffusion from a constant source like the federal government, or in which there is incomplete mixing of the population, e.g., regional or professional communication networks may produce distinctive diffusion patterns. For these more elaborate models see: James S. Coleman, *Introduction to Mathematical Sociology* (New York: Free Press of Glencoe, 1964), chap. 17.

not enforce it or states may revoke laws, as Mississippi, South Carolina, and Virginia have done for compulsory school attendance), the data sources are not systematically informative on this point. Hence, this model does not allow the process to go "backward."

By rearrangement, the equation becomes

$$(5)\quad A_t = 1A_{t-1} + bLA_{t-1} - bA_{t-1}^2,$$

whose parameters can be estimated by the following regression equation:

$$(6)\quad A_t = (1 + bL)A_{t-1} - bA_{t-1}^2 + c + e$$

where c is the intercept and

e is the error term.

If the intercept c is near zero, and if the error, e, meets standard expectations, then regression may furnish useful estimates of b, the contribution from interaction, and L, the maximum proportion of states susceptible to adoption of any one law.[22]

The interaction model was evaluated using as observations the cumulative proportion of states having adopted a particular law. Figure 1 below displays an example of the fit of the curve predicted by the model for adoption of the twelve laws. The squared term of the equation causes the regression line to depart from linearity and allows the "S"-shape characteristic of some cumulative adopter distributions.

The fit of the regression line is very good for all twelve laws, as Table 2 shows. Relying upon R^2 as the goodness-of-fit criterion, one can observe in column 1 that the variance explained ranges from .9380 for AFDC to .9976 for high-school degree requirement. Referring to the graphs, one will note that when adoptions are plotted over time, the high-school degree requirement data (Figure 2) approach a normal curve, but AFDC (Figure 3) presents quite a different picture—a damped oscillatory pattern.

It was stated previously that the error must be small and the regression constant c must be near zero in order for true estimates of the parameters to be given. As Column 2 of Table 2 shows, the intercept is very close to zero except in one case. That case is AFDC, whose intercept is .1320; that figure is sensible when you examine its graph (in Figure 3). The third column of Table 2 reports the error of the dependent variable relative to its standard deviation. The standard errors are rather small; again AFDC is the most aberrant. Therefore, by these criteria the simple model fits fairly well for these twelve laws.

Another basis on which one can evaluate the fruitfulness of the model is to examine the parameter estimates. Columns 4 and 5 of Table 2 allow for comparison of the estimated value for the parameter L and the last observed value. For eight of the twelve cases, the estimated value is close to the observed value; in two cases, the observed value is overestimated; in two cases, underestimation occurs. For each of the latter four cases there are technical reasons to anticipate poor predictions of L: low R^2's for

[22] J. Johnston, *Econometric Methods* (New York: McGraw-Hill Book Co., 1963), p. 7.

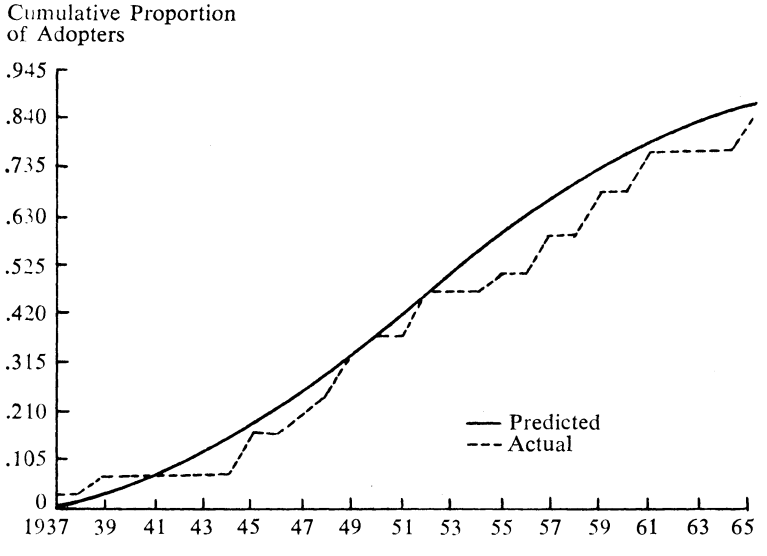

Figure 1. Predicted and actual curves for adoption of fair housing legislation, 1937–1965

Table 2. Evaluation of Interaction Diffusion Model, $A_t = A_{t-1} + bA_{t-1}(L - A_{t-1})$, for 12 Innovations

Laws	(1) R^2	(2) Intercept	(3) Standard Error	(4) Estimated L^*	(5) Observed L^*	(6) b
Civil Rights						
Public Accommodations	.9756	.0250	.0337	.590	.651	.15
Fair Housing	.9841	.0068	.0172	.391	.399	.32
Fair Employment	.9615	.0278	.0341	.468	.588	.06
Welfare						
Merit System	.9453	−.0227	.0483	1.486	1.000	.22
Old Age Assistance	.9772	.0039	.0570	1.079	1.000	.38
Aid to the Blind	.9931	−.0027	.0290	1.145	1.000	.14
AFDC	.9380	.1320	.0690	.769	1.000	.08
Education						
Boards of Education	.9951	.0019	.0229	.791	.840	.07
Chief School Officer	.9962	.0032	.0213	.731	.777	.14
Compulsory Attendance	.9960	.0075	.0216	1.019	1.000	.05
Degree, Elementary	.9931	.0130	.0268	1.014	.966	.07
Degree, High School	.9976	.0013	.0175	.895	.924	.15

* L = limit on the pool of adopters.

merit system, fair employment, and AFDC; negative intercepts for merit system and AB; a large intercept for AFDC; large standard errors for merit system and AFDC. More error seems to occur when attempting to predict the processes which have diffused completely. A more substantive interpretation is that error in prediction occurs for welfare laws; an explanation for this phenomenon will be offered in the section comparing issue areas.

The estimates of the parameter b in column 6 of Table 2 are also of interest; b can be interpreted as the probability that when "leaders" from two states meet, their interaction results in another adoption. Unfortunately, there is no criterion by which to evaluate the accuracy of

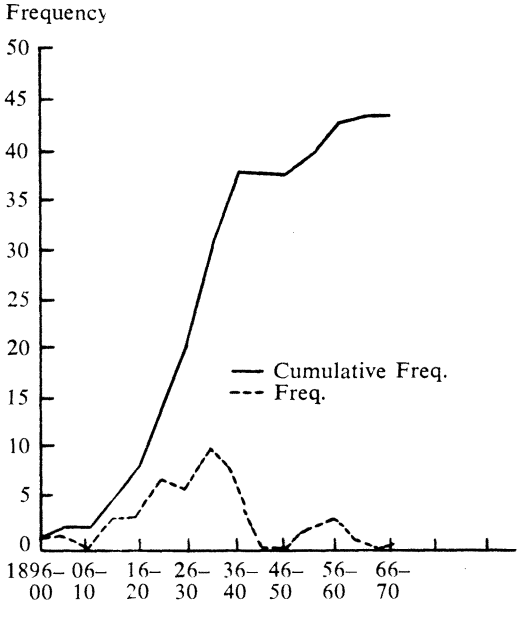

Figure 2. Adoption of degree requirement for teaching in high school by state, 1896–1966

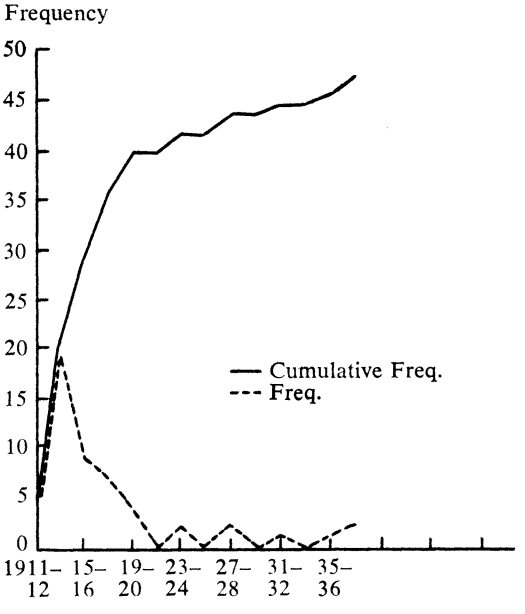

Figure 3. Adoption of aid to families with dependent children legislation by state, 1911–1937

these probabilities.[23] Interaction has the greatest impact in the diffusion of old-age assistance legislation. The fact that most of the b's are small is understandable, since for the graphs of most of these twelve laws a straight line with a "tail" at each end would fit. Therefore, a linear model was also evaluated, using the regression equation,

$$(7)\quad A_t = bA_{t-1} + c + e,$$

where the symbols are those defined earlier.

The R^2's of the quadratic model can be compared to the R's of the linear model, using the F-statistic as the test for significant difference.[24] As shown in Table 3, for 6 of the 12 models there is a significant increase in the proportion of variance explained when the interaction term is added. Consequently, in half of the cases studied, innovations seem to diffuse through interaction.

Table 3. Comparison of Quadratic and Linear Models for Twelve Innovations

Laws	Quadratic R^2	Linear R^2	F
Civil Rights			
Public Accommodations	.9756	.9750	.45
Fair Housing	.9841	.9831	1.56
Fair Employment	.9615	.9614	.04
Welfare			
Merit System	.9453	.9415	3.89*
Old Age Assistance	.9772	.9696	4.37*
Aid to the Blind	.9931	.9918	8.66*
AFDC	.9380	.9376	.18
Education			
Boards of Education	.9951	.9950	4.66*
Chief School Officer	.9962	.9958	12.33*
Compulsory Attendance	.9960	.9958	2.82
Degree, Elementary	.9931	.9928	1.63
Degree, High School	.9976	.9967	22.00*

* Significant at .05 level.

This simple interaction model holds up fairly well under evaluation on the basis of the criteria used above. The results generally confirm that some of these innovations diffuse as do others—through the interaction of users and nonusers. The next section compares the results by issue area. Certainly, one might want to refine the model, perhaps by adding a term for constant source diffusion and by relaxing the assumption of a completely intermixed population.[25]

Diffusion Patterns by Issue Area. Results from evaluating the diffusion interaction model can be put to a further use: comparing the three policy areas—education, welfare, and civil rights—with respect to diffusion from interaction. Several analyses of state expenditures, broken down by functional area, report that states vary in their level of support for each function, sometimes in response to the varied nature of the stimulus from federal grants-in-aid.[26]

Table 2 contained several points at which the issue areas differ. The average R^2 for civil rights is .9637; for welfare, .9634; for education, .9956. Innovations in education appear to occur with more regularity, possibly because the process took place over a longer period than in the other issue areas. Furthermore, within the area of education, there is little variation in R^2's among the various laws, while in the other two areas, there is marked variation in the amount of variance explained. Thus, one

[23] In general, the accuracy of b may depend upon the degree to which a social structure is completely intermixed. In this case, bias may be introduced by structural characteristics, such as regionalism, which reduce the number of relations *across* regional boundaries and increase the state contacts *within* regional communication networks. For an excellent discussion of communication networks at the state level see: Walker, "The Diffusion of Innovations Among the States," pp. 891–897.

[24] John Cohen, "Multiple Regression as a General Data-Analytic System," *Psychological Bulletin*, 70 (1968), 435.

[25] It should also be noted that several sources of error are possible in this model. First of all, the data are recorded as proportions based on 48 states; obviously, there were less than 48 states in existence for many years studied. Nevertheless, the model fits best for the longer processes (i.e., education) in which more states are absent; hence, this possible source of error did not have deleterious effect on the goodness of fit.

Another kind of error could arise from using a lagged dependent variable on the right-hand side of the regression equation; the assumption that the stochastic or disturbance term is normally and independently distributed may be violated in such a situation. A common test statistic for the presence of serial correlation (i.e., the disturbance at t is highly correlated with the disturbance at t-1) is the Durbin-Watson d. When proper adjustments are made for using a lagged dependent variable, the d-test indicates no serial correlation. (See Carl F. Christ, *Econometric Models and Methods* [New York: John Wiley & Sons, 1966], p. 522). Another test for normality is to collect the residuals into a frequency distribution and graph them. (See Christ, pp. 526–530). If the residuals are approximately normal, the graph will be bell-shaped. When this test was applied to three of the laws, the residuals did not appear by inspection to be normally distributed. Thus, the results of the two tests are conflicting concerning the error terms.

[26] See Virginia Hickman Gray, "Theories of Party Leader Strategy and Public Policies in the American States." (Doctoral dissertation, Washington University, 1972).

could say that education innovations diffuse in a regular and similar manner, for whatever reasons, whereas civil rights and welfare adoptions do not follow a single diffusion path unique to the subject matter of the law.

It is interesting to note from Table 3 that the interaction term makes a difference for 3 of 5 education laws, 3 of 4 welfare laws, and no civil rights laws. This tendency fits in with the other findings, all generally pointing to the conclusion that the normal diffusion of civil rights laws is met by resistance from particularly immune states.

Although the simple diffusion model does not allow for it, one might also differentiate patterns of adoption according to the amount of diffusion from a constant source relative to diffusion from interaction. For instance, one might hypothesize that program adoptions tied to federal grants-in-aid will diverge from the pattern of normality exhibited by programs adopted independently by states. For this reason, wherever possible, laws were chosen for this study from areas relatively untouched by the federal government. In the welfare area, programs were selected which began independently, though the last few observations (those after 1935) are of programs falling under federal aegis.

Walker in his landmark article does not anticipate much difference:

> In a later work I will report the results of comparisons of the diffusion patterns of issues from different subject matter areas. Preliminary efforts at such comparisons, however, have not revealed significant variations. There does not seem to be much difference in the diffusion patterns of issues of different types.[27]

Walker makes up his composite innovation score from 88 programs which represent a mixture of federal grant-in-aid and independent state programs. He includes five state programs which are used in this study: compulsory school attendance, fair housing, teacher certification at both levels, and superintendence of public instruction. Their graphs are displayed in Figures 4–7 and in Figure 2. In the welfare area he uses program adoptions under the Social Security Act. The course of their adoption over time is displayed in Figure 8. There is a large initial enactment, and then adoptions drop off rapidly. Their diffusion pattern is radically different from that in any graph previously shown in this study. It seems, therefore, that diffusion patterns vary, even in Walker's own data, owing, apparently, to federal intervention.

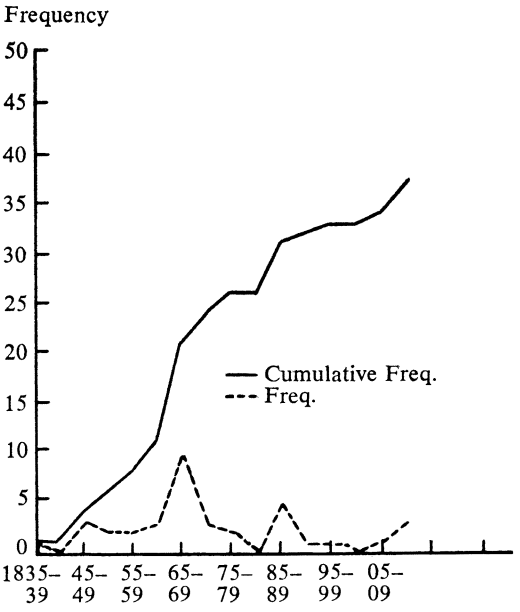

Figure 4. Adoption of chief state school officer legislation by state, 1835–1912

The hypothesis that federal involvement is a source of variation in adoption patterns is also

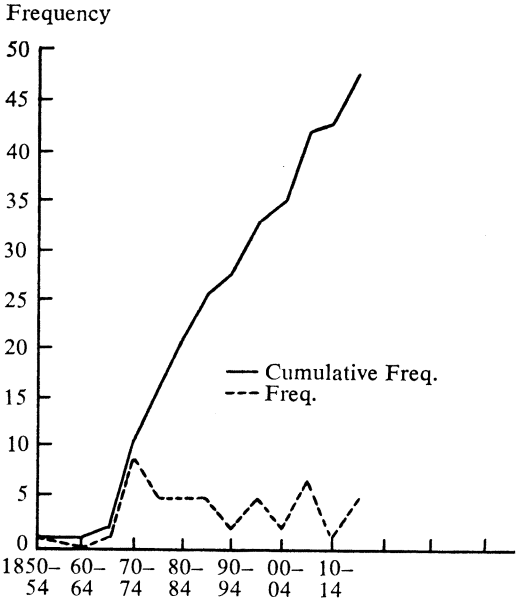

Figure 5. Adoption of compulsory school attendance legislation by state, 1850–1918

[27] Walker, "Diffusion of Innovations Among the States," pp. 882, n. 9, or Jack L. Walker, "Innovation in State Politics," in *Politics in the American States*, 2nd ed.; ed. Herbert Jacob and Kenneth N. Vines (Boston: Little, Brown and Co., 1971), p. 591, n. 9.

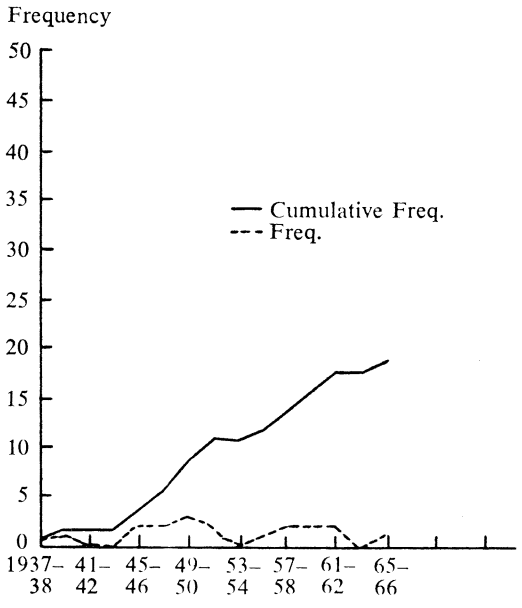

Figure 6. Adoption of fair housing legislation by state, 1937–1965

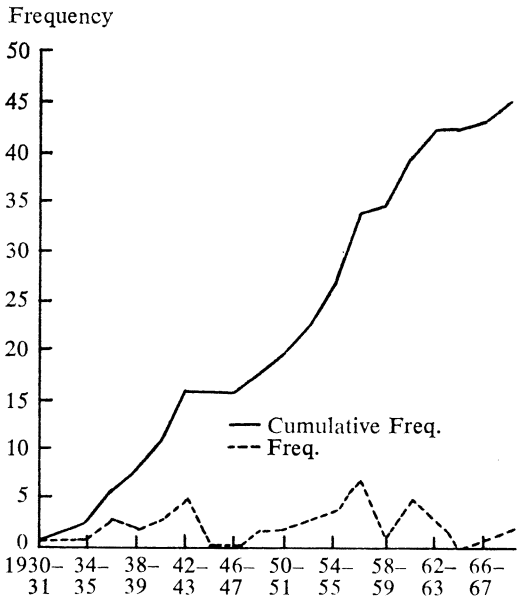

Figure 7. Adoption of degree requirement for teaching in elementary school by state, 1930–1969

borne out by the graph in Figure 9 for state merit systems covering welfare. Only nine states had such coverage before the Social Security Act was passed. After its passage 32 states decided to place their employees under a merit plan. Following the Social Security Board's successful fight to make merit plans a requirement, the remaining seven states followed suit. As a result, the pattern of spread for this innovation is somewhat different from that of other welfare policies. These results indicate the necessity for at least distinguishing between state and state-federal control in this dimension of policy and perhaps distinguishing among various types of federal aid to states.

Sources of Innovativeness

The second consideration of this study is the question: Why do some states adopt before others? Walker hypothesizes that demographic (socioeconomic) and political factors are among the more important preconditions for innovation just as they are for expenditures; hence, his prediction is that the wealthier and

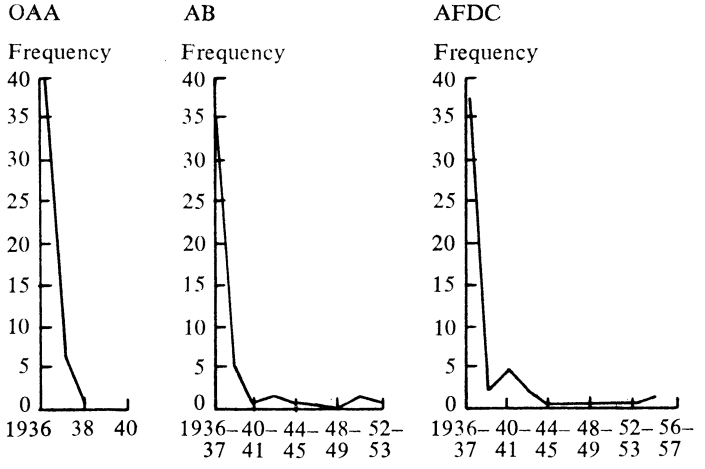

Figure 8. Adoption of Social Security programs by state, 1936–1955

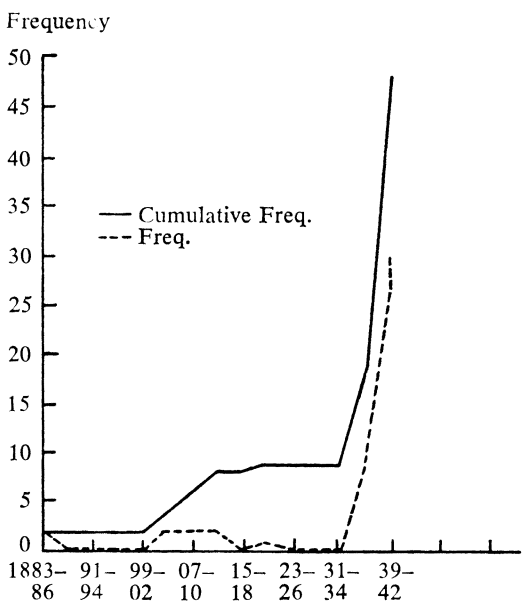

Figure 9. Adoption of welfare merit system legislation by state, 1883–1942

more competitive states ought to be more innovative. He found a strong positive correlation between average income and his innovation score in three time periods and little relationship between party competition and the composite innovation score for 95 years, when controlling for the demographic variable.[28]

The averaging of innovativeness, party competition, and income over nearly a hundred-year period may serve only to obscure whatever relationships exist between policy and the political system. This investigation of the reasons for innovation will be based on a less rigorous test of the above political and economic hypotheses. The question of interest is why a state adopts a law at a particular point in time. Part of the answer (to why states adopt at all) lies in user interaction, as demonstrated earlier in this article. User interaction, however, is not a full explanation because it cannot account for the first adoption. Political and economic explanations may be more relevant to the most and least innovative states (i.e., why the first is susceptible and why the last is most immune), while user interaction might better account for the order of the states falling in the middle range of innovativeness. Therefore, this part of the inquiry will focus on the political and economic differences between the first adopters and the rest of the states at the time of adoption. A similar kind of analysis could not be performed for the laggard states because for several laws, diffusion is not yet complete.

Analysis of First Adopters. One might predict that the most innovative states (defined as the first ten states to adopt any paricular law) would be above average in wealth and competitiveness in whatever year they adopted the law. The wealth measure used is per capita personal income which is available since 1922. The party competition measure is the governor's electoral margin in the most recent general election.[29] An appropriate test is to compare an early adopter's competition (or wealth) score in the year of adoption to the mean competition (or wealth) score for all 48 states in that particular year. The early adopter's score should be above the nationwide mean in each case.

There are 120 possible observations on which to make the test (12 laws times the top 10 states). Unfortunately, much of the pertinent data is missing from standard sources because the adoptions occurred very early for many of these laws. There are only sixteen observations for party competition. Of these, twelve (75 per cent) are in the predicted direction: competition is higher in innovative states. There are 40 observations for per capita personal income. Thirty-four (89 per cent) are in the predicted direction: innovative states are richer.

Thus, it appears that innovative states are both wealthier and more competitive than their sister states at the time of adoption of a particular law. This finding is consistent with the hypotheses derived from studies of state and local expenditures.[30] The small amount of data is not sufficient for testing the independence of the two variables. Also the available data were in the fields of education and civil rights only. The relationships discovered were more clear-cut for civil rights laws than for education laws. This finding, along with the fact that education laws diffused in a more regular pattern than civil rights, is evidence that education may be the least politicized of the three policy areas. The following section documents one case in which politics was particularly important.

The Case of Mothers' Aid Legislation. As noted earlier, the user interaction model failed to account for the unique diffusion pattern displayed by AFDC, or Mothers' Aid, as it was

[28] Walker, "Diffusion of Innovations Among American States," 884, 886.

[29] For more complete explanation of these measures and their data sources, see Gray, chap. 2.

[30] Richard E. Dawson and James A. Robinson, "Inter-Party Competition, Economic Variables and Welfare Policies in the American States," *Journal of Politics*, 25 (May, 1963), 265–289.

called at its inception. Also the distribution of adopters is unusual as was shown in Figure 3. For these reasons another explanation of the fact that eighteen states adopted such legislation in 1913, the second year of its diffusion should be sought.

The origin of the idea seems to have come from the "White House Conference on the Care of Dependent Children" called by President Theodore Roosevelt in 1909. The theme of that conference was that home care for dependent children is preferable to their being placed in institutions.[31] The innovation was opposed by social workers;[32] it was popular with legislators, however, because no increased taxes were anticipated.[33] Thus, the presidentially sponsored conference may have been indirectly responsible for the rapid dissemination of the information, though not for rapid adoption of the legislation.

Certainly the outstanding political feature of this era was the Progressive Movement, and it is reasonable to suppose that politicians of Progressive sympathies would support social welfare legislation. Dewitt, writing in 1915 on the Progressive Movement, said that the social phase of the movement was by far the most important at the state level and that Progressive reformers advocated mothers' pensions.[34] In fact, a history of Progressivism in Ohio gives credit for Ohio's mothers' pensions to James Cox, a Democratic governor with Progressive sympathies elected in 1912.[35]

In order to test for Progressive influence on the time of adoption, the states were divided into two groups: the eighteen states which adopted in 1913, and the 28 states which adopted later and for which data are available. For each group of states the mean percentage of Progressive party strength was computed, based on the elections for the governorship and the legislature immediately prior to 1913. This figure should underestimate the strength of Progressivism since politicians running on the regular party ticket also may have had Progressive sympathies.

[31] Fred S. Hall, ed., *Social Work Yearbook, 1929* (New York: Russell Sage Foundation, 1930), pp. 131, 274.

[32] James Leiby, *Charity and Correction in New Jersey* (New Brunswick: Rutgers University Press, 1967), p. 94.

[33] Ada J. Davis, "The Evolution of the Institution of Mothers' Pensions in the United States," *American Journal of Sociology*, 35 (January, 1930), 582.

[34] Benjamin Parke DeWitt, *The Progressive Movement* (New York: Macmillan Co., 1915), p. 253.

[35] Hoyt Landon Warner, *Progressivism in Ohio, 1897–1917* (Columbus: Ohio State University Press, 1964), p. 404.

The means for each group are displayed in Table 4. States which adopted mothers' aid legislation in 1913 averaged much greater Progressive strength than did states adopting later. Apparently, this is one case where politics played an important part in the timing of an innovation. In the following section the investigation focuses on patterns of innovation.

Patterns of Innovation. Throughout this study each innovation has been studied separately, in contrast to the method used by Walker. The previous sections have demonstrated the utility of disaggregation. Indeed, one might question the fundamental assumption of a "composite innovation score"—namely, that "innovativeness" exists as a single factor among states. Operationally, the question becomes "Do the states which are early to adopt one law also adopt other laws first as well?"

Table 5 shows how states rank in each of the three issue areas, and how they rank overall. The states were ranked from 1 (first) to 48 (last) on time of adoption of each law. Then a state average was computed for each issue area and overall. The overall ranking is similar to Walker's, partly because five of the laws included here were the same as his. There are some notable differences, however; Pennsylvania is 20th on this scale and 7th on Walker's; Nevada is 21st on this scale and 47th on Walker's; Louisiana ranks 19 on his scale and 36.5 here.

The interesting information that is concealed by a simple average ranking is the range for any one state. New York and California are the most innovative states; yet each has failed to adopt one of the laws in question. South Dakota is the most laggard state; nevertheless, it was among the first ten for one law. Thus, any study of policy innovation using averages

Table 4. Extent of Progressive Influence in States, According to Time of Adoption of Mothers' Aid Legislation

	Mean % Progressive Party Strength in Last Election Before 1913	
	Timing of Adoption	
Electoral Contest	1913 Adopters	Later Adopters
Governor	15.2%	6.5%
Lower House	7.0	.5
Upper House	6.0	1.2

Source: The World Almanac and Encyclopedia, 1914 (New York: Press Publishing Company, 1913), pp. 729–778.

across issue areas may conceal phenomena of great potential interest.

Table 5. Ranks of the States According to Order of Adoption of Laws, Averaged by Issue Area

State	Overall Average Rank	Average Education Rank	Average Welfare Rank	Average Civil Rights Rank
California	13.0	6.1	11.5	26.5
New York	13.0	19.2	12.5	3.3
Massachusetts	14.8	25.0	8.7	6.0
New Jersey	16.0	24.9	13.3	4.8
Wisconsin	16.2	27.7	5.0	12.3
Connecticut	16.2	16.4	24.3	5.1
Washington	16.4	18.0	17.7	11.8
Colorado	16.8	26.3	9.3	11.1
Michigan	16.8	16.0	20.3	13.6
Illinois	17.2	25.0	10.1	13.6
Ohio	17.2	25.7	10.3	15.6
Idaho	19.0	23.6	12.1	20.5
Oregon	19.0	20.9	23.7	9.6
New Hampshire	19.9	22.4	16.3	20.5
Maryland	20.0	15.5	15.7	33.5
Indiana	20.4	16.1	33.5	10.1
Kansas	21.4	14.2	29.5	22.6
Utah	21.5	17.6	22.2	40.3
Minnesota	22.1	39.1	11.3	8.1
Pennsylvania	22.9	27.1	25.5	12.6
Nevada	23.5	24.0	10.5	40.3
Wyoming	25.3	27.6	21.7	39.8
Montana	25.5	29.7	25.7	18.1
Rhode Island	25.5	28.1	35.7	7.8
Kentucky	25.7	21.3	23.8	35.6
Vermont	25.9	18.1	29.2	37.8
Missouri	26.6	21.7	28.3	32.6
Arizona	27.2	22.8	27.6	34.1
Iowa	27.5	30.0	16.8	37.8
Delaware	27.8	25.6	28.1	31.1
Nebraska	28.2	35.7	18.8	28.3
Maine	29.6	34.4	18.8	36.0
New Mexico	29.7	25.2	38.3	26.0
North Carolina	30.2	17.5	42.7	48.0
West Virginia	30.9	25.4	25.1	48.0
Louisiana	31.7	21.1	32.8	48.0
Texas	31.7	23.0	41.1	48.0
Tennessee	31.9	23.2	30.7	48.0
South Carolina	34.3	24.4	36.5	48.0
Arkansas	35.0	30.9	30.3	48.0
Florida	35.0	28.4	33.5	48.0
North Dakota	35.4	38.1	28.7	39.8
Virginia	36.0	25.5	40.2	48.0
Oklahoma	37.1	36.2	30.1	48.0
Alabama	37.1	28.2	35.3	48.0
Mississippi	37.4	32.0	36.3	48.0
Georgia	37.7	31.0	38.5	48.0
South Dakota	38.4	37.9	32.0	48.0

Spearman rank-order correlations can be utilized to answer more directly the question of the stability of "innovativeness." If there exists a stable factor of "innovativeness," then states ranking high (or low) on a scale of time of adopting any one law ought to rank high (or low) on a time of adoption scale for another law. Certainly, within an issue area this principle ought to hold; i.e., the correlation between one education ranking scale and another education ranking scale should be positive. States were ranked from 1 (first) to 48 (last) on each of the twelve laws according to time of adoption.

Table 6 presents the correlation of the rank on one innovation scale with the rank on every other innovation scale. In general, the strength of the correlations is very low. Only eleven of 66 (⅙) are .50 or above; sixteen (about 25 per cent) are negative. About half of the stronger correlations are between laws which diffused during roughly the same time period. One might infer that some states are innovative at one point in time, but they are not necessarily innovative at another point in time; hence, "innovativeness" should not be aggregated over long time periods.

If "innovativeness" does not occur as a general timeless phenomenon, perhaps it is issue-specific, i.e., the same states might be innovative in all phases of education but not innovative on other issues. Table 7 shows that only for the issue of civil rights does the phenomenon of "innovativeness" truly appear to exist: the average of states' rank intercorrelations on civil rights laws is .67. States which are leaders (or laggards) in adopting one civil rights law are leaders (or laggards) on other civil rights laws. This finding, juxtaposed with those earlier concerning the civil rights distribution's stronger association with wealth and competition, is further evidence that civil rights laws are more politicized than are the laws in the other two policy areas.

Contrast this with the situation in the education field where not only is the adoption of education laws unrelated to adoption of laws in welfare and civil rights, but adoption of one education law is only slightly related to adoption of another education law; the average rank correlation among education laws is .17. Probably the length of time is one explanation, e.g., adoptions of one education law extend over the period 1784–1969. Also the five education laws are probably more diverse in substance than the set of three civil rights laws which evoke more powerful public reactions.

Another reason for the high intercorrelation among civil rights laws is that they diffused later in a shorter time period; many states have not yet adopted them. Technically, this means that there are a larger number of ties on the civil rights rankings; therefore, a correction was made for ties which has the effect generally of reducing the strength of the correlation, though the magnitude of the reduction was slight for these three laws.[36] At any rate, the civil rights rankings reported here are corrected for ties

[36] Sidney Siegel, *Nonparametric Statistics for the Behavioral Sciences* (New York: McGraw-Hill Book Co., 1956), p. 210.

Table 6. Spearman Rank-Order Correlations (rho) For 12 Innovation Rankings

	Education				Welfare				Civil Rights		
Laws	Chief School Officer	Compulsory Attendance	Degree for Elem. School	Degree for High School	OA	AB	AFDC	Merit System	Public Accommodations	FEPC	Fair Housing
State School Boards	.07	.06	.27	.18	−.06	.12	−.22	−.04	−.09	.20	.08
Chief School Officer		−.29	−.16	−.05	.01	.03	−.03	−.16	−.28	−.13	.00
Compulsory Attendence			−.08	.75	.43	.36	.55	.38	.60	.50	.53
Degree for Elem. School				.42	−.11	−.17	−.11	.12	−.08	.30	.27
Degree for High School					.02	.09	.01	.20	.07	.21	.10
OA						.38	.52	.37	.36	.38	.48
AB							.50	.37	.46	.39	.37
AFDC								.37	.37	.46	.55
Merit System									.45	.49	.48
Public Accommodations										.65	.65
FEPC											.71

and are still much different from all other uncorrected rankings.

Welfare occupies an intermediate position in respect to intercorrelation. There is a moderate amount of underlying stability within the welfare dimension but slightly more relationship between the welfare and civil rights areas than within welfare itself.

Table 7. Spearman Rank-Order Correlations for Date of Adoption, Averaged by Issue Area

	Education	Welfare	Civil Rights
Education	.17	.07	.15
Welfare		.41	.44
Civil Rights			.67

Summary

Innovations (adoption of laws by states) were studied in three "have-not" oriented policy areas: education, welfare, and civil rights. A model of the diffusion process based on user interaction was constructed; it performed fairly well under evaluation by several common criteria. Graphical analysis showed, however, that diffusion patterns do differ by issue area and by degree of federal involvement.

Political and economic explanations proved to be useful in determining which states are the first to adopt laws. A brief case history of the adoption of Mothers' Aid legislation pointed up the strong effect of Progressive sympathies on early adopters. Finally, it was shown that "innovativeness" is not a pervasive factor; rather, it is issue-and time-specific at best.